

CHRONIC RESPIRATORY
DISEASE IN COAL MINERS

Follow-Up Study of Two Mining
Communities in West Virginia

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ABSTRACT

Coal miners have generally been found to have an excess of respiratory disease compared with other men. Occupational mortality statistics point clearly to such an excess, and surveys comparing the prevalence of respiratory symptoms and average ventilatory lung function in miners and ex-miners with those of non-miners of similar age and living in similar circumstances have provided support. In 1963-4, the U.S.P.H.S. conducted surveys of respiratory disease in two mining towns, Mullens and Richwood, in Southern and Central West Virginia. The populations were defined by private census and household information including occupation was obtained from all persons aged 21 years and over. Matched groups of miners and non-miners were selected from each town and invited, with their wives, to participate in a medical examination. The prevalence of respiratory symptoms and mean ventilatory lung function in miners, non-miners, and their respective wives were compared. In Mullens, a higher prevalence of persistent cough, wheezing in the chest, breathlessness and past pneumonia and pleurisy was reported by the miners than by the non-miners. Their wives also reported a higher prevalence of persistent cough, persistent phlegm, wheezing, breathlessness and past pneumonia than the wives of non-miners. The mean age-adjusted FEV₁ was significantly lower in miners than in non-miners, but there was no difference between the mean FEV₁ of the wives of the two occupational groups. In Richwood, miners reported a higher prevalence of wheezing, breathlessness, and past pneumonia than non-miners, but their mean FEV's did not differ significantly. Miners' wives in Richwood reported insignificantly more cough, phlegm, breathlessness and past pneumonia than non-miners' wives. The mean FEV₁ values of the two groups of wives did not differ significantly.

Follow-up of these two communities after approximately nine years has been carried out. In each town, in addition to the follow-up, a new census was taken and an attempt was made to examine all men and women aged 20 to 74 years in each town. The examination, which was carried out in two trailers, included a British Medical Research Council respiratory symptoms questionnaire, occupational history, measurement of ventilatory lung function, and postero-anterior and lateral chest radiographs. Persons who refused to come to the center were visited in their homes where as much of the examination as possible was completed.

Mortality from all causes was slightly higher in miners and ex-miners than in non-miners. Standardized mortality ratios (SMR's) using deaths for the State

of West Virginia around the 1970 census (1969 to 1971) as a basis for calculating expected deaths were computed for all causes and for certain broad disease specific categories. In each town, the SMR's for non-miners were slightly above those expected for West Virginia; those for miners and ex-miners were more appreciably raised and in Mullens the ratio is on the borderline of significance at the 5 percent level. In both towns, high ratios were found among miners and ex-miners for non-malignant respiratory diseases and low rates for cancer of the respiratory system. Mortality from all causes was also higher in smokers than in non-smokers. Among those examined on the two occasions, there was a greater decline in FEV_1 among miners and ex-miners than among non-miners. In the non-miners in both Mullens and Richwood, there was also a greater decline in FEV_1 among cigarette smokers than among non-smokers. But among the miners and ex-miners in each town there was a greater decline among non-smokers than smokers. This is partly accounted for by exceptionally large declines in a few men. The number of men in the samples with radiographic changes was too few to draw any firm conclusions about the effect of pneumoconiosis on mortality.

In new cross sectional comparison, a higher prevalence of respiratory symptoms and a lower mean FEV_1 were found in miners and ex-miners compared with non-miners. The effect of cigarette smoking on the FEV_1 was clearly seen in each community in both non-miners and miners and ex-miners. Independent effects of both mining and smoking therefore appeared to be clearly operating. There was some tendency for respiratory symptom prevalence to increase and lung function to decline with increasing years spent working underground or at the coal face. Radiographic changes of pneumoconiosis were detected in 23 percent of the miners and ex-miners in Mullens and in 11 percent of those in Richwood. Progressive Massive Fibrosis (PMF) mostly of early degree was recorded in 5 percent of the miners in Mullens and in 2 percent of those in Richwood. The mean FEV_1 values of those with PMF aged 55 years and over were appreciably below the rest of the men in their respective age groups; but under 55 years the FEV_1 values of those with PMF and the rest of the group were very similar.

A higher prevalence of respiratory symptoms and a lower mean FEV_1 was found in those with less education. These differences with educational status cannot, however, account for the higher prevalence of symptoms and lower lung function among miners. Nor do they appear to be completely explained by the association between educational attainment and smoking.

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INTRODUCTION

1. BACKGROUND TO THE STUDY

Occupational exposure to coal dust has long been believed to be an important factor in the pathogenesis of chronic respiratory disease. National mortality statistics in both the United States and United Kingdom support this view. Mine operatives and laborers in the United States have exceptionally high rates for diseases of the respiratory system (Table 1). This is due largely to the inclusion of deaths attributed to pneumoconiosis. But even when deaths attributed to this cause are excluded, miners' death rates for respiratory diseases are appreciably higher than those of other workers (Enterline, 1964). During the past 2 decades the inaccuracies inherent in mortality statistics and their limitations have been increasingly recognized (Heasman, et al., 1958). In fact no attempt has been made in the U.S. to assess occupational mortality on a national basis since 1950 because the discrepancies between occupations as reported at the census and that reported at death were thought to be too great to merit study of this kind. Studies of more limited groups have, however, generally confirmed the higher mortality rates from respiratory disease among coal miners. Thus, Enterline (1972) noted that data from the Society of Actuaries indicated high standardized mortality ratios among coal miners especially for respiratory diseases and accidents. A recent study of death rates of coal miners covered by the United Mine Workers of America (UMWA) Health and Retirement Fund (Rockette, 1976, in press) indicated increased SMR's from respiratory diseases, notably emphysema, asthma and tuberculosis. In this study, unlike that of Enterline, mortality from all causes was close to that expected on the basis of the U.S. male population. Respiratory disease mortality has been found to be more closely related to ventilatory lung function and to smoking habits than to pneumoconiosis (Higgins, 1970; Ortmeier, et al., 1973 and 1974). Only the more advanced stages of progressive massive fibrosis (PMF) have been found to be associated with an increased respiratory disease mortality (Cochrane 1973).

Information on morbidity has been available in Britain since 1948 through the Ministry of Pensions and National Insurance. Coal miners have rates of sickness absence for bronchitis which are between two and three times the average for the whole working population (Table 2). High morbidity rates for respiratory disease have also been reported in other coal mining regions in Europe (Carstens, et al., 1958; Worth, et al., 1959; Vyskocil, 1964). The high rates in British coal miners were observed in a special study of a random sample of working men and women conducted by the Ministry of Pensions in 1961-1962. These findings were confirmed by Liddell (1973) who noted that incapacity was highest in the lowest paid workers, that it varied between different coal fields, increased with increasing financial obligations, category of pneumoconiosis and depth of mine, but was independent of mechanization.

Special surveys have supported the view that coal miners have an increased prevalence of chronic respiratory diseases compared with other workers. For example, Pemberton (1956) found a higher prevalence of chronic bronchitis, emphysema, and bronchial spasm in Pennsylvanian bituminous coal miners than in other industrial workers. In a sample drawn from Union records, Hyatt and his colleagues (1964) found a much higher prevalence of respiratory symptoms in miners than in non-miners in West Virginia. Higgins and his colleagues (1956, 1959, 1961, 1962) carried out a series of studies in coal-mining areas in England and Wales. In each area representative samples of miners and ex-miners were compared with men of the same age who had never worked in mining. A consistently higher prevalence of respiratory symptoms and lower average ventilatory lung function was found in the mining groups.

2. INITIAL STUDIES

Public Health Service in Mullens and Richwood

Similar community comparisons have been carried out in this country. Enterline and Lainhart (1967) and Lainhart, et al. (1969) reported on surveys carried out in Mullens and Richwood, West Virginia. In each of the two communities a census of all persons living in the area combined with extensive household interviews was carried out under contract with the Opinion Research Corporation in Princeton, N.J. In every household with a resident male of 21 years and over, all persons aged 21 and over were interviewed. Basic demographic data, smoking and occupational histories and health information on selected diseases, injuries and impairments, hospitalizations and medical care were obtained. On the basis of information collected in these interviews, matched groups of miners and non-miners aged 21 to 64 years were randomly selected from each community. The men and their wives were invited to participate in a medical examination. In Mullens the matching was based on age, length of residence in West Virginia, and length of time in usual occupation (coal mining or other industry). In Richwood in addition to these characteristics, matching was also based on educational level since the study in Mullens had shown this to be significantly related to respiratory disease. The sample in each town comprised 225 miners and 224 non-miners and their wives (191 miners and 185 non-miners in Mullens and 196 and 158 respectively in Richwood). A higher prevalence of persistent cough, wheezing in the chest, breathlessness and past pneumonia and pleurisy were reported by the miners than by the non-miners in Mullens. Their wives also reported a higher prevalence of persistent cough, persistent phlegm, wheezing, breathlessness and past pneumonia than the wives of non-miners. The mean age adjusted FEV_1 was significantly lower in miners than non-miners in Mullens; but there was no difference in the mean FEV_1 of the wives of the two occupation groups. In Richwood, miners reported a higher prevalence of wheezing, breathlessness, past pneumonia and pleurisy than non-miners but their mean FEV_1 's did not differ significantly. Miners' wives in Richwood reported a higher prevalence of persistent cough, persistent phlegm, breathlessness and past pneumonia than wives of non-miners but these differences did not attain statistical significance. Nor did the mean FEV_1 's of miners' and non-miners' wives in Richwood differ significantly.

Study of Marion County Communities

Higgins and his colleagues (1968) studied mining communities in Marion County, Northern West Virginia. During 1964 through 1966 the total population of five small towns was defined by a private census. Information about health and illness was obtained by home interviews on all adults (persons aged 20 years and over) who lived in the five towns. All men aged 20-69 who lived in three of the five towns were examined and special tests, including spirometry and chest radiography, were carried out. A small sample of women was also examined. Respiratory symptoms, smoking habits, and present and past respiratory diseases were recorded using a questionnaire comparable to that recommended by the British Medical Research Council (1960). Ventilatory lung function was assessed by one second forced expiratory volume ($FEV_{1.0}$) and forced vital capacity (FVC). The prevalence of respiratory symptoms was not appreciably higher in miners and ex-miners than in non-miners, except in the oldest age group of men (aged 60-69). In this age group miners had a higher prevalence of cough, breathlessness and chest illness during the past three years. A significantly lower average $FEV_{1.0}$ was also noted among miners and ex-miners than among non-miners in this age group. In line with previous findings, a higher prevalence of symptoms, particularly of cough and sputum, was found in smokers compared with non-smokers. Significantly lower mean $FEV_{1.0}$ values were found for cigarette smokers compared with non-smokers at ages 50 years and over.

Follow-up of the persons who were surveyed in these studies seemed important for several reasons: The mortality of coal miners could be compared with that of other men living in the same neighborhood; the relationships of respiratory symptoms and lung function, of radiographic category of pneumoconiosis, dust exposure and smoking habits to mortality could be established; changes in the prevalence of respiratory symptoms and ventilatory lung function over time and the relationship of such changes as to age, sex, occupation, dust exposure and smoking habits could be studied; and comparison could be made with the findings of similar studies conducted in this country and in Britain (Higgins and Oldham, 1962; Higgins et al., 1967).

3. PRELIMINARY FOLLOW-UP IN MARION COUNTY

In 1969 and 1970, supported by a grant from the Michigan Lung Association, we reviewed three of the communities in Marion County. All households which had been enumerated at the original survey in 1964-65 were re-visited by the home visitor who had conducted most of the original interviews. Information was obtained about every member of the household who had been 20 years or over at the original survey. Inquiry was made as to whether each member was living or dead and, if dead, the date and place of death. If living, the current address, if known, was noted. A short questionnaire was completed whenever possible for each surviving household member on admission to hospital, attendance at hospital or clinic as an out-patient, or attendance by a physician during the past five years. The emphasis was on cardiovascular and respiratory illnesses. In addition, questions were asked about respiratory

symptoms (cough, sputum, wheezing, breathlessness and chest illness during the past three years), present smoking habits or age at giving up smoking, and occupation during the past five years.

In most cases each person listed in the household list was interviewed. It was only rarely necessary to accept information by proxy interview. Persons who had moved out of the area but who still resided within a reasonable distance were visited and questionnaires were completed for them. Confirmation and cause of death were obtained by checking the records of the Marion County Health Department. Some information was obtained about persons who left the area and subsequently died; but no systematic attempt to obtain information on all who left the area to find out who has died outside Marion County was possible because of limitation of funds.

The main finding from this preliminary study was that there was little difference in the mortality rates from all causes between the mining and non-mining groups in the population which had been examined in 1964-66. This was in line with our findings on prevalence of respiratory symptoms and lung function at the time of the initial survey--only in the oldest age group (men aged 60 to 69 years) had we found a higher prevalence of symptoms and a significantly lower ventilatory lung function in miners and ex-miners compared with non-miners. The preliminary study was also in agreement with the findings in a 9-year follow-up on a representative sample of the population of Staveley, Derbyshire, in England (Higgins et al., 1968). But it was at variance with expectations based on the national occupational statistics quoted earlier. The present study was carried out to investigate the health and mortality of miners further.

4. PLANS FOR THE PRESENT STUDY AND THEIR MODIFICATION

The original intention was to complete the follow-up of mortality and morbidity in all of the five Marion County communities which had been studied in 1964-66, and to conduct a similar follow-up in Mullens and Richwood. This was to be succeeded by redefinition by private census of each of the communities, examinations of all adults living in the communities, and examinations whenever possible of all persons who had been studied previously but who had left the communities. Thus the study was to combine a full scale follow-up with a new cross sectional investigation in each of the three areas. For a variety of reasons these plans had to be modified. It became obvious, for example, that the home interviewing which was needed to establish mortality should be combined with that required to redefine the population in the area. Once the population was defined, examinations should be carried out without delay to avoid the problems arising from the very high mobility of persons living in West Virginia. Consequently, we realized that each community should be tackled in turn. This report describes the studies in Mullens and Richwood. Comparable studies in Marion County have not yet been done. Mullens was studied in 1972-73, 8 years and 10 months after the original survey. Richwood was studied in 1973-74, 9 years and 3 months after the original survey.

THE NEW CENSUSES, HOME INTERVIEWS AND FOLLOW-UP

From January to October 1972, follow-up of all persons who were living in Mullens in 1963 was carried out. This was combined with a new census of the persons living in the town in 1972. Note was made of the date and place of death and probable cause of deaths of anyone who had died. The last known address of each person who had left the area was recorded. Health information was collected from all persons aged 20 years and over using a questionnaire. Questions were asked about hospital attendances and admissions and physician visits for heart and respiratory diseases during the follow-up period. More detailed questions were asked about respiratory and cardiac symptoms. Note was made of any therapy during the year preceding interview and smoking habits and occupational category, whether miner, ex-miner or non-miner, were recorded. Any man who had worked for 6 months or more in mining was categorized as a miner. If he had worked for 6 months but was no longer working in mining he was categorized as an ex-miner. In Mullens a considerable proportion of men were railroad workers. In Richwood a considerable proportion were engaged in lumbering. From December 1972 to December 1973, examinations of all men and women aged 20 to 74 years living in Mullens were carried out. Each person was invited to attend a center. Appointments were made and reminders were issued on the day of, or day before, the appointment. Those who could not or would not come to the center were visited in their homes. During 1973, while the examinations were proceeding in Mullens, a follow-up of the 1964 population of Richwood, a new census and home interviews of all persons aged 20 years and over living in that community were carried out. Examinations similar to those in Mullens were carried out in Richwood during 1974.

EXAMINATIONS

1. IN THE TRAILER

The examinations were conducted in two trailers, one designed for radiographic examinations, the other for clinical examinations, lung function and other tests. The examinations were essentially similar in each town. They included:

1) A questionnaire of respiratory symptoms, chest illnesses, cardiac pain, and leg pain; smoking habits; and occupational history.

2) A brief clinical examination of the chest and measurement of the blood pressure.

3) Measurement of the one second forced expiratory volume FEV_1 and forced vital capacity (FVC) using a Stead-Wells spirometer. Recording of flow-volume loops, using the apparatus devised by Dr. Arend Bouhuys at Yale. Measurement of height, weight, and skinfold thickness over the triceps.

4) Postero-anterior and lateral chest radiography. Total lung capacity (TLC) has been determined by the method of Barnard and others, (1960). Subtraction from the TLC of the FVC provides an estimate of the residual volume. Assessment of residual volume was included because this has been shown to be increased in working coal miners with simple pneumoconiosis in the absence of large airway obstruction (Morgan, et al., 1971, 1972). All the measurements were made by one observer who was trained at ALOSH.

5) In Richwood, measurement of the volume of sputum brought up during the first hour after rising was measured and assessment of its quality was made macroscopically. This proved impossible in the early stage of the survey in Mullens because of personnel problems.

The forms used at the censuses, the home interview follow-up questionnaires, the examination questionnaires and the forms used for recording the results of the examination, ventilatory capacity and the chest radiographic category are shown in Appendix A.

2. IN THE HOME

All persons who refused to attend at the trailers were visited in their homes where every effort was made to obtain as much of the basic information as possible. Most people could be persuaded to answer the examination questionnaire and give an occupational history. Many also performed adequate spirometry on a portable spirometer and had their standing height measured. A few subsequently attended for chest radiography.

During the early part of the survey a McDermott dry spirometer was used. Towards the end of 1973 the portable Stead-Wells spirometer became available and this instrument was used for home interviews from about October 1973 to the end of the survey in Mullens and for all the home interviews in Richwood.

The chest radiographs were read for clinical purposes during the course of the survey. Any significant abnormality was reported promptly to the subject's personal physician. After the survey was completed, all the films were re-read systematically. They were classified for pneumoconiosis according to the International Labor Office classification (I.L.O. 1971). Initially analysis of pneumoconiosis was based on the readings of a single reader (ITTH). Subsequently the films were re-read by three additional readers experienced in the classification. The results of analysis of all four readers are given in Appendix B.

PROCESSING THE DATA

The results were checked for logical consistency and gross errors. They were then coded usually onto separate sheets, punched and put onto magnetic tape. Some punching was done directly from the original sheets, for example, the second radiographic readings were coded directly onto the ALOSH reading sheets. Death certificates were sent to Lansing, where they were coded by the State nosologists at the Michigan Department of State. Until January 1975 an IBM 360/67 computer was used. For a short time afterwards an IBM 370 was used. In August 1975 an Amdahl 470 V/6 was employed.

RESPONSE RATES

1. IN THE TOTAL ADULT POPULATION

Tables 3 to 6 show the status of the follow-up in the population of Mullens according to sex, age and occupation at the cut-off date, July 31, 1972. Tables 7 to 10 show the same information for Richwood to January 31, 1974. The duration of the follow-up examinations was 8 years and 10 months in Mullens and 9 years and 3 months in Richwood. The overall emigration rates were similar for the two towns: 28 percent of the population had left Mullens and 27 percent had left Richwood. In both towns emigration rates were higher among miners and ex-miners than among non-miners: 39 percent compared with 22 percent in Mullens and 34 percent compared with 27 percent in Richwood. Information was not obtained for 2 percent of the original population of Mullens and 4.6 percent of that of Richwood.

2. IN THE SAMPLES EXAMINED

Tables 11 to 18 show the status of the non-miners, miners, non-miners' wives and miners' wives in the matched sample originally studied by Enterline and Lainhart. The tables for Mullens (11 to 14) and Richwood (15 to 18) show some differences between the outcomes in the samples and the total population. In Mullens a higher proportion of non-miners aged 55-64 in the sample died than in the corresponding age group in the general population. Conversely a lower proportion of miners and ex-miners in this age group in the sample died. The samples in Richwood reflect the total population more closely.

The numbers of persons in each town who were identified by the censuses, their distribution by age, sex and occupational category and their response to the home interviews are shown in Tables 19 to 26. In each town a small number of people moved during the course of the census. They are reported as moved since they were not living in Mullens on July 31, 1972 or Richwood on January 31, 1974, the days to which the conduct of each census was arbitrarily assigned. In Richwood 35 men were not categorized by occupation at the time of the Census. The reasons for this are shown in the footnote to Table 26.

3. RESPONSE TO THE EXAMINATIONS

Tables 27 to 32 show response rates to the examinations by type of examination in Mullens. Again the information is presented for men, for women and for non-miners and miners and ex-miners by age. Tables 29 and 30 give the occupational categories as defined on the basis of census information. Not unexpectedly, when more detailed occupational histories were taken at the examination, discrepancies were encountered. Tables 31 and 32, therefore, give the response rates on the basis of the occupational categories as established at the examination. Tables 33 to 39 show the identical information for Richwood.

4. REFUSALS

In both areas a large number of people refused to attend the center despite persistent attempts at persuading them to do so. Many were seen at home where a questionnaire was completed. Often spirometry was also performed. Furthermore, since questionnaires were completed for over 95 percent of all persons in Mullens and for 90 percent of those in Richwood, an estimate can be made of the comparability of those who attended the trailer and those who did not. It seems legitimate to combine the questionnaire results for the trailer and the home visits. There are, however, problems with combining the lung function results. Portable spirometers were used in the home. These differed from the spirometer used in the trailer in their operating characteristics (see Appendix B). More importantly, however, no temperature correction was made in the home. Since the temperature during the summer months was often high, this could have introduced a serious bias into the home visits. It seems desirable not to combine the lung function results. In the main body of this report the lung function of those who attended the trailer will be used. The values for measurements made in the home are given in Appendix C.

RESULTS

1. FOLLOW-UP

Mortality According to Age, Sex and Occupation

Overall mortality in each town was similar (Table 40). In Mullens, 15.2 percent of men and 8.5 percent of women aged 21 and over are known to have died during the follow-up period. The corresponding figures for Richwood were 18 percent and 11.8 percent. The duration of the follow-up period was slightly longer in Richwood than in Mullens (9.25 compared with 8.83 years). The mean annual death rates (percent) are also shown for each sex and town in the table. Mortality from all causes was fractionally higher among miners and ex-miners than among non-miners in each town (Table 41). In Mullens, 15.3 percent of non-miners and 15.1 percent of miners and ex-miners died, and in Richwood the corresponding figures were 19.7 percent among the non-miners and 14.8 percent among the miners and ex-miners. Age-adjusted to the total male populations, the overall mortality in Mullens was 14.5 percent for non-miners compared with 17.2 percent for miners and ex-miners; the corresponding figures in Richwood were 17.5 percent and 19.1 percent.

The numbers in the original populations were small. Only a broad breakdown by disease categories is possible. Tables 42 and 43 show the distribution of deaths by cause for the two occupational groups in each town. In Mullens, death certificates have been obtained for 86 percent of those who died. In Richwood, they have been obtained for 84 percent. The proportional mortality rates of all those who had died and for those who died for whom certificates are available are shown in the tables. The proportional mortality rates are much as one would expect: high rates for accidents and non-malignant respiratory diseases among miners and ex-miners but low rates for lung cancer.

Standardized mortality ratios have also been computed for each occupational group. Expected deaths were calculated using the average annual age-specific death rates for the years 1969 to 1971 for the State of West Virginia. These rates were applied to the number of men in each age and occupation category for each town. The number of deaths observed, divided by the number of deaths expected for men aged 25 to 74 during the whole follow-up has been expressed as a percentage in the usual way (Table 44). In each town the SMR for all causes of death among the non-miners was slightly above that expected for the State of West Virginia. An SMR of 111 as recorded in Mullens or of 117 in Richwood might well have occurred by chance ($p < 0.05$). In each town the SMR for all causes among the miners and ex-miners was more substantially raised. An SMR of 128 as observed in Richwood is not significantly different from 100. But one of 135 as observed in Mullens approaches significance at the 5 percent level. If the two areas are combined (Table 45) the resulting SMR of 132 for all causes among miners and ex-miners is statistically significant at the 5 percent level. In both towns, SMR's were high for non-malignant respiratory disease. All causes of death from respiratory diseases and not merely

chronic obstructive lung disease are included because of the small numbers. Conversely there was some slight deficiency of deaths attributed to lung cancer.

It is important to note that little information is available on mortality among those men who left West Virginia. A few of those men who moved out of the State are known to have died but no systematic study has yet been made among the migrants. It is possible that among migrants, mortality may have differed between miners and non-miners. Migrant miners were in fact somewhat older than migrant non-miners. In Mullens, the mean age of non-miners who left the area was 40.0 years compared with 43.1 years for the miners and ex-miners. In Richwood, corresponding figures were 39.7 for the non-miners and 40.2 years for the miners and ex-miners. Apart from this relatively small age difference, which in any case will be allowed for in the analysis, there is no reason to expect a substantial difference in mortality between migrant and non-migrant groups. It is, however, important that those who moved should be followed up. A start on this has been made.

Mortality According to Smoking Habits

Information on respiratory symptoms and smoking habits was collected by the Opinion Research Corporation at the time of the initial census. Mortality in relation to smoking habits as defined by the O.R.C., is shown for men, women, non-miners, and miners and ex-miners in Mullens and Richwood respectively in Tables 46 to 53. In each town, the age specific mortality rates in men and women in most 10-year age groups under 65 is higher among cigarette smokers and ex-smokers than among non-smokers. This association between cigarette smoking and mortality is inconsistent among miners and ex-miners in Mullens, and is not seen at all among the miners and ex-miners in Richwood.

Mortality according to smoking habits in the samples of men and their wives examined by Lainhart and Enterline are shown in Tables 54 to 61 for each area. Among the men, in spite of small numbers, age specific death rates were fairly consistently higher among cigarette smokers than among non-smokers. Among the women there were too few deaths for any useful conclusions.

Mortality According to X-ray Category of Pneumoconiosis

Mortality according to radiographic category of pneumoconiosis as originally presented by Enterline and Lainhart is shown in Tables 62 and 63. The numbers are too few for firm conclusions, particularly in view of the fact that between 40 percent and 50 percent of those men with pneumoconiosis moved out of the area and have yet to be followed up. Even if the two areas are combined, there are only 36 men with pneumoconiosis. Mortality among these 36 did not differ from that observed in the rest of the sample.

Prevalence of Symptoms and Level of Lung Function in Those Who Were Re-examined

The prevalence of certain symptoms (cough, sputum, breathlessness and wheezing) in the chest was measured at the time of the initial survey and again at the time of the follow-up approximately 9 years later. Unfortunately, the questions asked and their precise wording differed on the two occasions. Consequently, the comparability of the prevalence established on the two occasions is open to question. The symptoms which are most likely to be comparable are shown in the tables. The prevalence on each occasion is based on those who were seen on both occasions. In these circumstances, it is justifiable to ignore age and consider the changes for the whole group. In any case, the numbers are too few to permit an adequate breakdown by ten year ages. Tables 64 to 66 compare the prevalence of symptoms in men and women, non-miners and miners and ex-miners, and broad smoking categories for Mullens. Tables 67 to 69 present the same information for Richwood. In both areas, the prevalence of persistent cough and sputum and wheeze most days was higher at the time of the follow-up for both men and women. The increase was modest for women but much larger for men. Among the men, the increase was much larger among the miners than the non-miners. The smoking tables suggest that most of the increase in symptom prevalence occurred among miners and cigarette smokers.

The mean FEV_1 values by age, occupation and smoking of these men seen in the original surveys who were seen again in our follow-up study are shown in Table 70 for Mullens and Table 71 for Richwood. The decline in FEV_1 during the 9-year follow-up period appears to have been greater in Richwood than in Mullens. In Mullens, in men under 35 years there was in fact a slight increase in values which was more marked among non-miners. In Richwood, the FEV_1 declined at all ages. In both areas the decline was greater in miners and ex-miners than in non-miners. Among non-miners, the decline was greater in cigarette smokers than in non-smokers; but among miners and ex-miners the decline was as great or even greater among non-smokers as among cigarette smokers.

2. THE NEW CROSS-SECTIONS

Presentation of the findings.

The results for each town are presented in a systematic manner in Appendix C. Only the more significant findings are presented in the text. The appendix tables show the prevalence of respiratory symptoms and mean anthropometric and ventilatory capacity measurements (FEV_1 and FVC) for:

- (1) Men
- (2) Women
- (3) Non-miners
- (4) Miners and ex-miners

- (5) Miners (separately)
- (6) Ex-miners (separately)
- (7) Non-dusty workers (Mullens only)
- (8) Railroad workers (Mullens only)
- (9) The same groups (1-8) broken down by smoking habits, first for those seen at the trailer, then for those with home visits which included spirometry, and finally those for home visits without spirometry.

Additional tables in Appendix C present information on the prevalence of symptoms and mean lung function values in relation to number of years spent in mining, number of years spent working underground, and number of years spent working on the coal face.

Prevalence of Symptoms by Age, Occupation and Smoking

Table 72 shows the percentage prevalence of the main respiratory symptoms by age and occupation in Mullens. Table 73 shows the numbers of men in the two occupational groups according to age and smoking categories. Table 74 shows the percentage prevalence of symptoms by age, occupation and smoking categories. Table 75 shows mean FEV_1 values for the same categories. The means are those for the third, fourth and fifth blows. The numbers differ slightly in some of the categories because not all men in the study group performed five blows on the Stead-Wells spirometer. Tables 76 to 79 show precisely comparable data for Richwood.

The prevalence of symptoms tended to increase with age, in non-miners to about 50 years, and in miners and ex-miners to about 60. The prevalence of all sputum and breathlessness were also much more prevalent among cigarette smokers than among non-smokers. Wheezing and chest illness during the past three years were usually somewhat more prevalent among smokers than non-smokeokers but the results were not entirely consistent. Among non-miners, most symptoms were more prevalent among cigarette smokers than among other smokers or ex-smokers. But among miners and ex-miners, other smokers tended to have a higher prevalence of symptoms than cigarette smokers.

The mean FEV_1 was lower in miners and ex-miners than in non-miners for all ages over 25 years. Under 45 years there was little difference between the mean FEV_1 of the two occupational groups among non-smokers. Over 55 years there was no difference among cigarette smokers, though ex-smokers and ex-miners had considerably lower mean FEV_1 values than non-miners.

In Richwood, the higher prevalence of symptoms with mining and smoking was again seen. But miners who were cigarette smokers usually recorded a higher prevalence of symptoms than other smokers. The mean FEV_1 was consistently lower in miners and ex-miners than in non-miners; and in cigarette smokers than in non-smokers. Ex-smokers and other smokers under 55 years tended to

have higher FEV₁ values than non-smokers.

Figures 1 and 2 illustrate these FEV₁ values for the two occupational categories. Figures 3 and 4 show the additional breakdown by smoking. These results are restricted to those who performed 5 blows on the Stead-Wells at the center (trailer). Figures 5 and 6 present the age, occupation and smoking breakdown for all men who had an FEV₁ measured irrespective of machine used. It can be seen that the restriction to the standard Stead-Wells instrument rather than to all FEV₁ measurements makes very little difference to the conclusions.

Regressions of Forced Expiratory Volume and Forced Vital Capacity on Age and Height

Regressions of FEV₁ and FVC on age and standing height for miners and ex-miners and non-miners in each area are as follows:

FEV₁

Mullens	Non-Miners (356)	.0388 (±.0048) x Height - .0364 (±.0022) x Age - 1.6755
	Miners & Ex-Miners (372)	.0333 (±.0061) x Height - .0486 (±.0026) x Age - 0.4129
Richwood	Non-Miners (285)	.0334 (±.0053) x Height - .0357 (±.0022) x Age - 0.8029
	Miners & Ex-Miners (243)	.0345 (±.0066) x Height - .0412 (±.0036) x Age - 1.1003
Both Areas Combined	Non-Miners (641)	.0366 (±.0035) x Height - .0359 (±.0015) x Age - 1.3182
	Miners & Ex-Miners (615)	.0332 (±.0045) x Height - .0464 (±.0021) x Age - 0.5461

FVC

Mullens	Non-Miners (356)	.0554 (±.0053) x Height - .0344 (±.0024) x Age - 3.8390
	Miners & Ex-Miners (372)	.0497 (±.0070) x Height - .0428 (±.0029) x Age - 2.6869
Richwood	Non-Miners (285)	.0523 (±.0060) x Height - .0319 (±.0025) x Age - 3.3567
	Miners & Ex-Miners (243)	.0415 (±.0068) x Height - .0371 (±.0037) x Age - 1.5284
Both Areas Combined	Non-Miners (641)	.0540 (±.0040) x Height - .0333 (±.0017) x Age - 3.6174
	Miners & Ex-Miners (615)	.0455 (±.0049) x Height - .0409 (±.0023) x Age - 2.0437

The numbers on which the regressions are based, the regression coefficients, and their standard errors are shown. In each town, the slope of the regression lines with age was slightly steeper in the miners than in the non-miners. In both areas the higher prevalence of symptoms and lower mean FEV₁ of miners and ex-miners compared with non-miners is clear. In both areas a higher percentage of miners and ex-miners smoked cigarettes. Both smoking and mining appear to contribute to the prevalence of symptoms and to average lung function. An attempt has been made to summarize the relative importance of each factor in the age-adjusted values in Tables 75 and 79. Two methods of age adjustment have been used. First, the FEV₁ was standardized by the direct method on the

total examined population of each town. Values for the 20 to 74 groups are shown. Second, adjustment has been made using the linear regression of FEV_1 on age and height for the non-miners in each town. It appears that in Mullens, smoking was a more important determinant of FEV than mining. But in Richwood, somewhat surprisingly in view of Enterline and Lainhart's earlier findings, mining appears to be more important than smoking. Using the regression method, it might even appear that there was no difference in FEV attributable to mining among the non-smokers in Mullens. That this is not entirely true can be seen from Figure 3. The differences at different ages are, however, based on small numbers and are statistically insignificant.

Relationship of FEV_1 to Duration of Mining Exposures

Tables 80 to 82 show the relationships of age and duration of mining, work underground and work at the coal face to FEV_1 in Mullens. Tables 83 to 85 show the same information for Richwood. The results provide some support for the hypothesis that the duration of work in mining, whether underground or at the coal face, is associated with a reduction in ventilatory lung function. But there are large inconsistencies, which may be attributable in part to small numbers, making it difficult to allow adequately for differences in smoking habits among the different exposure categories. Inconsistencies may also be due to the selection of hardier individuals who escaped illness or disability.

Radiological Frequency of Pneumoconiosis

Tables 86 to 89 show the radiological frequency of the various categories of pneumoconiosis in non-miners and miners and ex-miners in Mullens. It will be noted that category 1 pneumoconiosis was read in some 4 percent of non-miners. Exclusion of men who had worked on the railroad (Table 88) does not eliminate all these early changes. In fact, about 4 percent of those who had worked only in non-dusty jobs (Table 89) showed category 1 changes or over. However, pneumoconiosis, especially of category 2 and over, was much more frequent among the miners and ex-miners. Among this group nearly 5 percent had PMF. Changes in the chest radiograph were less frequently observed in Richwood than in Mullens (Tables 90 and 91). Here the prevalence of PMF was less than half that of Mullens.

Educational Attainment, Smoking Habits and FEV_1

Table 92 shows levels of formal education attained by men and women in Mullens. The increase in formal education is clearly seen in the increasing proportion of younger subjects, both male and female, completing high school. The change has been greater for men than for women with the result that among 65 to 74 year olds, 34 percent of women compared with only 21 percent of men were high school graduates; whereas among 20 to 24 year olds, 89 percent of men but only 74 percent of women were graduates. Table 93 compares educational attainment in non-miners and miners and ex-miners. At all ages a higher proportion of non-miners completed 9 grades and over. There has been a

large increase in the miners' formal education during the past 20 years. But even at the time of this study an appreciable percentage of miners failed to graduate (17 percent). Table 94 shows the mean number of years of education according to age, mining and smoking. At all ages, miners and ex-miners received roughly 2 years less formal education than non-miners. Smokers received somewhat fewer years of education than non-smokers. For most age groups the lower educational attainment of miners is more clearly seen for smokers than for non-smokers.

Tables 95 to 97 show similar data for Richwood. The main difference between the areas is the more similar trend in formal education among men and women in Richwood. Miners and ex-miners again received less formal education than non-miners, and smokers received less than non-smokers.

Mean FEV_1 according to highest completed education grade is shown for men and women (Table 98) and for non-miners and miners and ex-miners (Table 99). In each table various adjustments based on the appropriate regressions have been made. Mean values increased progressively from those with least formal education (grades 8 or less) to those with the most education (education beyond high school). This is consistent for men and women and for miners and ex-miners, but it is rather less so for non-miners, especially when adjustments are made for education within the educational categories. Allowance for educational differences does not eliminate the difference in FEV_1 between miners and ex-miners and non-miners.

Tables 100 and 101 show comparable data for Richwood. Fairly consistent trends of mean FEV_1 with educational level are again seen. When the two areas are compared, it appears that the men and women who completed less than 12 years of education had a lower FEV_1 in Richwood than in Mullens. This difference was seen for both non-miners and miners and ex-miners, but was larger for the latter.

Tables 102 and 103 show the prevalence of various respiratory symptoms among non-miners and miners and ex-miners according to educational attainment in Mullens and Richwood respectively. In each town there are some inconsistencies, but the tendency for those with less formal education to have a higher prevalence of symptoms is clear. The difference in symptom prevalence between miners and non-miners cannot be explained by the differences in education between them.

Table 104 shows smoking habits by educational attainment and age for men and women, and non-miners and miners and ex-miners in Mullens; Table 105 shows comparable data for Richwood. While the data are not entirely consistent, there is a tendency for those groups with more education to have a higher proportion of non-smokers and a lower proportion of smokers than those groups with less education. The difference is perhaps most evident for those with any post-secondary education.

DISCUSSION

1. LAPSE RATES

We encountered considerable reluctance to attend the trailer for examination. Response was better in Richwood than in Mullens. In each town women responded better than men. In Mullens a higher percentage of non-miners than miners and ex-miners attended the trailer; in Richwood the reverse was the case. Some indication of how non-response might have affected the findings may be given by differences in symptom prevalence between those who attended the trailer and those who were seen in their homes. No clear pattern emerges from a comparison of the appropriate appendix tables.

2. PREVALENCE OF PNEUMOCONIOSIS

Pneumoconiosis was more prevalent in Mullens than Richwood. Approximately 23 percent of miners and ex-miners aged 20 to 74 in Mullens had pneumoconiosis of category 1/0 or over; 4.6 percent of them had PMF. The comparable figures for Richwood were 11 percent and 2 percent. These figures may be compared with those found in the National Study of Coal Workers' Pneumoconiosis (Morgan, et al., 1973). Here the overall prevalence of pneumoconiosis of category 1/0 and over was 28 percent, 1.7 percent of it PMF. In Southern West Virginia, a more appropriate comparison, the rates were 28 percent and 4 percent respectively. In the earlier study in Mullens a prevalence of 20 percent was found. The findings in Mullens were very close to these values. Those in Richwood were appreciably lower. It should, of course, be pointed out that these are crude comparisons. No adjustments have been made for age. But it seems unlikely that adjustment for age will make much difference. Radiographic changes were noted in non-miners in both areas though these were more frequent in Mullens than in Richwood. Some but not all of the pneumoconiosis among non-miners in Mullens can be attributed to railroad work. Changes in those not occupationally exposed to dust have been noted previously (Enterline, 1966, Higgins, 1966). Of course it is well recognized that radiographic changes indistinguishable from those due to pneumoconiosis can be produced by disease in the absence of dust exposure. (For example, review of the non-miner with PMF indicated that he probably had tuberculosis.) It is possible also that smoking or aging may result in minor changes of a nature similar to the earlier deviations from normal found in pneumoconiosis.

3. RESPIRATORY SYMPTOMS AND LUNG FUNCTION

A clear occupational difference in respiratory symptoms and lung function was found in the new cross-sectional studies of these communities. In both areas, miners and ex-miners reported a higher prevalence of respiratory symptoms and lower average lung function than non-miners. These differences persist when age and smoking habits are adequately allowed for. In both areas an occupational effect was noted in non-smokers. There is a suggestion that effects might be greater in the event of both mining and smoking. These findings are in line with almost all previous studies of coal miners in this

country and abroad. It is particularly interesting that the anomalous finding of no occupational differences in Richwood (Lainhart, et al., 1969) was not confirmed in our study. A simple explanation of the earlier finding that there was no difference which could be attributed to mining in Richwood may be that the samples studied there were matched for educational level. Since educational level is correlated with mining, it may be that any occupational effect was eliminated by the process of matching. It is a little surprising, however, that such matching should have eliminated all the differences between miners and non-miners, since in our study respiratory symptom prevalence was higher and FEV₁ lower in miners and ex-miners even after standardizing for educational attainment.

4. FINDINGS IN THE FOLLOW-UP POPULATIONS

The overall mortality of coal miners in these communities appears to be only modestly raised. A standardized mortality ratio for all causes of death between 130 and 140 is very similar to that found for many years for coal miners in Britain. The method used to compute these SMR's is, however, only approximate. We are also aware that mortality rates are being based on those who, for the most part, have remained in or near the area. Follow-up of those who left the area is still needed.

The higher SMR's for non-malignant respiratory disease and accidents among miners are not surprising. Excess mortality for these conditions is well known. The low ratios for respiratory cancer are in agreement with British observations; though in view of the small number of deaths from this cause, too much should not be made of them. In this country, SMR's for lung cancer have not usually been low in miners. Rockette's study indicates considerable variation in different areas. Of the areas Rockette identifies, the Beckley area is nearest to Mullens; its SMR was 109.

SUMMARY

This report describes follow-up after approximately nine years of the populations of two mining towns, Mullens and Richwood, in Southern and Central West Virginia. In each town, in addition to the follow-up, a new definition of the population was made by a private census. Those aged 20 to 74 were invited to participate in an examination for chronic respiratory disease, which included a respiratory symptom questionnaire for symptoms and smoking habits, measurement of ventilatory lung function using a Stead-Wells spirometer, an occupational history, a brief clinical examination, postero-anterior and lateral chest radiographs, and a twelve lead resting electrocardiogram.

Mortality from all causes during the nine years was slightly higher in miners and ex-miners than in non-miners. Proportional mortality rates among miners and ex-miners were higher for respiratory diseases and accidents (but lower for respiratory cancer) than among non-miners. SMR's were computed for miners and ex-miners and non-miners in each town using the mean annual death rates during the years 1969 to 1971 for the State of West Virginia as a basis for expected deaths. The SMR for all causes of death among miners and ex-miners was 128 in Richwood and 135 in Mullens. The latter SMR differs from 100 with borderline significance at the 5 percent level. Miners also had high SMR's from non-malignant respiratory diseases (292 in Mullens; 244 in Richwood), and low SMR's for respiratory cancer (29 and 35 respectively) which support conclusions based on proportional mortality rates. But these figures are based on very small numbers. Mortality from all causes was also higher in smokers than in non-smokers. A somewhat greater decline in forced expiratory volume was found in miners compared with non-miners and in smokers compared with non-smokers.

In the new cross-sectional comparison, a higher prevalence of symptoms and lower mean FEV were found in miners and ex-miners compared with non-miners and in cigarette smokers compared with non-smokers. Independent effects of mining and smoking on symptoms and lung function appeared to be clearly operating. There was some tendency for symptom prevalence to increase and lung function to decline with increasing duration of work underground or at the coal face. Radiographic changes of pneumoconiosis were found in 23 percent of miners and ex-miners in Mullens and 11 percent of those in Richwood. PMF mostly of early degree was noted in 5 percent of miners in Mullens and 2 percent of those in Richwood.

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Appendix A. Forms Used in the Study: Household Census and Medical Examination

CONFIDENTIAL

The University of Michigan
Follow-Up of Mullens

1. Household Form

Household Number: _____ Telephone Number: _____
 Address: _____ Date of Canvas: _____
 _____ Color: White Non-White
 _____ Interviewer: _____

Were you living in Mullens, Itmann, Tralee, Otsego or Caloric in 1963? Yes/No
 If yes, Address: _____

Approved Budget Bureau No. 68-S 72009 Exp. Dec 31, 1974

ON THE FRONT OF THIS FORM LIST ALL PERSONS LIVING IN THE HOUSEHOLD ON DATE OF CANVAS.
ON THE BACK LIST THOSE WHO USUALLY LIVE HERE BUT WHO WERE AWAY AT THAT TIME.

Last Name	First Name	Other Names	Sex	Date of Birth	Marital ¹ State	Relation to Head	Occupation ² of Men

¹NM - never married; M - married; W - widowed; D - divorced; S - separated.
²M - miner; EM - exminer; NM - nonminer.

LIST OF PERSONS USUALLY RESIDENT IN THE HOUSEHOLD BUT AWAY ON DATE OF CANVAS

Last Name	First Name	Other Names	Sex	Date of Birth	Marital ¹ State	Relation to Head	Occupation ² of Men	Reason for Absence

Approved Budget Bureau No 68-S72009
Exp. Dec 31, 1974

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The University of Michigan

2. Home Interview Follow-Up Questionnaire: Mullens.

Name Mr. _____
Mrs. _____
Miss _____ I.D. No. _____

Address _____ Month Day Year

Person Interviewed
(if not the above) _____

Reason for not Interviewing:

Moved Date of move: _____
Present Address: _____

Died Date of Death: _____
Place of Death: _____

Refused Give Details: _____

Other Give Details: _____

I Since 1963, have you been admitted to hospital? Yes/No
If yes, was this for
heart trouble? Yes/No
chest trouble? Yes/No
other? (Specify) Yes/No
Give details and dates.

II Since 1963, have you been to hospital as an outpatient? Yes/No
If yes, was this for
heart trouble? Yes/No
chest trouble? Yes/No
other? (Specify) Yes/No
Give details and dates.

III Since 1963, have you been seen by your doctor? Yes/No
If yes, was this for
heart trouble? Yes/No
chest trouble? Yes/No
other? (Specify) Yes/No
Give details and dates.

Approved Budget Bureau No. 68-S72009 Exp. Dec. 31, 1974

- IV 1. Do you usually cough first thing in the morning? Yes/No
2. Do you usually cough during the day or night? Yes/No
- If yes to 1 or 2,
3. Do you cough on most days for as much as 3 months in the year? Yes/No
4. Do you usually bring up phlegm from your chest first thing in the morning? Yes/No
5. Do you usually bring up phlegm from your chest during the day or night? Yes/No
- If yes to 4 or 5,
6. Do you bring up phlegm on most days for as much as 3 months in the year? Yes/No
7. Have you had a period of increased cough and phlegm lasting 3 weeks or more during the past 3 years? Yes/No
- If yes,
8. Only one period? Yes/No
9. Two or more? Yes/No
10. During the past 3 years have you had any chest illness which has kept you off work or indoors at home? Yes/No
- If yes,
11. Once only? Yes/No
12. More than once? Yes/No
13. Did you have increased cough? Yes/No
14. Did you have increased phlegm? Yes/No
15. Do you get short of breath when you walk at an ordinary pace on the level? Yes/No
16. Do you have to stop for breath after walking 100-200 yards on the level? Yes/No
17. Does your chest ever sound wheezy or whistling? Yes/No
- If yes,
18. Is this occasionally only? Yes/No
19. Or most days? Yes/No

20. Have you ever had any pain or discomfort in your chest? Yes/No

If no, proceed to question 27.
If yes, do you get it

21. When you walk uphill or hurry? Yes/No

22. When you walk at an ordinary pace on the level? Yes/No

23. When you get the pain or discomfort in your chest, what do you do?

Stop? Yes/No

Slow down? Yes/No

Continue at the same pace? Yes/No

24. Does it go away if you stand still? Yes/No

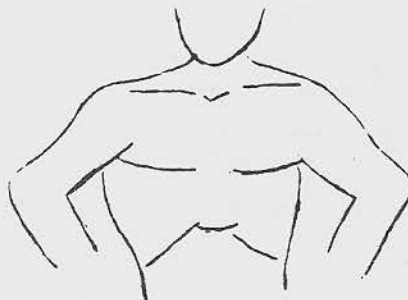
If yes,

25. How soon?

10 minutes or less? Yes/No

More than 10 minutes? Yes/No

26. Where do you get this pain or discomfort? Mark the place(s) with X on the diagram.



Approved Budget Bureau No. 68-S72009 Exp. Dec. 31, 1974

27. Have you ever had a severe pain across the front of your chest lasting for half an hour or more? Yes/No

If yes, did you see a doctor because of this pain? Yes/No

What did he say it was?

28. Do you get pain in either leg on walking? Yes/No

If no, go to question 36.

If yes,

29. Does this pain ever begin when you are standing still or sitting? Yes/No

30. Do you get the pain in your calf (or calves)? Yes/No

31. Do you get it when you walk up hill or hurry? Yes/No

32. Do you get it when you walk at an ordinary pace on the level? Yes/No

33. Does the pain ever disappear while you are still walking? Yes/No

34. What do you do if you get the pain when you are walking?

Stop? Yes/No

Slow down? Yes/No

Continue at the same pace? Yes/No

35. What happens to the pain if you stand still

Usually continues for 10 minutes? Yes/No

Usually disappears in less than 10 minutes? Yes/No

36. Have you taken medicines, tablets, pills or had any shots in the last year? Yes/No
Please list them.

Name of Medication	Condition for which Medication was given
_____	_____
_____	_____
_____	_____
_____	_____

37. Do you smoke at the present time? Yes/No

If no,

38. Have you ever smoked? Yes/No
If yes, when did you give up?
Date _____

If yes,

39. Number of cigarettes/day _____

40. Number of cigars/day _____

41. Number of pipes/day _____

42. Do you inhale? Yes/No

Deeply? Yes/No

Moderately? Yes/No

Slightly? Yes/No

43. What is your usual occupation? _____

44. Have you ever worked in mining? Yes/No

If yes,

45. Number of years in mining _____

46. Number of years underground _____

47. Number of years at coal face _____

48. Have you ever worked in any other dusty jobs? Yes/No
If yes, specify _____

49. What jobs have you done since 1963?

University of Michigan
3. Medical Questionnaire

Mullens Health Survey
ASSURANCE OF CONFIDENTIALITY

All the information obtained in this survey is strictly confidential. Nothing will be released without your written approval. If you would like a report of the findings sent to your personal physician please complete the authorization below.

* * * * *

**AUTHORIZATION TO RELEASE MEDICAL INFORMATION TO
MY PERSONAL PHYSICIAN.**

Name of physician: _____

Address: _____

Signature: _____

Date of Interview _____

Examiner _____

COUGH

- | | Yes | No |
|---|--------------------------|--------------------------|
| 1. Do you usually cough first thing in the morning? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you usually cough during the day or night? | <input type="checkbox"/> | <input type="checkbox"/> |

If yes to 1 or 2,

- | | Yes | No |
|---|--------------------------|--------------------------|
| 3. Do you cough on most days for as much as 3 months in the year? | <input type="checkbox"/> | <input type="checkbox"/> |

4. How many years have you had this cough?

Under 2 | 2 - 4 | 5 & over

--	--	--

PHLEGM

- | | Yes | No |
|---|--------------------------|--------------------------|
| 5. Do you usually bring up phlegm from your chest first thing in the morning? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Do you usually bring up phlegm from your chest during the day or night? | <input type="checkbox"/> | <input type="checkbox"/> |

If yes to 4 or 5,

- | | Yes | No |
|---|--------------------------|--------------------------|
| 7. Do you bring up phlegm on most days for as much as 3 months in the year? | <input type="checkbox"/> | <input type="checkbox"/> |

8. How many years have you had this phlegm?

Under 2 | 2 - 4 | 5 & over

--	--	--

Page 2.

9. During the past 3 years, have you had a period of [increased] cough and phlegm lasting 3 weeks or more? Yes No

If yes,

10. Only one period?
11. Two or more?

CHEST ILLNESS

12. During the past 3 years have you had any chest illness which has kept you off work or indoors at home? Yes No

Year	Duration of Incapacity		Increased Cough		Increased Phlegm		Doctors Diagnosis (if known)
	one week or more	less than one week	yes	no	yes	no	

SHORTNESS OF BREATH

13. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill? Yes No
14. Do you get short of breath when you walk at an ordinary pace on the level? Yes No
15. Do you have to stop for breath after walking 100-200 yards on the level? Yes No

WHEEZING IN THE CHEST

16. Does your chest ever sound wheezy or whistling? Yes No

If yes,

17. Is this occasionally only?

18. Or most days?

CARDIAC PAIN

19. Have you ever had any pain or discomfort in your chest? Yes No

If no, proceed to question 26.

If yes, do you get it

20. When you walk uphill or hurry? Yes No

21. When you walk at an ordinary pace on the level? Yes No

22. When you get the pain or discomfort in your chest, what do you do?

Stop?

Slow down?

Continue at the same pace?

23. Does it go away if you stand still? Yes No

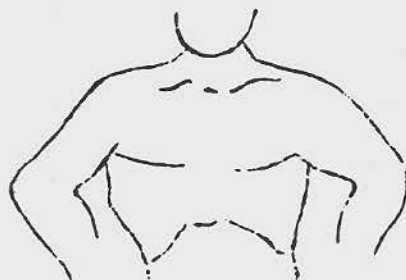
If yes,

24. How soon?

10 minutes or less?

more than 10 minutes?

25. Where do you get this pain or discomfort?
Mark the place(s) with X on the diagram.



26. Have you ever had a severe pain across the front of your chest lasting for half an hour or more? Yes No
- If yes, did you see a doctor because of this pain? Yes No
- What did he say it was?

LEG PAIN

27. Do you get pain in either leg on walking? Yes No

If no, go to question 35.
If yes,

- | | Yes | No |
|---|--------------------------|--------------------------|
| 28. Does this pain ever begin when you are standing still or sitting? | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Do you get the pain in you calf (or calves)? | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Do you get it when you walk up hill or hurry? | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Do you get it when you walk at an ordinary pace on the level? | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Does the pain ever disappear while you are still walking? | <input type="checkbox"/> | <input type="checkbox"/> |

33. When you get the pain while you are walking, what do you do?

Stop?

Slow down?

Continue at the same pace?

34. Does the pain go if you stand still?

Yes No

If yes,

How soon?

10 minutes or less?

more than 10 minutes?

SMOKING

35. Do you smoke?

Yes No

If no,

36. Have you ever smoked?

Yes No

If yes,

	Amount Smoked	
	Now	Previously
Cigarettes/day		
Pipefuls/day		
Cigars/day (Large)		
Cigars/day (Small)		

Page 6.

37. Age started regular smoking?

38. Age stopped regular smoking?

39. Do you inhale? Yes No

If yes,

40. Deeply

41. Moderately

42. Slightly

43. Do you chew tobacco? Yes No

44. Do you take snuff? Yes No

EDUCATION

45. What was the highest grade of school you completed?

- | | |
|-------------------------------|--------------------------|
| Never attended school | 0 |
| | <input type="checkbox"/> |
| Elementary School | 1-6 |
| | <input type="checkbox"/> |
| Junior High | 7-8 |
| | <input type="checkbox"/> |
| High School | 9-12 |
| | <input type="checkbox"/> |
| College (Put number of years) | <input type="checkbox"/> |

Page 7.

OCCUPATION (Men)

- | | Yes | No |
|--|--------------------------|--------------------------|
| 46. Have you ever worked
in a coal mine? | <input type="checkbox"/> | <input type="checkbox"/> |
| any other mine? | <input type="checkbox"/> | <input type="checkbox"/> |
| a quarry? | <input type="checkbox"/> | <input type="checkbox"/> |
| a foundry? | <input type="checkbox"/> | <input type="checkbox"/> |
| a pottery? | <input type="checkbox"/> | <input type="checkbox"/> |
| a textile mill? | <input type="checkbox"/> | <input type="checkbox"/> |
| with asbestos? | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Have you ever been exposed to irritant gas
or chemical fumes? | <input type="checkbox"/> | <input type="checkbox"/> |

6. Ventilatory Capacity

Name _____

Identification No. _____

Date _____

Temperature _____

Correction factor _____

Before Isoprenaline

After Isoprenaline

FEV V.C.

FEV V.C.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Mean

--	--

--	--

Mean

--	--

--	--

(Corrected)

University of Michigan
7. Follow-Up of Richwood

Approved Budget Bureau
No. 68-S72009
Exp. Dec. 31, 1974

CONFIDENTIAL

Household Form

Name: _____

Address: _____

Telephone Number: _____

Date of Canvas: _____

Color: White Non-White

Interviewer: _____

For each person who lived in this household in 1963, record (if known):

Last Name	First Name	Initial	Sex	Date Left Household	Reason Left Household ³	Present Address

- 3. Married
- Divorced
- Moved Away
- Died (include cause if known)

CONFIDENTIAL

The University of Michigan

8. Home Interview Follow-Up Questionnaire: Richwood

Name Mr. _____
Mrs. _____
Miss _____ I.D. No. _____

Address _____
_____ Month Day Year
Date _____

Person Interviewed
(if not the above) _____

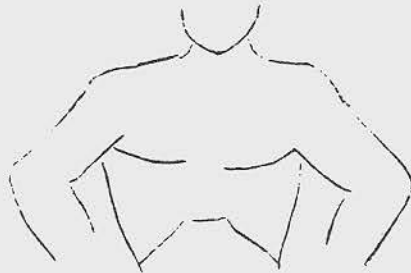
I Since 1963, have you been admitted to hospital? Yes/No
If yes, was this for
heart trouble? Yes/No
chest trouble? Yes/No
other? (Specify) Yes/No
Give details and dates.

II Since 1963, have you been to hospital as an outpatient? Yes/No
If yes, was this for
heart trouble? Yes/No
chest trouble? Yes/No
other? (Specify) Yes/No
Give details and dates.

- III Since 1963, have you been seen by your doctor? Yes/No
- If yes, was this for
- heart trouble? Yes/No
 - chest trouble? Yes/No
 - other? (Specify) Yes/No
- Give details and dates.
- IV 1. Do you usually cough first thing in the morning? Yes/No
2. Do you usually cough during the day or night? Yes/No
- If yes to 1 or 2,
- 3. Do you cough on most days for as much as 3 months in the year? Yes/No
 - 4. Do you usually bring up phlegm from your chest first thing in the morning? Yes/No
 - 5. Do you usually bring up phlegm from your chest during the day or night? Yes/No
- If yes to 4 or 5,
- 6. Do you bring up phlegm on most days for as much as 3 months in the year? Yes/No
 - 7. Have you had a period of increased cough and phlegm lasting 3 weeks or more during the past 3 years? Yes/No
- If yes,
- 8. Only one period? Yes/No
 - 9. Two or more? Yes/No
10. During the past 3 years have you had any chest illness which has kept you off work or indoors at home? Yes/No
- If yes,
- 11. Once only? Yes/No
 - 12. More than once? Yes/No
 - 13. Did you have increased cough? Yes/No
 - 14. Did you have increased phlegm? Yes/No

15. Have you ever had...? If yes, date.
- | | | |
|--------------|--------|-------|
| Pneumonia | Yes/No | _____ |
| Pleurisy | Yes/No | _____ |
| Bronchitis | Yes/No | _____ |
| Asthma | Yes/No | _____ |
| Tuberculosis | Yes/No | _____ |
16. Have you ever been told you had Silicosis, Pneumoconiosis, or dust in the lungs? Yes/No
17. Do you get short of breath when you hurry on the level or walk up a slight hill? Yes/No
18. Do you get short of breath when you walk at an ordinary pace on the level? Yes/No
19. Do you have to stop for breath after walking 100-200 yards on the level? Yes/No
20. Does your chest ever sound wheezy or whistling? Yes/No
- If yes,
21. Is this occasionally only? Yes/No
22. Or most days? Yes/No
23. Have you ever had any pain or discomfort in your chest? Yes/No
- If no, proceed to question 33.
If yes, do you get it...
24. When you walk uphill or hurry? Yes/No
25. When you walk at an ordinary pace on the level? Yes/No
26. When you are at rest (sitting, lying down or standing)? Yes/No

27. When you get the pain in your chest when you are walking, what do you do?
- Stop? Yes/No
- Slow down? Yes/No
- Continue at the same pace? Yes/No
28. Does it go away if you stand still? Yes/No
- If yes,
29. How soon?
- 10 minutes or less? Yes/No
- More than 10 minutes? Yes/No
30. Where do you get this pain or discomfort? Mark the place(s) with X in the diagram.



31. Have you ever seen a doctor because of this pain? Yes/No
- If yes, what did he say it was? _____
32. Do you take any tablets (or other medicines) for the pain? Yes/No
- If yes, What? _____

LEG PAIN

31. Do you get pain in either leg on walking? Yes No

If no, go to question 39.

If yes,

32. Does this pain ever begin when you are standing still or sitting? Yes No

33. Do you get the pain in your calf (or calves)?

34. Do you get it when you walk up hill or hurry?

35. Do you get it when you walk at an ordinary pace on the level?

36. Does the pain every disappear while you are still walking?

37. When you get the pain while you are walking, what do you do:

Stop?

Slow down?

Continue at the same pace?

38. Does the pain go if you stand still? Yes No

If yes, how soon:

10 minutes or less?

more than 10 minutes?

SMOKING

39. Do you smoke? Yes No

If no,

40. Have you ever smoked? Yes No

Page 6.

If yes,

	Amount Smoked	
	Now	Previously
Cigarettes/day		
Pipefuls/day		
Cigars/day (Large)		
Cigars/day (Small)		

41. Age started regular smoking?

42. Age stopped regular smoking?

43. Do you inhale?

Yes No

If yes,

Deeply?

Moderately?

Slightly?

Yes No

45. Do you chew tobacco?

46. Do you take snuff?

EDUCATION

47. What was the highest grade of school you completed:

Never attended school (0)

Elementary School (1-6)

Junior High School (7-8)

High School (9-12)

College (Put number of years)

55. Do you inhale?

Slightly

Moderately

Deeply

56. What is your usual occupation? _____

57. Have you ever worked in mining?

Yes/No

If yes,

58. Number of years in mining _____

59. Number of years underground _____

60. Number of years at coal face _____

61. Have you ever worked in any other dusty jobs?

Yes/No

If yes, specify _____

62. What jobs have you done since 1963?

Approved Budget Bureau
No. 68-S72009
Exp. Dec. 31, 1974

University of Michigan
9. Medical Questionnaire

Richwood Health Survey
ASSURANCE OF CONFIDENTIALITY

All the information obtained in this survey is strictly confidential. Nothing will be released without your written approval. If you would like a report of the findings sent to your personal physician please complete the authorization below.

* * * * *

AUTHORIZATION TO RELEASE MEDICAL INFORMATION TO
MY PERSONAL PHYSICIAN.

Name of physician: _____

Address: _____

Signature: _____

CONFIDENTIAL

--

Date of Interview _____

Examiner _____

COUGH

1. Do you usually cough first thing in the morning? Yes No
2. Do you usually cough during the day or night?

If yes to 1 or 2,

3. Do you cough on most days for as much as 3 months in the year? Yes No
4. How many years have you had this cough?

Under 2 | 2 - 4 | 5 & over

--	--	--

PHLEGM

5. Do you usually bring up phlegm from your chest first thing in the morning? Yes No
6. Do you usually bring up phlegm from your chest during the day or night?

If yes to 4 or 5,

7. Do you bring up phlegm on most days for as much as 3 months in the year? Yes No

8. How many years have you had this phlegm?

Under 2 | 2 - 4 | 5 & over

--	--	--

Page 2.

9. During the past 3 years, have you had a period of [increased] cough and phlegm lasting 3 weeks or more? Yes No

If yes,

10. Only one period?

11. Two or more?

CHEST ILLNESS

12. During the past 3 years have you had any chest illness which has kept you off work or indoors at home? Yes No

Year	Duration of Incapacity		Increased Cough		Increased Phlegm	Doctor's Diagnosis (if known)
	one week or more	less than one week	yes	no		

13. Have you ever had:

- Pneumonia
- Pleurisy
- Bronchitis
- Asthma
- Pneumoconiosis (black lung, silicosis)

SHORTNESS OF BREATH

14. Are you troubled by shortness of breath when hurrying on the level (on level ground) or walking up a slight hill? Yes No
15. Do you get short of breath when you walk at an ordinary pace on the level?
16. Do you have to stop for breath after walking on the level for 100-200 yards?

WHEEZING IN THE CHEST

17. Does your chest ever sound wheezy or whistling? Yes No
- If yes,
18. Is this occasionally only?
19. Or most days?

CARDIAC PAIN

20. Have you ever had any pain or discomfort in your chest? Yes No

If no, proceed to question 28.

If yes, do you get it:

21. When you walk uphill or hurry? Yes No
22. When you walk at an ordinary pace on the level?
23. When you get the pain or discomfort in your chest, what do you do:
- Stop?
- Slow down?
- Continue at the same pace?
24. Does it go away if you stand still? Yes No

Page 4.

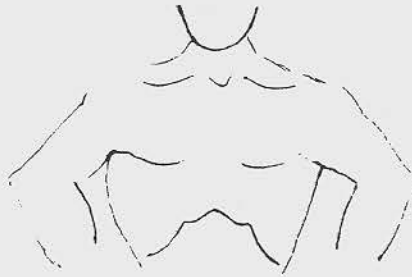
If yes,

25. How soon:

10 minutes or less?

more than 10 minutes?

26. Where do you get this pain or discomfort?
Mark the place(s) with X on the diagram.



27. Have you seen your doctor because Yes No
of this pain?

What did he say it was?

28. Have you ever had a severe pain across the front Yes No
of your chest lasting for half an hour or more?

If yes,

Did you see a doctor because of this Yes No
pain?

What did he say it was?

29. Have you ever had a heart attack? Yes No

If yes,

When?
Additional details:

30. Have you ever been told you had high blood Yes No
pressure?

If yes,

Are you having treatment for high Yes No
blood pressure now?

LEG PAIN

31. Do you get pain in either leg on walking? Yes No

If no, go to question 39.

If yes,

32. Does this pain ever begin when you are standing still or sitting? Yes No

33. Do you get the pain in your calf (or calves)?

34. Do you get it when you walk up hill or hurry?

35. Do you get it when you walk at an ordinary pace on the level?

36. Does the pain every disappear while you are still walking?

37. When you get the pain while you are walking, what do you do:

Stop?

Slow down?

Continue at the same pace?

38. Does the pain go if you stand still? Yes No

If yes, how soon:

10 minutes or less?

more than 10 minutes?

SMOKING

39. Do you smoke? Yes No

If no,

40. Have you ever smoked? Yes No

Page 6.

If yes,

	Amount Smoked	
	Now	Previously
Cigarettes/day		
Pipefuls/day		
Cigars/day (Large)		
Cigars/day (Small)		

41. Age started regular smoking?

42. Age stopped regular smoking?

43. Do you inhale?

Yes

No

If yes,

Deeply?

Moderately?

Slightly?

45. Do you chew tobacco?

Yes

No

46. Do you take snuff?

EDUCATION

47. What was the highest grade of school you completed:

Never attended school (0)

Elementary School (1-6)

Junior High School (7-8)

High School (9-12)

College (Put number of years)

Page 7.

OCCUPATION (Men)

- | | Yes | No |
|--|--------------------------|--------------------------|
| 48. Have you ever worked: | | |
| in a coal mine? | <input type="checkbox"/> | <input type="checkbox"/> |
| any other mine? | <input type="checkbox"/> | <input type="checkbox"/> |
| a quarry? | <input type="checkbox"/> | <input type="checkbox"/> |
| a foundry? | <input type="checkbox"/> | <input type="checkbox"/> |
| a pottery? | <input type="checkbox"/> | <input type="checkbox"/> |
| a textile mill? | <input type="checkbox"/> | <input type="checkbox"/> |
| with asbestos? | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Have you ever been exposed to irritant gas or
chemical fumes? | <input type="checkbox"/> | <input type="checkbox"/> |

Page 8.

EXAMINATION

Height:

Weight:

Skinfolds:

Triceps: _____

Subscapular: _____

Abdominal: _____

Blood Pressure:

1. _____

2. _____

Heart:

Lungs:

Other:

10. OCCUPATIONAL HISTORY

Age at leaving school _____
 Year of leaving school _____

Date (Year)	Job	Business or industry (Name of mine)	Employer*	Description

(Continue over if needed)

Years in mining _____ Years underground _____ Years at the coal face _____

*Private, Government or Self

OCCUPATIONAL HISTORY (Continued)

Date (Year)	Job	Business or industry (Name of mine)	Employer*	Description

*Private, Government or Self

11. VENTILATORY CAPACITY

Name _____

Identification No. _____

Date _____

Temperature _____

Correction factor _____

Before Isoprenaline

After Isoprenaline

FEV V.C.

FEV V.C.

1.		
2.		
3.		
4.		
5.		
6.		

Mean

--	--

--	--

Mean

--	--

--	--

(Corrected)

12. Radiographic Classification Form

1. NUMBER

2. DATE OF X-RAY

MO.		DAY		YEAR	

3. FILM QUALITY

1	2	3
---	---	---

YES NO

4. IS FILM COMPLETELY NEGATIVE?

5. SMALL OPACITIES-ROUNDED

TYPE	PROFUSION	ZONES																						
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6. SMALL OPACITIES-IRREGULAR

TYPE	PROFUSION	ZONES																						
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3	3	3	3																					

7. COMBINED PROFUSION

8. LARGE OPACITIES

SIZE

TYPE

9. PLEURAL THICKENING

a. Costophrenic Angle...

O	R	L	B*
O	R	L	B
O	A	B	C
O	1	2	

b. Walls & Diaphragm...

O	R	L	B
O	A	B	C
O	1	2	

c. Width...

O	A	B	C
O	1	2	

d. Extent...

O	1	2
---	---	---

*Both

10. ILL DEFINED DIAPHRAGM

11. ILL DEFINED CARDIAC OUTLINE

12. PLEURAL CALCIFICATION

Dia-phragm Wall Other Sites Grade

13. OTHER SYMBOLS

OBLIGATORY ax bu ca cn co cp cv di ef em es hi ho k p q px rl t_a t_v

Report items which may be of present clinical significance in this section. OD _____

14. OTHER COMMENTS _____

DATE READ

--	--	--	--	--	--

Appendix B. Rereading of Chest Radiographs

The chest radiographs taken in Mullens and Richwood were reread by four readers in Morgantown. At least two readers saw each film, and the readings were averaged. Tables B-1 and B-2 show the radiological frequencies of the various categories of pneumoconiosis found in non-miners and miners and ex-miners in Mullens. It will be noted that pneumoconiosis was read in 2% of the non-miners. Among miners 17.9% had pneumoconiosis and 3.3% had P.M.F. Changes in the chest radiograph were less frequently observed in Richwood than in Mullens (Tables B-3 and B-4). Here the prevalence of P.M.F. was less than half that of Mullens and only 0.7% of Richwood's non-miners had evidence of pneumoconiosis.

The rereadings of the radiographs yield results not dissimilar from those found in the initial readings by a single observer as presented in the main text. It appears that the single observer tended to see a somewhat higher degree of pneumoconiosis when his readings are compared with the averaged readings.

Table B-1. X-ray Category of Pneumoconiosis by age and occupation.
 Mullens, West Virginia, 1973.
Non-Miners

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	44 (100.00)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	44
25 - 34	60 (100.00)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	61
35 - 44	65 (100.00)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	65
45 - 54	82 (96.4)	2 (2.4)	1 (1.2)	0 (--)	3 (3.5)	0 (--)	85
55 - 64	68 (95.8)	3 (4.2)	0 (--)	0 (--)	3 (4.2)	0 (--)	71
65 - 74	30 (96.9)	1 (3.3)	0 (--)	0 (--)	1 (3.1)	0 (--)	31
20 - 74	350 (98.0)	6 (1.7)	1 (0.3)	0 (--)	7 (2.0)	0 (0.0)	357

Table B-2. X-ray Category of Pneumoconiosis by age and occupation.
 Mullens, West Virginia, 1973.
Miners and Ex-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	42 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	42
25 - 34	65 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	65
35 - 44	41 (80.4)	6 (11.8)	4 (7.8)	0 (--)	10 (19.6)	0 (--)	51
45 - 54	91 (80.5)	10 (8.9)	9 (8.0)	2 (1.8)	21 (18.7)	1 (0.9)	113
55 - 64	62 (63.9)	15 (15.5)	10 (10.3)	1 (1.0)	26 (26.8)	9 (9.3)	97
65 - 74	25 (86.2)	1 (3.5)	0 (--)	0 (--)	1 (3.5)	3 (10.3)	29
20 - 74	326 (82.1)	32 (8.1)	23 (5.8)	3 (0.8)	58 (14.6)	13 (3.3)	397

Table B-3. X-ray Category of Pneumoconiosis by age and occupation.
 Richwood, West Virginia, 1974.
Non-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	52 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	52
25 - 34	72 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	72
35 - 44	47 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	47
45 - 54	51 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	51
55 - 64	48 (96.0)	2 (4.0)	0 (--)	0 (--)	2 (4.0)	0 (--)	50
65 - 74	35 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	35
20 - 74	305 (99.3)	2 (0.7)	0 (--)	0 (--)	2 (0.7)	0 (--)	307

Table B-4. X-ray Category of Pneumoconiosis by age and occupation.
 Richwood, West Virginia, 1974.
Miners and Ex-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	7 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	7
25 - 34	36 (97.3)	1 (2.7)	0 (--)	0 (--)	1 (2.7)	0 (--)	37
35 - 44	58 (96.7)	1 (1.7)	1 (1.7)	0 (--)	2 (3.3)	0 (--)	60
45 - 54	78 (86.7)	8 (8.9)	3 (3.3)	0 (--)	11 (12.2)	1 (1.1)	90
55 - 64	39 (83.0)	6 (12.8)	2 (4.3)	0 (--)	8 (17.0)	0 (--)	47
65 - 74	25 (75.8)	5 (15.2)	0 (--)	0 (--)	5 (15.2)	3 (9.1)	33
20 - 74	243 (88.7)	21 (7.7)	6 (2.2)	0 (--)	27 (9.9)	4 (1.5)	274

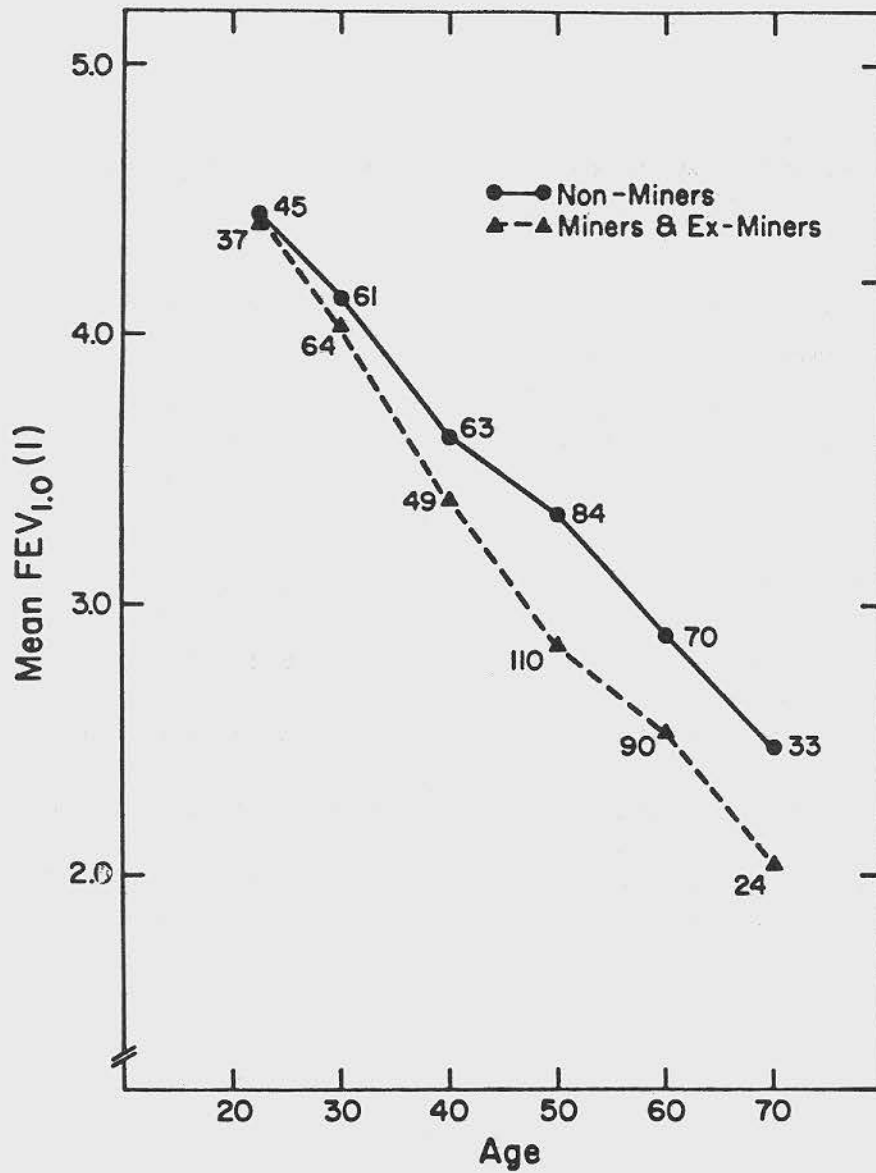


Figure 1. Mean FEV_{1.0} according to age and occupation. Men aged 20 to 24 in Mullens, West Va. in 1973. (Standard Stead Wells)

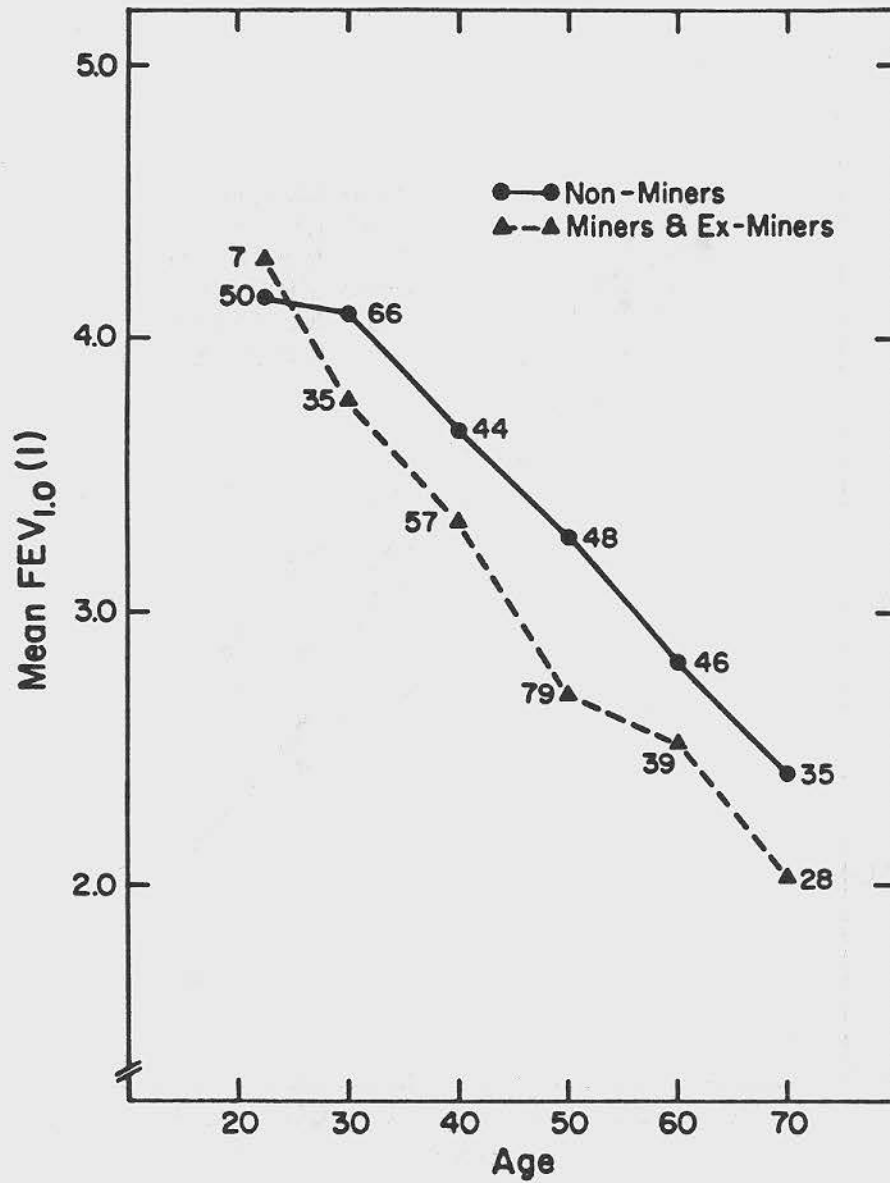


Figure 2. Mean FEV_{1.0} according to age and occupation. Men aged 20 to 74 in Richwood, West Va. in 1974. (Standard Stead Wells)

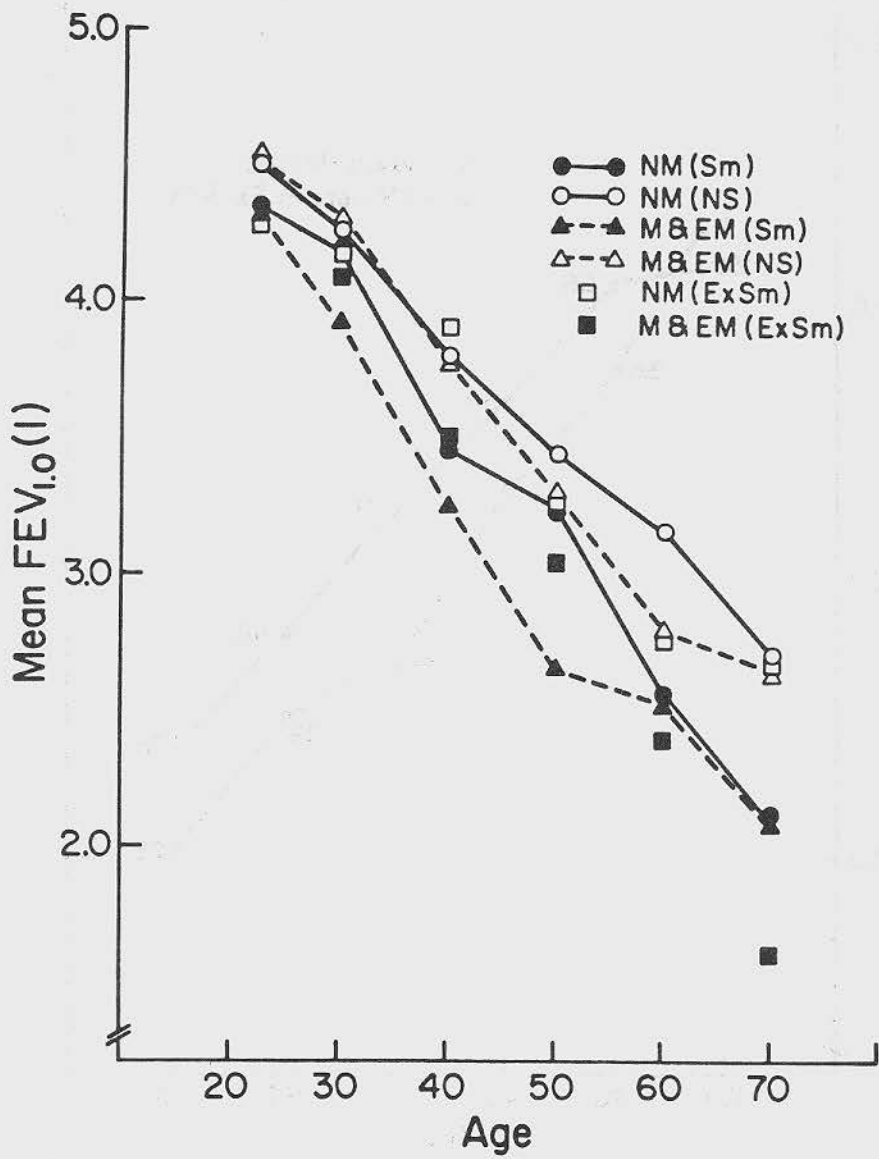


Figure 3. Mean FEV_{1.0} according to age, occupation, and smoking habits. Men aged 20 to 74 seen at trailer in Mullens, West Va., in 1973.

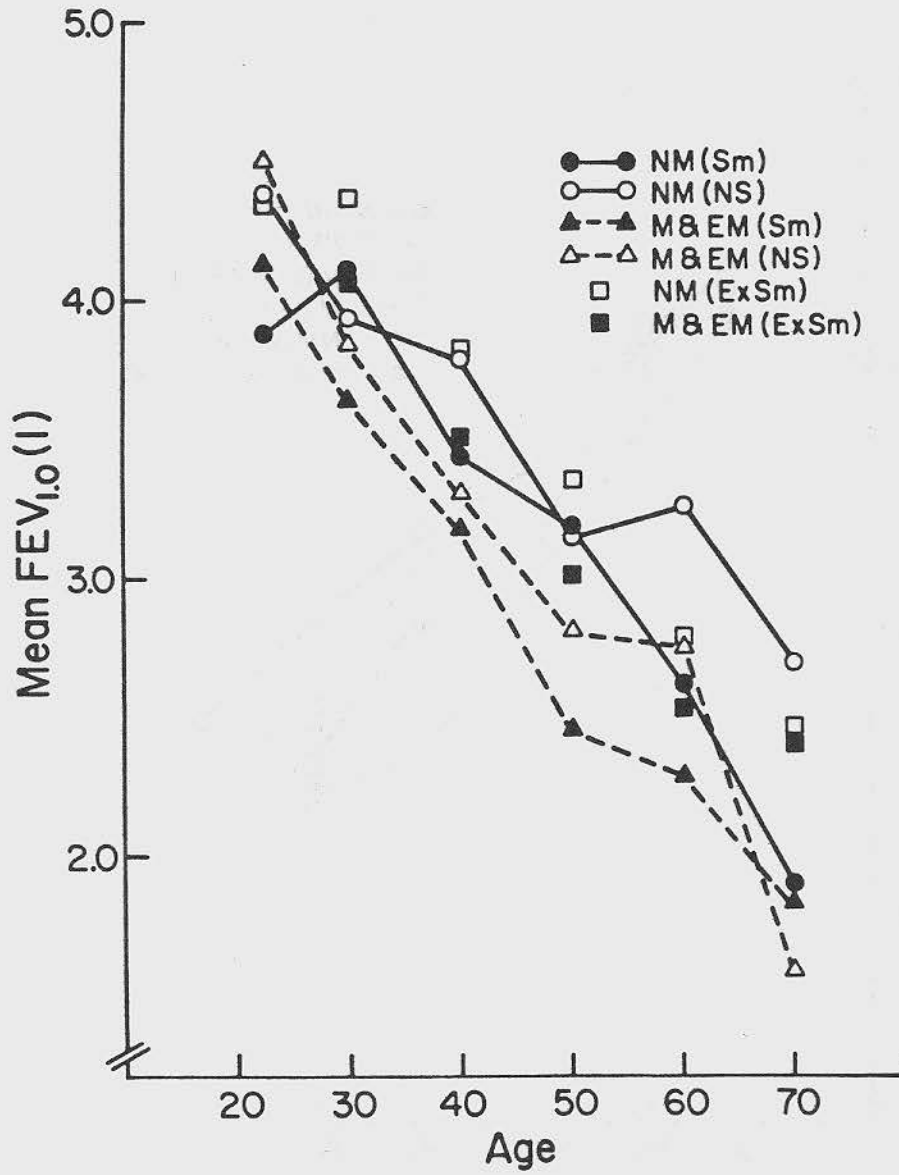


Figure 4. Mean FEV_{1.0} according to age, occupation, and smoking habits. Men aged 20 to 74 seen at trailer in Richwood, West Va., in 1974.

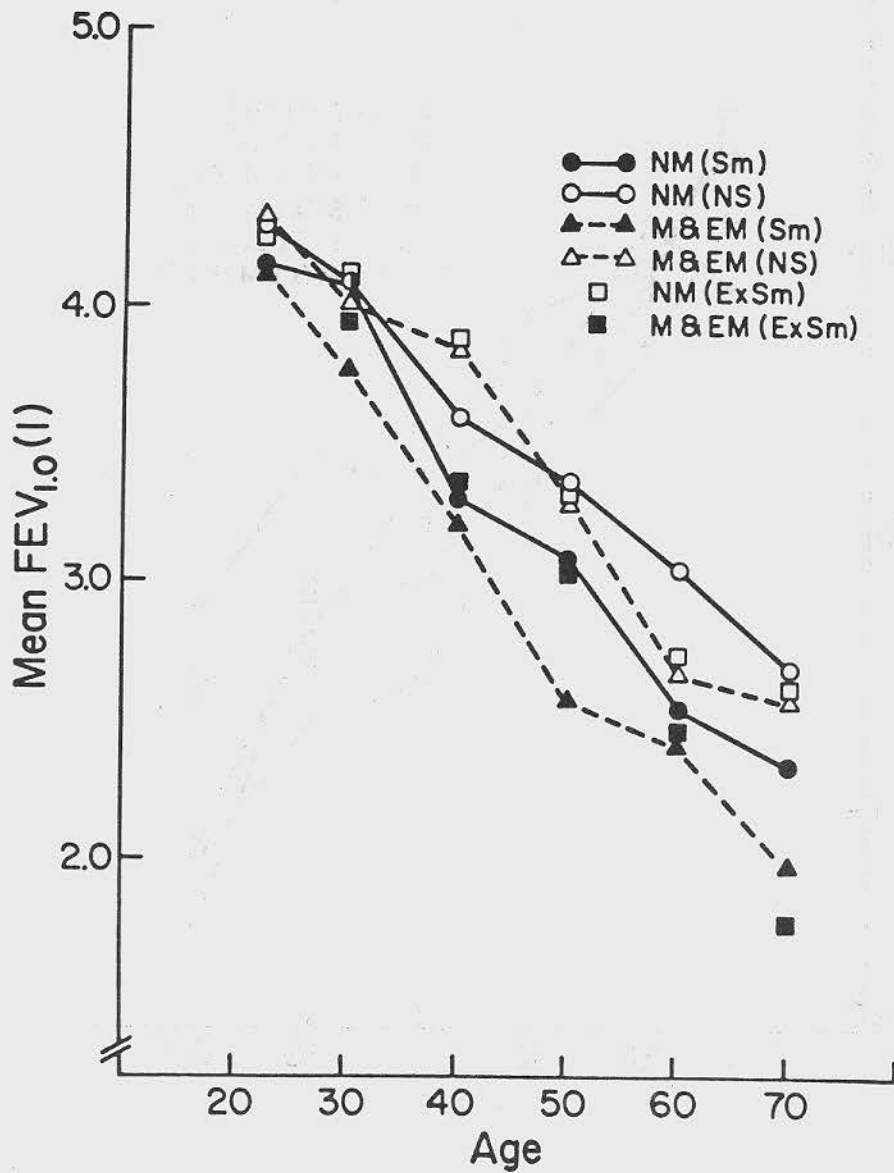


Figure 5. Mean FEV_{1.0} according to age, occupation, and smoking habits. All men aged 20 to 74 with an FEV_{1.0} in Mullens, West Va., in 1973.

Mean FEV_{1.0} According To Age, Occupation, and Smoking Habits. All Men Aged 20 to 74 with an FEV_{1.0} in Richwood, West Va., in 1974.

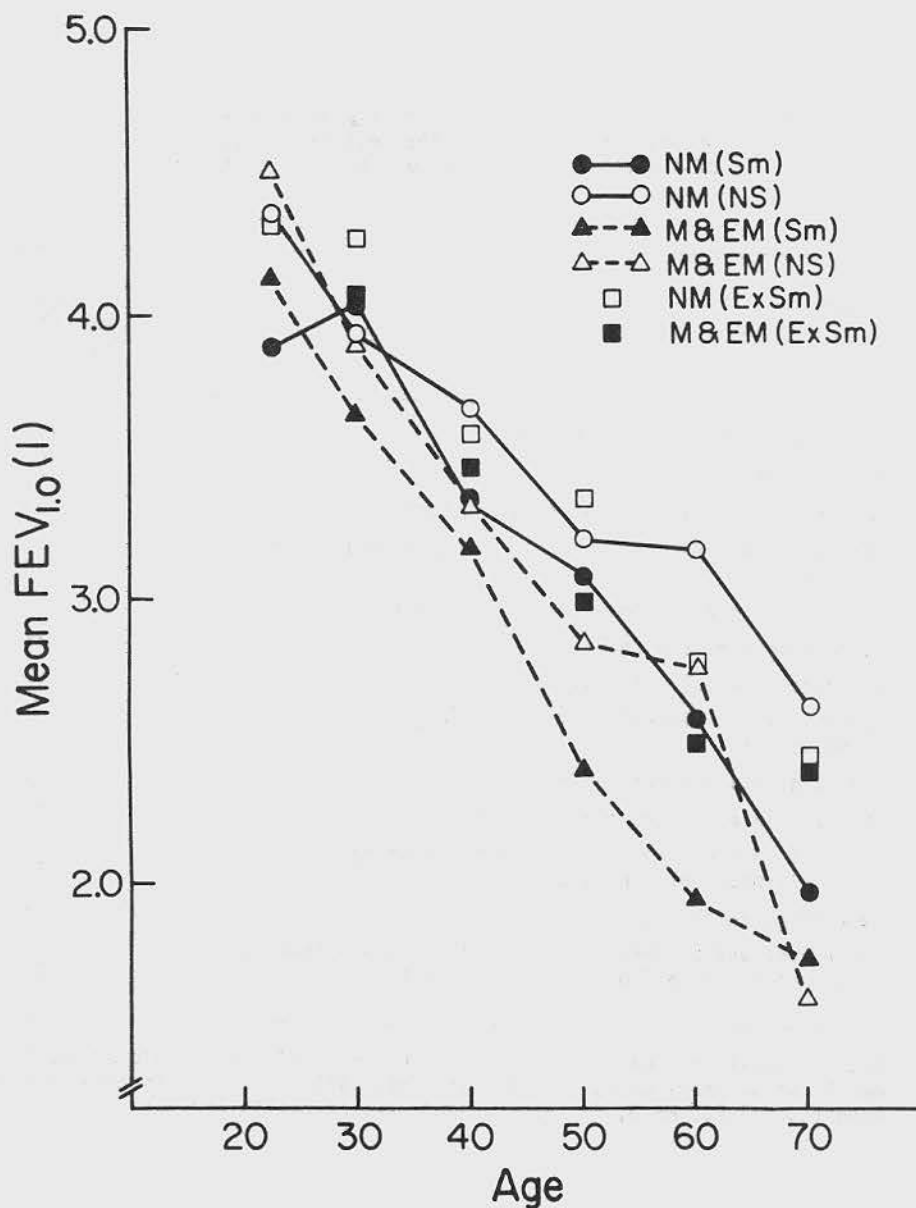


Figure 6. Mean FEV_{1.0} according to age, occupation and smoking habits. All men aged 20 to 74 with an FEV_{1.0} in Richwood, West Va., in 1974.

Table 1. Standardized mortality ratios greater than 150, by occupation diseases of the respiratory system exclusive of influenza and pneumonia. United States, 1950.

Occupation	Standardized mortality ratio
Mine operatives and laborers (n.e.c.)	933
Molders, metal	500
Laborers (n.e.c.) transportation equipment	433
Operatives and kindred workers, stone, clay and glass products	250
Laborers (n.e.c.) primary metal industries	258
Taxicab drivers and chauffeurs	225
Laborers (n.e.c.) wholesale and retail trade	215
Operatives and kindred workers (n.e.c.) primary metal industries	195
Cooks, except private household	195
Laborers (n.e.c.) wholesale and retail trade	170
Laborers (n.e.c.) furniture, saw and planing mills, miscellaneous wood products	154
Lumbermen, raftsmen, and wood choppers	154
Operatives and kindred workers (n.e.c.) transportation, communication, and other public utilities	153

Source: Guralnick, Lillian: Mortality by occupation and cause of death among men 20 to 64 years of age: United States, 1950; Vital Statistics-Special Reports, Vol.53, No.3, September, 1963; Public Health Service

Table 2. Spells of sickness absence beginning in 1951.
Men Aged 17-67.
(Ministry of Pensions and National Insurance)

	Population (Thousands)	Total No. of spells (Thousands)	No. of spells due to bronchitis (Thousands)	Spells due to bronchitis per 100 workers	Percentage of all spells due to bronchitis
All	14,400	4,843	476	3.3	9.8
Agriculture, horticulture and forestry	1,052	238	15	1.4	6.3
Coal-mining	630	535	51	8.1	9.5
Foundry-work	141	65	9	6.4	13.8

Table 3. Status of persons, aged 21 years and over, in the follow-up of Mullens on July 31, 1972.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	294 (54.1)	8 (1.5)	232 (42.7)	9 (1.7)	543
35 - 44	432 (65.4)	6 (0.9)	196 (29.7)	27 (4.1)	661
45 - 54	402 (65.3)	11 (1.8)	150 (24.4)	53 (8.6)	616
55 - 64	202 (54.8)	11 (3.0)	85 (23.0)	71 (19.2)	369
65 - 74	93 (47.2)	3 (1.5)	23 (11.7)	78 (39.6)	197
75 - 84	15 (24.2)	0 (---)	6 (9.7)	41 (66.1)	62
85 - 94	1 (11.1)	1 (11.1)	0 (---)	7 (77.8)	9
95+	0 (---)	0 (---)	0 (---)	1 (100.0)	1
[75+	16 (22.2)	1 (1.4)	6 (8.3)	49 (68.1)	72]
Unknown	0 (---)	0 (---)	0 (---)	2 (100.0)	2
21 & over	1439 (58.5)	40 (1.6)	692 (28.1)	289 (11.8)	2460

Table 4. Status of men, aged 21 years and over, in the follow-up of Mullens on July 31, 1972.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	116 (49.6)	4 (1.7)	109 (46.6)	5 (2.1)	234
35 - 44	198 (61.9)	3 (0.9)	100 (31.3)	19 (5.9)	320
45 - 54	203 (61.9)	6 (1.8)	74 (22.6)	45 (13.7)	328
55 - 64	92 (51.1)	2 (1.1)	46 (25.6)	40 (22.2)	180
65 - 74	39 (41.1)	2 (4.7)	10 (10.5)	44 (46.3)	95
75 - 84	5 (15.6)	0 (---)	2 (6.3)	25 (78.1)	32
85 - 94	1 (25.0)	0 (---)	0 (---)	3 (75.0)	4
95+	0 (---)	0 (---)	0 (---)	1 (100.0)	1
[75+	6 (16.2)	0 (---)	2 (5.4)	29 (78.4)	37]
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0
21 & over	654 (54.8)	17 (1.4)	341 (28.6)	182 (15.2)	1194

Table 5. Status of women, aged 21 years and over, in the follow-up of Mullens on July 31, 1972.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	178 (57.6)	4 (1.3)	123 (39.8)	4 (1.3)	309
35 - 44	234 (68.6)	3 (0.9)	96 (28.2)	8 (2.3)	341
45 - 54	199 (69.1)	5 (1.7)	76 (26.4)	8 (2.8)	288
55 - 64	110 (58.2)	9 (4.8)	39 (20.6)	31 (16.4)	189
65 - 74	54 (52.9)	1 (1.0)	13 (12.7)	34 (33.3)	102
75 - 84	10 (33.3)	0 (---)	4 (13.3)	16 (53.3)	30
85 - 94	0 (---)	1 (20.0)	0 (---)	4 (80.0)	5
95+	0 (---)	0 (---)	0 (---)	0 (---)	0
[75+	10 (28.6)	1 (2.9)	4 (11.4)	20 (57.1)	35]
Unknown	0 (---)	0 (---)	0 (---)	2 (100.0)	2
21 & over	785 (62.0)	23 (1.8)	351 (27.7)	107 (8.5)	1266

Table 6. Status of men, aged 21 years and over, in the follow-up of Mullens on July 31, 1972 according to age and occupation (O.R.C.)

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total	
Non-Miners	21 - 34	89 (53.6)	2 (1.2)	72 (43.4)	3 (1.8)	166 (100.0)
	35 - 44	120 (70.6)	2 (1.2)	37 (21.8)	11 (6.5)	170 (100.1)
	45 - 54	136 (73.5)	4 (2.2)	22 (11.9)	23 (12.4)	185 (100.0)
	55 - 64	66 (56.9)	2 (1.7)	23 (19.8)	25 (21.6)	116 (100.0)
	65 - 74	32 (43.2)	2 (2.7)	9 (12.2)	31 (41.9)	74 (100.0)
	75 - 84	4 (18.2)	0 (--)	1 (4.5)	17 (77.3)	22 (100.1)
	85+	1 (25.0)	0 (--)	0 (--)	3 (75.0)	4 (100.0)
	21 & over	448 (60.8)	12 (1.6)	164 (22.3)	113 (15.3)	737 (100.0)
Miners and Ex-Miners	21 - 34	27 (39.7)	2 (2.9)	37 (54.4)	2 (2.9)	68 (100.1)
	35 - 44	78 (52.0)	1 (0.7)	63 (42.0)	8 (5.3)	150 (100.1)
	45 - 54	67 (46.9)	2 (1.4)	52 (36.4)	22 (15.4)	143 (100.1)
	55 - 64	26 (40.6)	0 (--)	23 (35.9)	15 (23.4)	64 (100.0)
	65 - 74	7 (33.3)	0 (--)	1 (4.8)	13 (61.9)	21 (100.0)
	75 - 84	1 (10.0)	0 (--)	1 (10.0)	8 (80.0)	10 (100.0)
	85+	0 (--)	0 (--)	0 (--)	1 (100.0)	1 (100.0)
	21 & over	206 (45.1)	5 (1.1)	177 (38.7)	69 (15.1)	457 (100.0)

Table 7. Status of persons aged 21 years and over, in the follow-up of Richwood on January 31, 1974.

Age Range in 1964	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	283 (50.2)	16 (2.8)	258 (45.7)	7 (1.2)	564
35 - 44	322 (63.1)	29 (5.7)	137 (26.9)	22 (4.3)	510
45 - 54	294 (61.2)	26 (5.4)	111 (23.1)	49 (10.2)	480
55 - 64	218 (55.1)	23 (5.8)	76 (19.2)	79 (19.9)	396
65 - 74	117 (47.8)	10 (4.1)	28 (11.4)	90 (36.7)	245
75 - 84	29 (23.0)	5 (3.9)	13 (10.3)	79 (62.7)	126
85 - 94	1 (4.3)	0 (-)	6 (26.1)	16 (69.6)	23
95+	0 (--)	0 (-)	0 (--)	1 (100.0)	1
75+	30 (20.0)	5 (3.3)	19 (12.7)	96 (64.0)	150
21 & over	1264 (53.9)	109 (4.6)	629 (26.8)	343 (14.6)	2345

Table B. Status of men, aged 21 years and over, in the follow-up of Richwood on January 31, 1974.

Age Range in 1964	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	121 (46.5)	6 (2.3)	128 (49.2)	5 (1.9)	260
35 - 44	134 (57.8)	13 (5.6)	67 (28.9)	18 (7.8)	232
45 - 54	125 (56.6)	13 (5.9)	52 (23.5)	31 (14.0)	221
55 - 64	92 (47.7)	11 (5.7)	37 (19.2)	53 (27.5)	193
65 - 74	43 (42.2)	5 (4.9)	10 (9.8)	44 (43.1)	102
75 - 84	11 (19.6)	3 (5.4)	6 (10.7)	36 (64.3)	56
85+	0 (--)	0 (-)	1 (14.3)	6 (85.7)	7
75+	11 (17.5)	3 (4.8)	7 (11.1)	42 (66.7)	63
21 & over	526 (49.1)	51 (4.8)	301 (28.1)	193 (18.0)	1071

Table 9. Status of women, aged 21 years and over, in the follow-up of Richwood on January 31, 1974.

Age Range in 1964	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	162 (53.3)	10 (3.3)	130 (42.8)	2 (0.7)	304
35 - 44	188 (67.6)	16 (5.8)	70 (25.2)	4 (1.4)	278
45 - 54	169 (65.3)	13 (5.0)	59 (22.2)	18 (6.9)	259
55 - 64	126 (62.1)	12 (5.9)	39 (19.2)	26 (12.8)	203
65 - 74	74 (51.7)	5 (3.5)	18 (12.6)	46 (32.2)	143
75 - 84	18 (25.7)	2 (2.9)	7 (10.0)	43 (61.4)	70
85 - 94	1 (6.3)	0 (-)	5 (31.3)	10 (62.5)	16
95+	0 (--)	0 (-)	0 (--)	1 (100.0)	1
75+	19 (21.8)	2 (2.3)	12 (13.8)	54 (62.1)	87
21 & over	738 (57.9)	58 (4.6)	328 (25.7)	150 (11.8)	1274

Table 10. Status of men, aged 21 years and over, in the follow-up of Richwood on January 31, 1974 according to age and occupation (O.R.C.)

	Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
Non-Miners	21 - 34	80 (46.0)	4 (2.3)	86 (49.4)	4 (2.3)	174 (100.1)
	35 - 44	72 (61.0)	9 (7.6)	26 (22.0)	11 (9.3)	118 (100.0)
	45 - 54	87 (61.7)	8 (5.7)	30 (21.3)	16 (11.3)	141 (100.0)
	55 - 64	68 (49.3)	6 (4.3)	24 (17.4)	40 (29.0)	138 (100.0)
	65 - 74	36 (45.0)	4 (5.0)	7 (8.8)	33 (41.2)	80 (99.9)
	75 - 84	10 (20.8)	3 (6.3)	5 (10.4)	30 (62.5)	48 (100.0)
	85+	0 (--)	0 (--)	1 (16.7)	5 (83.3)	6 (100.0)
	21 & over	353 (50.1)	34 (4.8)	179 (25.4)	139 (19.7)	705 (100.1)
Miners and Ex-Miners	21 - 34	41 (47.7)	2 (2.3)	42 (48.8)	1 (1.2)	86 (100.0)
	35 - 44	62 (54.4)	4 (3.5)	41 (36.0)	7 (6.1)	114 (100.0)
	45 - 54	38 (47.5)	5 (6.3)	22 (27.5)	15 (18.8)	80 (100.1)
	55 - 64	24 (43.6)	5 (9.1)	13 (23.6)	13 (23.6)	55 (99.9)
	65 - 74	7 (31.8)	1 (4.5)	3 (13.6)	11 (50.0)	22 (99.9)
	75 - 84	1 (12.5)	0 (--)	1 (12.5)	6 (75.0)	8 (100.0)
	85+	0 (--)	0 (--)	0 (--)	1 (100.0)	1 (100.0)
	21 & over	173 (47.3)	17 (4.6)	122 (33.3)	54 (14.8)	366 (100.0)

Table 11. Status of non-miners in matched sample at the census as of July 31, 1972.
Mullens.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	32 (58.2)	1 (1.8)	22 (40.0)	0 (---)	55
35 - 44	39 (70.9)	0 (---)	12 (21.8)	4 (7.3)	55
45 - 54	51 (71.8)	2 (2.8)	8 (11.3)	10 (14.1)	71
55 - 64	20 (46.5)	1 (2.3)	7 (16.3)	15 (34.9)	43
21 - 64	142 (63.4)	4 (1.9)	49 (21.9)	29 (12.9)	224

Table 12. Status of miners and ex-miners in matched sample at the census as of July 31, 1972. Mullens.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	18 (40.9)	2 (4.5)	22 (50.0)	2 (4.5)	44
35 - 44	39 (52.0)	1 (1.3)	28 (37.3)	7 (9.3)	75
45 - 54	35 (47.3)	1 (1.4)	28 (37.8)	10 (13.5)	74
55 - 64	18 (56.3)	0 (---)	12 (37.5)	2 (6.3)	32
21 - 64	110 (48.9)	4 (1.8)	90 (40.0)	21 (9.3)	225

Table 13. Status of non-miners' wives in matched sample at the census as of July 31, 1972.
Mullens.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	36 (64.3)	0 (---)	20 (35.7)	0 (---)	56
35 - 44	48 (88.9)	0 (---)	5 (9.3)	1 (1.9)	54
45 - 54	42 (80.8)	2 (3.8)	6 (11.5)	2 (3.8)	52
55 - 64	14 (66.7)	0 (---)	4 (19.0)	3 (14.3)	21
65 - 74	0 (---)	0 (---)	0 (---)	1 (100.0)	1
21 - 74	140 (76.1)	2 (1.1)	35 (19.0)	7 (3.8)	184

Table 14. Status of miners' wives in matched sample at the census as of July 31, 1972. Mullens.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	31 (56.4)	1 (1.8)	22 (40.0)	1 (1.8)	55
35 - 44	45 (62.5)	1 (1.4)	22 (30.6)	4 (5.6)	72
45 - 54	32 (57.1)	1 (1.8)	23 (41.1)	0 (---)	56
55 - 64	4 (50.0)	0 (---)	4 (50.0)	0 (---)	8
21 - 64	112 (58.6)	3 (1.6)	71 (37.2)	5 (2.6)	191

Table 15. Status of non-miners in Matched sample at the census as of January 31, 1974. Richwood.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	33 (54.1)	2 (3.3)	23 (37.7)	3 (4.9)	61
35 - 44	33 (64.4)	4 (6.8)	12 (20.3)	5 (8.5)	59
45 - 54	33 (58.9)	3 (5.4)	13 (23.2)	7 (12.5)	56
55 - 64	24 (50.0)	3 (6.3)	7 (14.6)	14 (29.2)	48
21 - 64	128 (57.1)	12 (5.4)	55 (24.6)	29 (12.9)	224

Table 16. Status of miners and ex-miners in matched sample at the census as of January 31, 1974. Richwood.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	31 (53.4)	2 (3.4)	24 (41.4)	1 (1.7)	58
35 - 44	40 (52.6)	3 (3.9)	29 (38.2)	4 (5.3)	76
45 - 54	23 (44.2)	3 (5.8)	18 (34.6)	8 (15.4)	52
55 - 64	15 (38.5)	5 (12.8)	8 (20.5)	11 (28.2)	39
21 - 64	109 (48.4)	13 (5.7)	79 (35.1)	24 (10.7)	225

Table 17. Status of non-miners' wives in matched sample at the census as of January 31, 1974. Richwood.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	27 (56.3)	2 (4.2)	18 (37.5)	1 (2.1)	48
35 - 44	31 (66.0)	4 (8.5)	12 (25.5)	0 (---)	47
45 - 54	31 (70.5)	2 (4.5)	8 (18.2)	3 (6.8)	44
55 - 64	14 (73.7)	1 (5.3)	4 (21.1)	0 (---)	19
21 - 64	103 (65.2)	9 (5.7)	42 (26.6)	4 (2.5)	158

Table 18. Status of miners' wives in matched sample at the census as of January 31, 1974. Richwood.

Age Range in 1963	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
21 - 34	42 (56.0)	2 (2.7)	31 (41.3)	0 (---)	75
35 - 44	41 (66.1)	4 (6.5)	17 (27.4)	0 (---)	62
45 - 54	25 (55.6)	3 (6.7)	12 (26.7)	5 (11.1)	45
55 - 64	5 (35.7)	2 (14.3)	2 (14.3)	5 (35.7)	14
21 - 64	113 (57.7)	11 (5.6)	62 (31.6)	10 (5.1)	196

Table 19. Persons aged 20 to 74 in Mullens by census interview status.
(Age as of December 31, 1972)

Age Range in 1972	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	366 (89.7)	41 (10.0)	1 (.2)	0 (--)	408
25 - 34	495 (98.4)	8 (1.6)	0 (--)	0 (--)	503
35 - 44	467 (98.3)	8 (1.7)	0 (--)	0 (--)	475
45 - 54	645 (98.5)	6 (.9)	2 (.3)	2 (.3)	655
55 - 64	508 (97.9)	11 (2.1)	0 (--)	0 (--)	519
65 - 74	277 (95.5)	12 (4.1)	0 (--)	1 (.3)	290
TOTAL	2758 (96.8)	86 (3.0)	3 (.1)	3 (.1)	2850

Table 20. Men aged 20 to 74 in Mullens by census interview status.
(Age as of December 31, 1972)

Age Range in 1972	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	179 (87.3)	26 (12.7)	0 (--)	0 (--)	205
25 - 34	245 (98.4)	4 (1.6)	0 (--)	0 (--)	249
35 - 44	209 (98.1)	4 (1.9)	0 (--)	0 (--)	213
45 - 54	306 (98.1)	3 (1.0)	1 (.3)	2 (.6)	312
55 - 64	269 (98.2)	5 (1.8)	0 (--)	0 (--)	274
65 - 74	109 (96.5)	3 (2.7)	0 (--)	1 (.8)	113
TOTAL	1317 (96.4)	45 (3.3)	1 (.1)	3 (.2)	1366

Table 21. Women aged 20 to 74 in Mullens by census interview status.
(Age as of December 31, 1972)

Age Range in 1972	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Total
20 - 14	187 (92.1)	15 (7.4)	1 (.5)	203
25 - 34	250 (98.4)	4 (1.6)	0 (--)	254
35 - 44	258 (95.5)	4 (1.5)	0 (--)	262
45 - 54	339 (98.8)	3 (.9)	1 (.3)	343
55 - 64	239 (97.6)	6 (2.4)	0 (--)	245
65 - 74	168 (94.9)	9 (5.1)	0 (--)	177
TOTAL	1441 (97.1)	41 (2.8)	2 (.1)	1484

Table 22. Men aged 20-74 in Mullens, West Virginia, according to occupation at census.
(Age as of December 31, 1972)

Non-Miners					
Age Range	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	80 (81.6)	18 (18.4)	0 (-)	0 (-)	96
25 - 34	121 (97.6)	3 (2.4)	0 (-)	0 (-)	124
35 - 44	115 (97.5)	3 (2.5)	0 (-)	0 (-)	118
45 - 54	152 (97.4)	1 (0.6)	1 (0.6)	2 (1.3)	156
55 - 64	142 (97.9)	3 (2.1)	0 (-)	0 (-)	145
65 - 74	64 (95.5)	3 (4.5)	0 (-)	0 (-)	67
20 - 74	674 (95.2)	31 (4.4)	1 (0.1)	2 (.3)	708

Miners and Ex-Miners					
Age Range	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	99 (92.5)	8 (7.5)	0 (-)	0 (-)	107
25 - 34	124 (99.2)	1 (0.8)	0 (-)	0 (-)	125
35 - 44	94 (98.9)	1 (1.1)	0 (-)	0 (-)	95
45 - 54	154 (98.7)	2 (1.3)	0 (-)	0 (-)	156
55 - 64	127 (98.4)	2 (1.6)	0 (-)	0 (-)	129
65 - 74	45 (97.8)	0 (--)	0 (-)	1 (2.2)	46
20 - 74	643 (97.7)	14 (2.1)	0 (-)	1 (.2)	658

Table 23. Persons aged 20 to 74 in Richwood by census interview status.
(Age as of December 31, 1973)

Age Range in 1973	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	206 (86.2)	33 (13.8)	0 (---)	0 (---)	239
25 - 34	332 (96.0)	12 (3.5)	2 (.6)	0 (---)	346
35 - 44	327 (91.1)	25 (7.0)	7 (1.9)	0 (---)	359
45 - 54	435 (91.2)	29 (6.1)	11 (2.3)	2 (.4)	477
55 - 64	357 (89.5)	26 (6.5)	9 (2.3)	7 (1.8)	399
65 - 74	251 (83.7)	23 (8.1)	4 (1.4)	5 (1.8)	283
Unknown	0 (---)	13 (92.9)	0 (---)	1 (7.1)	14
TOTAL	1908 (90.1)	161 (7.6)	33 (1.6)	15 (.7)	2117

Table 24. Men aged 20 to 74 in Richwood by census interview status.
(Age as of December 31, 1973)

Age Range in 1973	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	100 (83.3)	20 (16.7)	0 (---)	0 (---)	120
25 - 34	176 (96.7)	5 (2.7)	1 (.5)	0 (---)	182
35 - 44	136 (90.7)	12 (8.0)	2 (1.3)	0 (---)	150
45 - 54	195 (90.3)	14 (6.5)	6 (2.8)	1 (.5)	216
55 - 64	152 (87.9)	12 (6.9)	5 (2.9)	4 (2.3)	173
65 - 74	101 (85.6)	11 (9.3)	2 (1.7)	4 (3.4)	118
Unknown	0 (---)	8 (100.0)	0 (---)	0 (---)	8
TOTAL	860 (88.9)	82 (8.5)	16 (1.7)	9 (.9)	967

Table 25. Women aged 20 to 74 in Richwood by census interview status
(Age as of December 31, 1973)

Age Range in 1973	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	106 (89.1)	13 (10.7)	0 (---)	0 (---)	119
25 - 34	156 (95.1)	7 (4.3)	1 (.6)	0 (---)	164
35 - 44	191 (91.4)	13 (6.2)	5 (2.4)	0 (---)	209
45 - 54	240 (92.0)	15 (5.7)	5 (1.9)	1 (.4)	261
55 - 64	205 (90.7)	14 (6.2)	4 (1.8)	3 (1.3)	226
65 - 74	150 (90.9)	12 (7.3)	2 (1.2)	1 (.6)	165
Unknown	0 (---)	5 (83.3)	0 (---)	1 (16.7)	6
TOTAL	1048 (91.1)	79 (6.9)	17 (1.5)	6 (.5)	1150

Table 26. Man aged 20-74 in Richwood, West Virginia, according to occupation at census.
(Age as of December 31, 1973)

Non-Miners					
Age Range	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	79 (84.0)	15 (16.0)	0 (-)	0 (-)	94
25 - 34	121 (96.8)	3 (2.4)	1 (0.8)	0 (-)	125
35 - 44	84 (95.5)	3 (3.4)	1 (1.1)	0 (-)	88
45 - 54	111 (92.5)	7 (5.8)	1 (0.8)	1 (0.8)	120
55 - 64	109 (91.6)	5 (4.2)	3 (2.5)	2 (1.7)	119
65 - 74	62 (82.7)	7 (9.3)	2 (2.7)	4 (5.3)	75
Unknown (20 - 74)	0 (-)	2 (100.0)	0 (-)	0 (-)	2
20 - 74	566 (90.9)	42 (6.7)	8 (1.3)	7 (1.1)	623
Miners and Ex-Miners					
Age Range	Seen, Still in Area	Away, Unavailable, Incapable, Refused	Moved	Died	Total
20 - 24	8 (100.0)	0 (-)	0 (-)	0 (-)	8
25 - 34	49 (98.0)	1 (2.0)	0 (-)	0 (-)	50
35 - 44	50 (86.2)	7 (12.1)	1 (1.7)	0 (-)	58
45 - 54	84 (87.5)	7 (7.3)	5 (5.2)	0 (-)	96
55 - 64	43 (79.6)	7 (13.0)	2 (3.7)	2 (3.7)	54
65 - 74	39 (90.7)	4 (9.3)	0 (-)	0 (-)	43
Unknown (20 - 74)	0 (-)	0 (-)	0 (-)	0 (-)	0
20 - 74	273 (88.3)	26 (8.4)	8 (2.6)	2 (0.6)	309

Table 26. (Continued) Men aged 20-74 in Richwood, West Virginia according to occupation at census. (Age as of December 31, 1973)

Age Range	Occupation Not Determined		Total
	Seen, Still in Area	Away, Unavailable, Incapable, Refused	
20 - 24	13 (72.2)	5 (27.8)	18
25 - 34	6 (85.7)	1 (14.3)	7
35 - 44	2 (50.0)	2 (50.0)	4
45 - 54	0 (--)	0 (---)	0
55 - 64	0 (--)	0 (---)	0
65 - 74	0 (--)	0 (---)	0
Unknown (20 - 74)	0 (--)	6 (100.0)	6
20 - 74	21 (60.0)	14 (40.0)	35

Note:

For the 21 men "Seen, Still in Area", the Occupations were not determined for one of these reasons:

- (1) Questionnaires never received (though should have been) (14 men)
- (2) Questionnaires were available but not coded and/or punched (5 men)
- (3) Questionnaires incomplete and occupation not given (2 men)

For the 14 men "Away, Unavailable, Incapable, Refused", no other information was available.

Richwood Census was not complete when Exam list was drawn up. The interviewers in Richwood updated question book and these were added to Census but had no Questionnaires.

Table 27. Response rates to examination by type of examination.
Men aged 20 to 74 years in Mullens, West Virginia in 1973.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incomp1 Exam	All Examined	Moved	Died	Unava.	Refus.	Total
20 - 24	87 (42.4)	32 (15.6)	11 (5.4)	2 (1.0)	132 (64.6)	43 (21.0)	1 (.5)	25 (12.2)	4 (2.0)	205
25 - 34	127 (51.0)	50 (20.1)	11 (4.4)	1 (.4)	189 (75.9)	44 (17.7)	1 (.4)	11 (4.4)	4 (1.6)	249
35 - 44	117 (54.9)	47 (22.1)	16 (7.5)	0 (-)	180 (84.5)	15 (7.0)	1 (.5)	7 (3.3)	10 (4.7)	213
45 - 54	199 (63.8)	54 (17.3)	15 (4.8)	0 (-)	268 (85.9)	16 (5.1)	5 (1.6)	13 (4.2)	10 (3.2)	312
55 - 64	170 (62.0)	42 (15.3)	21 (7.7)	1 (.4)	234 (85.4)	13 (4.7)	4 (1.5)	10 (3.6)	13 (4.7)	274
65 - 74	62 (54.9)	18 (15.9)	9 (8.0)	6 (5.3)	95 (84.1)	8 (7.1)	9 (8.0)	1 (.9)	0 (-)	113
TOTAL	762 (55.8)	243 (17.8)	83 (6.1)	10 (.7)	1098 (80.4)	139 (10.2)	21 (1.5)	67 (4.9)	41 (3.0)	1366

Table 28. Response rates to examination by type of examination.
Women aged 20 to 74 years in Mullens, West Virginia in 1973.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Total
20 - 24	94 (46.3)	32 (15.8)	13 (6.4)	1 (.5)	140 (69.0)	48 (23.6)	0 (-)	11 (5.4)	4 (2.0)	203
25 - 34	152 (59.8)	45 (17.7)	11 (4.3)	1 (.4)	209 (82.3)	34 (13.4)	0 (-)	5 (2.0)	6 (2.4)	254
35 - 44	153 (58.4)	54 (20.6)	19 (7.3)	0 (-)	226 (86.3)	15 (5.7)	1 (.4)	6 (2.3)	14 (5.3)	262
45 - 54	225 (65.6)	47 (13.7)	28 (8.2)	1 (.3)	301 (87.8)	17 (5.0)	2 (.6)	10 (2.9)	13 (3.8)	343
55 - 64	155 (63.3)	35 (14.3)	22 (9.0)	1 (.4)	213 (86.9)	8 (3.3)	3 (1.2)	6 (2.4)	15 (6.1)	245
65 - 74	80 (45.2)	28 (15.8)	26 (14.7)	10 (5.6)	144 (81.4)	13 (7.3)	4 (2.3)	4 (2.3)	12 (6.8)	177
TOTAL	850 (57.9)	241 (16.2)	119 (8.0)	14 (.9)	1233 (83.1)	135 (9.1)	10 (.7)	42 (2.8)	64 (4.3)	1484

Table 29. Response rates to examination by type of examination.
 Non-miners aged 20 to 74 years in Mullens, West Virginia in 1973.
 Census occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Total
20 - 24	47 (48.0)	10 (10.2)	4 (4.1)	1 (1.0)	62 (63.3)	19 (19.4)	0 (-)	13 (13.3)	4 (4.1)	98
25 - 34	68 (54.8)	17 (13.7)	5 (4.0)	1 (.8)	91 (73.4)	21 (16.9)	1 (.8)	8 (6.5)	3 (2.4)	124
35 - 44	70 (59.3)	23 (19.5)	10 (8.5)	0 (-)	103 (87.3)	5 (4.2)	1 (.8)	4 (3.4)	5 (4.2)	118
45 - 54	97 (62.2)	27 (17.3)	10 (6.4)	0 (-)	134 (85.9)	6 (3.8)	4 (2.6)	8 (5.1)	4 (2.6)	156
55 - 64	87 (60.0)	22 (15.2)	12 (8.3)	1 (.7)	122 (84.1)	7 (4.8)	2 (1.4)	7 (4.8)	7 (4.8)	145
65 - 74	37 (53.7)	10 (14.9)	6 (9.0)	6 (8.5)	58 (86.6)	3 (4.5)	5 (7.5)	1 (1.5)	0 (-)	67
TOTAL	405 (57.2)	109 (15.4)	47 (6.6)	9 (1.3)	570 (80.5)	61 (8.6)	13 (1.8)	41 (5.8)	23 (3.2)	708

Table 30. Response rates to examination by type of examination.
Miners and ex-miners aged 20 to 74 years in Mullens, West Virginia in 1973.
Census occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Total
20 - 24	40 (37.4)	22 (20.6)	7 (6.5)	1 (.9)	70 (65.4)	24 (22.9)	1 (.9)	12 (11.2)	0 (-)	107
25 - 34	59 (47.2)	33 (26.4)	6 (4.8)	0 (-)	98 (78.4)	23 (18.4)	0 (-)	3 (2.4)	1 (.8)	125
35 - 44	47 (49.5)	24 (25.3)	6 (6.3)	0 (-)	77 (81.1)	10 (10.5)	0 (-)	3 (3.2)	5 (5.3)	95
45 - 54	102 (65.4)	27 (17.3)	5 (3.2)	0 (-)	134 (85.9)	10 (6.4)	1 (.6)	5 (3.2)	6 (3.8)	156
55 - 64	83 (64.3)	20 (15.5)	9 (7.0)	0 (-)	112 (86.8)	6 (4.7)	2 (1.6)	3 (2.3)	6 (4.7)	129
65 - 74	26 (56.5)	8 (17.4)	3 (6.5)	0 (-)	37 (80.4)	5 (10.9)	4 (8.7)	0 (-)	0 (-)	46
TOTAL	357 (54.3)	134 (20.4)	36 (5.5)	1 (.2)	528 (80.2)	78 (11.9)	8 (1.2)	26 (4.0)	18 (2.7)	658

Table 31. Response rates to examination by type of examination.
 Non-miners aged 20 to 74 years in Mullens, West Virginia
 in 1973.
 Examination occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined
20 - 24	45 (69.2)	13 (20.0)	5 (7.7)	2 (3.1)	65
25 - 34	62 (72.9)	17 (20.0)	5 (5.9)	1 (1.2)	85
35 - 44	66 (66.7)	23 (23.2)	10 (10.1)	0 (--)	99
45 - 54	85 (72.0)	23 (19.5)	10 (8.5)	0 (--)	118
55 - 64	72 (74.2)	14 (14.4)	10 (10.3)	1 (1.0)	97
65 - 74	32 (64.0)	8 (16.0)	4 (8.0)	6 (12.0)	50
TOTAL	362 (70.4)	98 (19.1)	44 (8.6)	10 (1.9)	514

Table 32. Response rates to examination by type of examination.
Miners and ex-miners aged 20 to 74 years in Mullens,
West Virginia in 1973.
Examination occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined
20 - 24	42 (62.7)	19 (28.4)	6 (9.0)	0 (-)	67
25 - 34	65 (62.5)	33 (31.7)	6 (5.8)	0 (-)	104
35 - 44	51 (63.0)	24 (29.6)	6 (7.4)	0 (-)	81
45 - 54	114 (76.0)	31 (20.7)	5 (3.3)	0 (-)	150
55 - 64	98 (71.5)	28 (20.4)	11 (8.0)	0 (-)	137
65 - 74	30 (66.7)	10 (22.2)	5 (11.1)	0 (-)	45
TOTAL	400 (68.5)	145 (24.8)	39 (6.7)	0 (-)	584

Table 33. Response rates to examination by type of examination.
Men aged 20 to 74 years in Richwood, West Virginia, in 1974.

Age Range in 1973	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Out of Age Range	Total
20 - 24	60 (50.0)	4 (3.3)	7 (5.8)	0 (--)	71 (59.2)	31 (25.8)	0 (--)	14 (11.7)	4 (3.3)	0 (--)	120
25 - 34	111 (61.0)	13 (7.1)	8 (4.4)	0 (--)	132 (72.5)	32 (17.6)	3 (1.6)	11 (6.0)	4 (2.2)	0 (--)	182
35 - 44	107 (71.3)	12 (8.0)	5 (3.3)	0 (--)	124 (82.7)	15 (10.0)	0 (--)	7 (4.7)	4 (2.7)	0 (--)	150
45 - 54	150 (69.4)	17 (7.9)	12 (5.6)	0 (--)	179 (82.9)	14 (6.5)	1 (.5)	15 (6.9)	7 (3.3)	0 (--)	216
55 - 64	103 (59.5)	21 (12.1)	15 (8.7)	4 (2.3)	143 (32.6)	5 (2.9)	5 (2.9)	12 (6.9)	8 (4.6)	0 (--)	173
65 - 74	73 (61.9)	7 (5.9)	16 (13.6)	0 (--)	96 (81.4)	7 (5.9)	7 (5.9)	5 (4.2)	2 (1.7)	1 (.9)	118
Unknown	0 (--)	0 (--)	0 (--)	1 (12.5)	1 (12.5)	1 (12.5)	1 (12.5)	4 (50.0)	0 (-)	1 (12.5)	8
TOTAL	604 (62.5)	74 (7.7)	63 (6.5)	5 (.5)	746 (77.1)	105 (10.9)	17 (1.8)	68 (7.0)	29 (3.0)	2 (.2)	967

Table 34. Response rates to examination by type of examination.
Women aged 20 to 74 years in Richwood, West Virginia, in 1974.

Age Range in 1973	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Out of Age Range	Total
20 - 24	62 (52.1)	5 (4.2)	4 (3.4)	0 (--)	71 (59.7)	39 (32.8)	0 (--)	8 (6.7)	1 (.8)	0 (--)	119
25 - 34	126 (76.8)	6 (3.7)	7 (4.3)	0 (--)	139 (84.8)	21 (12.8)	1 (.6)	2 (1.2)	1 (.6)	0 (--)	164
35 - 44	153 (73.2)	10 (4.8)	17 (8.2)	1 (.5)	181 (86.6)	13 (6.2)	0 (--)	7 (3.3)	8 (3.8)	0 (--)	209
45 - 54	188 (72.0)	9 (3.4)	30 (11.5)	2 (.8)	229 (87.7)	19 (7.3)	2 (.8)	5 (1.9)	6 (2.3)	0 (--)	261
55 - 64	161 (71.2)	14 (6.2)	22 (9.7)	2 (.9)	199 (88.1)	11 (4.8)	4 (1.8)	5 (2.2)	7 (3.1)	0 (--)	226
65 - 74	100 (60.6)	4 (2.4)	38 (23.0)	0 (--)	142 (86.1)	5 (3.0)	3 (1.3)	6 (3.6)	9 (5.5)	0 (--)	165
Unknown	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	2 (33.3)	1 (16.7)	0 (--)	0 (-)	3 (50.0)	6
TOTAL	790 (68.7)	48 (4.2)	118 (10.3)	5 (.4)	961 (83.6)	110 (9.6)	11 (1.0)	33 (2.9)	32 (2.8)	3 (.3)	1150

Table 35. Response rates to examination by type of examination.
 Non-miners aged 20 to 74 years in Richwood, West Virginia, in 1974.
 Census Occupation.

Age Range in 1973	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Out of Age Range	Total
20 - 24	55 (58.5)	4 (4.3)	6 (6.4)	0 (--)	65 (69.1)	17 (18.1)	0 (--)	10 (10.6)	2 (2.1)	0 (--)	94
25 - 34	81 (64.8)	8 (6.4)	7 (5.6)	0 (--)	96 (76.8)	19 (15.2)	1 (.8)	5 (4.0)	4 (3.2)	0 (--)	125
35 - 44	60 (68.2)	7 (8.0)	4 (4.5)	0 (--)	71 (80.7)	12 (13.6)	0 (--)	3 (3.4)	2 (2.3)	0 (--)	88
45 - 54	79 (65.8)	9 (7.5)	8 (6.7)	0 (--)	96 (80.0)	9 (7.5)	1 (.8)	10 (8.3)	4 (3.3)	0 (--)	120
55 - 64	74 (62.2)	9 (7.6)	14 (11.8)	2 (1.7)	99 (83.2)	3 (2.5)	3 (2.5)	7 (5.9)	7 (5.9)	0 (--)	119
65 - 74	46 (61.3)	3 (4.0)	9 (12.0)	0 (--)	58 (77.3)	4 (5.3)	6 (8.0)	4 (5.3)	2 (2.7)	1	75
Unknown	0 (--)	0 (--)	0 (--)	1 (50.0)	1 (50.0)	1 (50.0)	0 (--)	0 (--)	0 (--)	0 (--)	2
TOTAL	395 (63.4)	40 (6.4)	48 (7.7)	3 (.5)	486 (78.0)	65 (10.4)	11 (1.8)	39 (6.3)	21 (3.4)	1 (.2)	623

Table 36. Response rates to examination by type of examination.
Miners and ex-miners aged 20 to 74 years in Richwood, West Virginia, in 1974.
Census Occupation.

Age Range in 1973	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Out of Age Range	Total
20 - 24	5 (62.5)	0 (--)	1 (12.5)	0 (--)	6 (75.0)	2 (25.0)	0 (--)	0 (--)	0 (--)	0 (--)	8
25 - 34	30 (60.0)	5 (10.0)	1 (2.0)	0 (--)	36 (72.0)	10 (20.0)	2 (4.0)	2 (4.0)	0 (--)	0 (--)	50
35 - 44	47 (81.0)	5 (8.6)	1 (1.7)	0 (--)	54 (91.4)	1 (1.7)	0 (--)	2 (3.4)	2 (3.4)	0 (--)	58
45 - 54	71 (74.0)	8 (8.3)	4 (4.2)	0 (--)	82 (86.5)	5 (5.3)	0 (--)	5 (5.3)	3 (3.2)	0 (--)	96
55 - 64	29 (53.7)	12 (22.2)	1 (1.9)	2 (3.7)	44 (81.5)	2 (3.7)	2 (3.7)	5 (9.3)	1 (1.9)	0 (--)	54
65 - 74	27 (62.8)	4 (9.3)	7 (16.3)	0 (--)	38 (88.4)	3 (7.0)	1 (2.3)	1 (2.3)	0 (--)	0 (--)	43
Unknown	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0
TOTAL	209 (67.6)	34 (11.0)	15 (4.9)	2 (.6)	260 (84.1)	23 (7.4)	5 (1.6)	15 (4.9)	6 (1.9)	0 (--)	309

Table 37. Response rates to examination by type of examination.
Men aged 20 to 74 years in Richwood, West Virginia, in 1974.
Occupation unknown.

Age Range in 1973	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined	Moved	Died	Unava.	Refus.	Out of Age Range	Total
20 - 24	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	12 (66.7)	0 (--)	4 (22.2)	2 (11.1)	0 (--)	18
25 - 34	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	3 (42.9)	0 (--)	4 (57.1)	0 (--)	0 (--)	7
35 - 44	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	2 (50.0)	0 (--)	2 (50.0)	0 (--)	0 (--)	4
45 - 54	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0
55 - 64	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0
65 - 74	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0
Unknown	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	1 (16.7)	4 (66.7)	0 (--)	1 (16.7)	6
TOTAL	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	17 (48.6)	1 (2.9)	14 (40.0)	2 (5.7)	1 (2.9)	35

Table 38. Response rates to examination by type of examination.
 Non-miners aged 20 to 74 years in Richwood, West Virginia
 in 1974.
 Examination Occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined
20 - 24	53 (84.1)	4 (6.3)	6 (9.5)	0 (-)	63
25 - 34	74 (86.0)	6 (7.0)	6 (7.0)	0 (-)	86
35 - 44	47 (82.5)	6 (10.5)	4 (7.0)	0 (-)	57
45 - 54	55 (82.1)	7 (10.4)	5 (7.5)	0 (-)	67
55 - 64	55 (72.4)	5 (6.6)	12 (15.8)	4 (5.3)	76
65 - 74	38 (79.2)	3 (6.3)	7 (14.6)	0 (-)	48
Unknown	0 (-)	0 (-)	0 (-)	1 (100.0)	1
TOTAL	322 (80.9)	31 (7.8)	40 (10.1)	5 (1.3)	398

Table 39. Response rates to examination by type of examination.
Miners and ex-miners aged 20 to 74 years in Richwood,
West Virginia, in 1974.
Examination Occupation.

Age Range in 1972	Trlr Visit	Home Visit Spiro	Home Visit No Sp	Incompl Exam	All Examined
20 - 24	7 (87.5)	0 (--)	1 (12.5)	0 (--)	8
25 - 34	37 (80.4)	7 (15.2)	2 (4.3)	0 (--)	46
35 - 44	60 (89.6)	6 (9.0)	1 (1.5)	0 (--)	67
45 - 54	95 (84.8)	10 (8.9)	7 (6.3)	0 (--)	112
55 - 64	48 (71.6)	16 (23.9)	3 (4.5)	0 (--)	67
65 - 74	35 (72.9)	4 (8.3)	9 (18.8)	0 (--)	48
TOTAL	282 (81.0)	43 (12.4)	23 (6.6)	0 (--)	348

Table 40. Mortality from all causes by age and sex during the follow-up period in Mullens & Richwood.

MULLENS								
Age Group	Men				Women			
	Number in Population	Number Dead	Rate % 9 Years	Mean Annual	Number in Population	Number Dead	Rate % 9 Years	Mean Annual
21-	234	5	2.1	.24	309	4	1.3	.15
35-	320	19	5.9	.67	341	8	2.3	.26
45-	328	45	13.7	1.55	288	8	2.8	.32
55-	180	40	22.2	2.51	189	31	16.4	1.86
65-	95	44	46.3	5.24	102	34	33.3	3.77
75+	37	29	78.4	8.88	35	20	57.1	6.47
Not Recorded					2	2	100.0	11.33
Total	1194	182	15.2	1.72	1266	107	8.5	0.96

RICHWOOD								
Age Group	Men				Women			
	Number in Population	Number Dead	Rate % 9 Years	Mean Annual	Number in Population	Number Dead	Rate % 9 Years	Mean Annual
21-	260	6	2.3	.24	304	2	0.7	.08
35-	232	18	7.8	.84	278	4	1.4	.15
45-	221	31	14.0	1.51	259	18	6.9	.75
55-	193	53	27.5	2.97	203	26	12.8	1.38
65-	102	43	42.2	4.56	143	46	32.2	3.48
75+	63	42	66.7	7.21	87	54	62.1	6.71
Not Recorded								
Total	1071	193	18.0	1.95	1274	150	11.8	1.28

Table 41. Mortality from all causes by age & occupation during the follow-up period in Mullens & Richwood.

MULLENS						
Age Group	Non Miners			Miners & Ex Miners		
	Number in Population	Number Dead	Rate % 9 Years	Number in Population	Number Dead	Rate % 9 Years
21-	166	3	1.8	68	2	2.9
35-	170	11	6.5	150	8	5.3
45-	185	23	12.4	143	22	15.4
55-	116	25	21.6	64	15	23.4
65-	74	31	41.9	21	13	61.9
75+	26	20	76.9	11	9	81.8
Total	737	113	15.3	457	69	15.1
Age Adjusted*			14.5			17.2

RICHWOOD						
Age Group	Non Miners			Miners & Ex Miners		
	Number in Population	Number Dead	Rate % 9 Years	Number in Population	Number Dead	Rate % 9 Years
21-	174	5	2.9	86	1	1.2
35-	118	11	9.3	114	7	6.1
45-	141	16	11.3	80	15	18.8
55-	138	40	29.0	55	13	23.6
65-	80	32	40.0	22	11	50.0
75+	54	35	64.8	9	7	77.8
Total	705	139	19.7	366	54	14.8
Age Adjusted*			17.9			19.1

*The age adjustments were made on the basis of the total male population of each town (Mullens: 1194; and Richwood: 1071)

Table 42. Deaths by causes in non-miners, miners and ex-miners 21 years and over in Mullens, West Virginia, July 31, 1972.

Cause of death	Non Miners			Miners and Ex Miners		
	No.	% of all deaths	% of those with certificates	No.	% of all deaths	% of those with certificates
Cardiovascular	55	48.7	56.1	30	43.5	51.7
Cancer:						
Respiratory	5	4.4	5.1	1	1.4	1.7
Other	13	11.5	13.3	7	10.1	12.1
Respiratory diseases	6	5.3	6.1	7	10.1	12.1
Accidents	6	5.3	6.1	7	10.1	12.1
All other	13	11.5	13.3	6	8.7	10.3
No certificate	15	13.3	--	11	15.9	--
All causes	113	100.0	--	69	100.0	--
	98 With certificates			58 With certificates		

Table 43. Deaths by causes in non-miners, miners and ex-miners 21 years and over in Richwood, West Virginia, January 31, 1974.

Cause of death	Non Miners			Miners and Ex Miners		
	No.	% of all deaths	% of those with certificates	No.	% of all deaths	% of those with certificates
Cardiovascular	72	51.8	60.5	26	48.1	60.5
Cancer:						
Respiratory	6	4.3	5.0	2	3.7	4.7
Other	11	7.9	9.2	3	5.6	7.0
Respiratory diseases	9	6.5	7.6	6	11.1	14.0
Accidents	4	2.9	3.4	4	7.4	9.3
All other	17	12.2	14.3	2	3.7	4.7
No certificate	20	14.4	--	11	20.4	--
All causes	139	100.0	--	54	100.0	--
	119 With certificates			43 With certificates		

Table 44. Standardized mortality ratios (SMRs) among men aged 25 to 74 years in Mullens and Richwood during the follow-up period.
 Expected number of deaths based on the mean mortality rates for 1969 to 1971 in West Virginia and white male population in 1970.

Town	Disease Category	Non Miners			Miners & Ex Miners		
		Observed	Expected	SMR	Observed	Expected	SMR
Mullens	Cardiovascular	46	42.8	107.5	23	21.0	109.5
	Non-Malignant Respiratory	6	5.0	120.0	7	2.4	291.7
	Respiratory Cancer	4	6.7	59.7	1	3.5	28.6
	Accidents	6	6.6	90.9	6	4.4	136.4
	All Causes	93	83.7	111.1	59	43.6	135.3
Richwood	Cardiovascular	51	46.5	109.7	23	17.8	129.2
	Non-Malignant Respiratory	5	5.4	92.6	5	2.1	243.9
	Respiratory Cancer	6	6.1	98.4	1	2.9	34.5
	Accidents	4	6.2	64.5	4	3.6	111.1
	All Causes	104	89.0	116.9	47	36.6	128.4

Table 45. Comparison of age standardized mortality (SMR) for miners and ex-miners and non-miners in Mullens and Richwood during the 8-9 year follow-up period.

Disease	Non Miners			Miners & Ex Miners		
	Observed	Expected	SMR	Observed	Expected	SMR
Cardiovascular	97	89.3	109	46	38.8	119
Non Malignant Respiratory	11	10.4	106	12	4.5	267*
Cancer of Respiratory System	10	12.8	78	2	6.4	31*
Accidents	10	12.8	78	10	8.0	125
All Causes	197	172.7	114	106	80.2	132*

*Significant at 5% level

Table 46. Status of men aged 21 years and over in the follow-up of Mullens on July 31, 1972 by Cigarette Smoking Status at the ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	31 (55.4)	0 (—)	24 (42.9)	1 (1.8)	56
35-44	36 (58.1)	0 (—)	24 (38.7)	2 (3.2)	62
45-54	43 (68.3)	1 (1.6)	14 (22.2)	5 (7.9)	63
55-64	26 (65.0)	2 (5.0)	7 (17.5)	5 (12.5)	40
65-74	13 (40.6)	0 (—)	3 (9.4)	16 (50.0)	32
75-84	3 (15.8)	0 (—)	0 (—)	16 (84.2)	19
85+	0 (—)	0 (—)	0 (—)	3 (100.0)	3
Exsmokers					
21-34	11 (44.0)	0 (—)	11 (44.0)	3 (12.0)	25
35-44	37 (66.1)	0 (—)	18 (32.1)	1 (1.8)	56
45-54	40 (63.5)	0 (—)	15 (23.8)	8 (12.7)	63
55-64	18 (39.1)	0 (—)	16 (34.8)	12 (26.1)	46
65-74	12 (42.9)	1 (3.6)	4 (14.3)	11 (39.3)	28
75-84	1 (33.3)	0 (—)	1 (33.3)	1 (33.3)	3
85+	1 (100.0)	0 (—)	0 (—)	0 (—)	1
Cigarette smokers					
21-34	74 (48.4)	4 (2.6)	74 (48.4)	1 (0.7)	153
35-44	125 (62.2)	3 (1.5)	57 (28.4)	16 (8.0)	201
45-54	120 (59.4)	5 (2.5)	45 (22.3)	32 (15.8)	202
55-64	48 (51.1)	0 (—)	23 (24.5)	23 (24.5)	94
65-74	14 (41.2)	0 (—)	3 (8.8)	17 (50.0)	34
75-84	1 (10.0)	0 (—)	1 (10.0)	8 (80.0)	10
85+	0 (—)	0 (—)	0 (—)	1 (100.0)	1

Table 47. Status of women aged 21 years and over in the follow-up of Mullens on July 31, 1972, by Cigarette Smoking Status at the ORC interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Non-Smokers					
21-34	90 (63.4)	1 (0.7)	49 (34.5)	2 (1.4)	142
35-44	105 (67.7)	2 (1.3)	45 (29.0)	3 (1.9)	155
45-54	103 (71.5)	2 (1.4)	34 (23.6)	5 (3.5)	144
55-64	77 (59.2)	7 (5.4)	30 (23.1)	16 (12.3)	130
65-74	46 (52.9)	1 (1.1)	12 (13.8)	28 (32.2)	87
75-84	10 (35.7)	0 (---)	4 (14.3)	14 (50.0)	28
85+	0 (---)	1 (20.0)	0 (---)	4 (40.0)	5
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0
Ex-Smokers					
21-34	16 (64.0)	0 (---)	9 (36.0)	0 (---)	25
35-44	20 (76.9)	0 (---)	6 (23.1)	0 (---)	26
45-54	21 (77.8)	0 (---)	6 (22.2)	0 (---)	27
55-64	8 (50.0)	1 (6.3)	0 (---)	7 (43.8)	16
65-74	3 (75.0)	0 (---)	0 (---)	1 (25.0)	4
75-84	0 (---)	0 (---)	0 (---)	0 (---)	0
85+	0 (---)	0 (---)	0 (---)	0 (---)	0
Unknown	0 (---)	0 (---)	0 (---)	1 (100.0)	1
Cigarette Smokers					
21-34	71 (50.7)	3 (2.1)	64 (45.7)	2 (1.4)	140
35-44	109 (68.1)	1 (0.6)	45 (28.1)	5 (3.1)	160
45-54	75 (64.7)	3 (2.6)	35 (30.2)	3 (2.6)	116
55-64	24 (57.1)	1 (2.4)	9 (21.4)	8 (19.0)	42
65-74	3 (42.9)	0 (---)	0 (---)	4 (57.1)	7
75-84	0 (---)	0 (---)	0 (---)	2 (100.0)	2
85+	0 (---)	0 (---)	0 (---)	0 (---)	0
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0

Table 48. Status of non-miners aged 21 years and over in the follow-up of Mullens on July 31, 1972, by Cigarette Smoking Status at the ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	28 (62.2)	0 (—)	16 (35.6)	1 (2.2)	45
35-44	27 (71.1)	0 (—)	9 (23.7)	2 (5.3)	38
45-54	34 (75.6)	1 (2.2)	6 (13.3)	4 (8.9)	45
55-64	21 (72.4)	2 (6.9)	4 (13.8)	2 (6.9)	29
65-74	12 (44.4)	0 (—)	3 (11.1)	12 (44.4)	27
75-84	2 (16.7)	0 (—)	0 (—)	10 (83.3)	12
85+	0 (—)	0 (—)	0 (—)	2 (100.0)	2
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	124 (62.6)	3 (1.5)	38 (19.2)	33 (16.7)	198
Exsmokers					
21-34	7 (43.8)	0 (—)	7 (43.8)	2 (12.5)	16
35-44	23 (69.7)	0 (—)	10 (30.3)	0 (—)	33
45-54	27 (71.1)	0 (—)	4 (10.5)	7 (18.4)	38
55-64	12 (38.7)	0 (—)	9 (29.0)	10 (32.3)	31
65-74	9 (47.4)	1 (5.3)	3 (15.8)	6 (31.6)	19
75-84	1 (100.0)	0 (—)	0 (—)	0 (—)	1
85+	1 (100.0)	0 (—)	0 (—)	0 (—)	1
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	80 (57.6)	1 (0.7)	33 (23.7)	25 (18.0)	139
Cigarette smokers					
21-34	54 (51.4)	2 (1.9)	49 (46.7)	0 (—)	105
35-44	70 (71.4)	2 (2.0)	17 (17.3)	9 (9.2)	98
45-54	75 (73.5)	3 (2.9)	12 (11.8)	12 (11.8)	102
55-64	33 (58.9)	0 (—)	10 (17.9)	13 (23.2)	56
65-74	11 (40.7)	0 (—)	3 (11.1)	13 (48.1)	27
75-84	1 (11.1)	0 (—)	1 (11.1)	7 (77.8)	9
85+	0 (—)	0 (—)	0 (—)	1 (100.0)	1
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	244 (61.3)	7 (1.8)	92 (23.1)	55 (13.8)	398

Table 49. Status of miners and ex-miners aged 21 years and over in the follow-up of Mullens on July 31, 1972, by Cigarette Smoking Status at the ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	3 (27.3)	0 (—)	8 (72.7)	0 (—)	11
35-44	9 (37.5)	0 (—)	15 (62.5)	0 (—)	24
45-54	9 (50.0)	0 (—)	8 (44.4)	1 (5.6)	18
55-64	5 (45.5)	0 (—)	3 (27.3)	3 (27.3)	11
65-74	1 (20.0)	0 (—)	0 (—)	4 (80.0)	5
75-84	1 (14.3)	0 (—)	0 (—)	6 (85.7)	7
85+	0 (—)	0 (—)	0 (—)	1 (100.0)	1
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	28 (36.4)	0 (—)	34 (44.2)	15 (19.5)	77
Exsmokers					
21-34	4 (44.4)	0 (—)	4 (44.4)	1 (11.1)	9
35-44	14 (60.9)	0 (—)	8 (34.8)	1 (4.3)	23
45-54	13 (52.0)	0 (—)	11 (44.0)	1 (4.0)	25
55-64	6 (40.0)	0 (—)	7 (46.7)	2 (13.3)	15
65-74	3 (33.3)	0 (—)	1 (11.1)	5 (55.6)	9
75-84	0 (—)	0 (—)	1 (50.0)	1 (50.0)	2
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	40 (48.2)	0 (—)	32 (38.6)	11 (13.3)	83
Cigarette smokers					
21-34	20 (41.7)	2 (4.2)	25 (52.1)	1 (2.1)	48
35-44	55 (53.4)	1 (1.0)	40 (38.8)	7 (6.8)	103
45-54	45 (45.0)	2 (2.0)	33 (33.0)	20 (20.0)	100
55-64	15 (39.5)	0 (—)	13 (34.2)	10 (26.3)	38
65-74	3 (42.9)	0 (—)	0 (—)	4 (57.1)	7
75-84	0 (—)	0 (—)	0 (—)	1 (100.0)	1
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	138 (46.5)	5 (1.7)	111 (37.4)	43 (14.5)	297

Table 50. Status of men aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.

Age range in 1964	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	31 (43.7)	1 (1.4)	39 (54.9)	0 (—)	71
35-44	17 (54.8)	4 (12.9)	5 (16.1)	5 (16.1)	31
45-54	22 (55.0)	4 (10.0)	11 (27.5)	3 (7.5)	40
55-64	17 (44.7)	3 (7.9)	12 (31.6)	6 (15.8)	38
65-74	19 (50.0)	1 (2.6)	3 (7.9)	15 (39.5)	38
75-84	9 (23.7)	3 (7.9)	4 (10.5)	22 (57.9)	38
85+	0 (—)	0 (—)	1 (20.0)	4 (80.0)	5
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	115 (44.1)	16 (6.1)	75 (28.7)	55 (21.1)	261
Exsmokers					
21-34	21 (63.6)	1 (3.0)	11 (33.3)	0 (—)	33
35-44	29 (67.4)	2 (4.2)	14 (29.2)	3 (6.3)	48
45-54	23 (59.0)	2 (5.1)	9 (23.1)	5 (12.8)	39
55-64	29 (54.7)	4 (7.5)	8 (15.1)	12 (22.6)	53
65-74	12 (41.4)	2 (6.9)	3 (10.3)	12 (41.4)	29
75-84	0 (—)	0 (—)	0 (—)	5 (100.0)	5
85+	0 (—)	0 (—)	0 (—)	2 (100.0)	2
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	114 (54.5)	11 (5.3)	45 (21.5)	39 (18.7)	209
Cigarette smokers					
21-34	69 (44.2)	4 (2.6)	77 (49.4)	6 (3.8)	156
35-44	88 (57.5)	7 (4.6)	48 (31.4)	10 (6.5)	153
45-54	80 (56.3)	7 (4.9)	32 (22.5)	23 (16.2)	142
55-64	46 (45.1)	4 (3.9)	17 (16.7)	35 (34.3)	102
65-74	12 (34.3)	2 (5.7)	5 (14.3)	16 (45.7)	35
75-84	2 (15.4)	0 (—)	2 (15.4)	9 (69.2)	13
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	297 (49.4)	24 (4.0)	181 (30.1)	99 (16.5)	601

Table 51. Status of women aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.

Age range in 1964	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Non-Smokers					
21-34	68 (50.4)	6 (4.4)	59 (43.7)	2 (1.5)	135
35-44	80 (73.4)	10 (9.2)	19 (17.4)	0 (---)	109
45-54	72 (65.5)	6 (5.5)	27 (24.5)	5 (4.5)	110
55-64	86 (65.2)	10 (7.6)	20 (15.2)	16 (12.1)	132
65-74	66 (57.4)	4 (3.5)	13 (11.3)	32 (27.8)	115
75-84	18 (26.9)	2 (3.0)	6 (9.0)	41 (61.2)	67
85+	1 (7.2)	0 (---)	5 (35.7)	8 (57.2)	14
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0
21 and over	391 (57.3)	38 (5.6)	149 (21.8)	104 (15.2)	682
Ex-Smokers					
21-34	16 (53.3)	1 (3.3)	13 (43.3)	0 (---)	30
35-44	25 (75.8)	0 (---)	7 (21.2)	1 (3.0)	33
45-54	17 (77.3)	0 (---)	3 (13.6)	2 (9.1)	22
55-64	10 (58.8)	0 (---)	3 (17.6)	4 (23.5)	17
65-74	4 (40.0)	1 (10.0)	3 (30.0)	2 (20.0)	10
75-84	0 (---)	0 (---)	1 (100.0)	0 (---)	1
85+	0 (---)	0 (---)	0 (---)	2 (100.0)	2
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0
21 and over	72 (62.6)	2 (1.7)	30 (26.1)	11 (9.6)	115
Cigarette Smokers					
21-34	78 (56.3)	3 (2.2)	57 (41.3)	0 (---)	138
35-44	83 (62.4)	6 (4.5)	41 (30.8)	3 (2.3)	133
45-54	78 (62.9)	7 (5.6)	28 (22.6)	11 (8.9)	124
55-64	28 (58.3)	2 (4.2)	12 (25.0)	6 (12.5)	48
65-74	4 (23.5)	0 (---)	1 (5.9)	12 (70.6)	17
75-84	0 (---)	0 (---)	0 (---)	1 (100.0)	1
85+	0 (---)	0 (---)	0 (---)	0 (---)	0
Unknown	0 (---)	0 (---)	0 (---)	0 (---)	0
21 and over	271 (58.8)	18 (3.9)	139 (30.2)	33 (7.2)	461

Table 52. Status of non-miners aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.

Age range in 1964	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	24 (43.6)	0 (—)	31 (56.4)	0 (—)	55
35-44	10 (53.8)	1 (5.9)	2 (11.8)	4 (23.5)	17
45-54	17 (60.7)	2 (7.1)	9 (32.1)	0 (—)	28
55-64	15 (46.9)	1 (3.1)	10 (31.3)	6 (18.8)	32
65-74	16 (51.6)	1 (3.2)	2 (6.5)	12 (38.7)	31
75-84	8 (25.0)	3 (9.4)	3 (9.4)	18 (56.3)	32
85+	0 (—)	0 (—)	1 (20.0)	4 (80.0)	5
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	90 (45.0)	8 (4.0)	58 (29.0)	44 (22.0)	200
Exsmokers					
21-34	15 (71.4)	0 (—)	6 (28.6)	0 (—)	21
35-44	14 (70.0)	1 (5.0)	3 (15.0)	2 (10.0)	20
45-54	18 (64.3)	2 (7.1)	5 (17.9)	3 (10.7)	28
55-64	22 (55.0)	2 (5.0)	6 (15.0)	10 (25.0)	40
65-74	12 (48.0)	2 (8.0)	3 (12.0)	8 (32.0)	25
75-84	0 (—)	0 (—)	0 (—)	5 (100.0)	5
85+	0 (—)	0 (—)	0 (—)	1 (100.0)	1
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	81 (57.9)	7 (5.0)	23 (16.4)	29 (20.7)	140
Cigarette smokers					
21-34	41 (41.8)	4 (4.1)	48 (49.0)	5 (5.1)	93
35-44	48 (59.3)	7 (8.6)	21 (25.9)	5 (6.2)	81
45-54	52 (61.2)	4 (4.7)	16 (18.8)	13 (15.3)	85
55-64	31 (47.0)	3 (4.5)	8 (12.1)	24 (36.4)	66
65-74	8 (33.3)	1 (4.2)	3 (12.5)	12 (50.0)	24
75-84	2 (18.2)	0 (—)	2 (18.2)	7 (63.6)	11
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	182 (49.9)	19 (5.2)	98 (26.8)	66 (18.1)	365

Table 53. Status of miners and ex-miners aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.

Age range in 1964	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
Nonsmokers					
21-34	7 (43.8)	1 (6.3)	8 (50.0)	0 (—)	16
35-44	7 (50.0)	3 (21.4)	3 (21.4)	1 (7.1)	14
45-54	5 (41.7)	2 (16.7)	2 (16.7)	3 (25.0)	12
55-64	2 (33.3)	2 (33.3)	2 (33.3)	0 (—)	6
65-74	3 (42.9)	0 (—)	1 (14.3)	3 (42.9)	7
75-84	1 (16.7)	0 (—)	1 (16.7)	4 (66.7)	6
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	25 (41.0)	8 (13.1)	17 (27.9)	11 (18.0)	61
Exsmokers					
21-34	6 (50.0)	1 (8.3)	5 (41.7)	0 (—)	12
35-44	15 (53.6)	1 (3.6)	11 (39.3)	1 (3.6)	28
45-54	5 (45.5)	0 (—)	4 (35.4)	2 (18.2)	11
55-64	7 (53.8)	2 (15.4)	2 (15.4)	2 (15.4)	13
65-74	0 (—)	0 (—)	0 (—)	4 (100.0)	4
75-84	0 (—)	0 (—)	0 (—)	0 (—)	0
85+	0 (—)	0 (—)	— (—)	1 (100.0)	1
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	33 (47.8)	4 (5.8)	22 (31.9)	10 (14.5)	69
Cigarette smokers					
21-34	28 (48.3)	0 (—)	29 (50.0)	1 (1.7)	58
35-44	40 (55.6)	0 (—)	27 (37.5)	5 (6.9)	72
45-54	28 (49.1)	3 (5.3)	16 (28.1)	10 (17.5)	57
55-64	15 (41.7)	1 (2.8)	9 (25.0)	11 (30.6)	36
65-74	4 (36.4)	1 (9.1)	2 (18.2)	4 (36.4)	11
75-84	0 (—)	0 (—)	0 (—)	2 (100.0)	2
85+	0 (—)	0 (—)	0 (—)	0 (—)	0
Unknown	0 (—)	0 (—)	0 (—)	0 (—)	0
21 and over	115 (48.7)	5 (2.1)	83 (35.2)	33 (14.0)	236

Table 54. Matched sample.
 Status of non-miners aged 21 years and over in the follow-up
 of Mullens on July 31, 1972, by Cigarette Smoking Status
 at the ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21 - 34	10 (58.8)	0 (-)	7 (41.2)	0 (-)	17
35 - 44	7 (70.0)	0 (-)	2 (20.0)	1 (10.0)	10
45 - 54	8 (72.7)	0 (-)	2 (18.2)	1 (9.1)	11
55 - 64	6 (66.7)	1 (11.1)	2 (22.2)	0 (-)	9
21 - 64	31 (66.0)	1 (2.1)	13 (27.7)	2 (4.3)	47
<u>Exsmokers</u>					
21 - 34	2 (66.7)	0 (-)	1 (33.3)	0 (-)	3
35 - 44	7 (53.8)	0 (-)	6 (46.2)	0 (-)	13
45 - 54	12 (63.2)	0 (-)	3 (15.8)	4 (21.1)	19
55 - 64	5 (35.7)	0 (-)	1 (7.1)	8 (57.1)	14
21 - 64	26 (53.1)	0 (-)	11 (22.4)	12 (24.5)	49
<u>Cigarette smokers</u>					
21 - 34	20 (57.1)	1 (2.9)	14 (40.0)	0 (-)	35
35 - 44	25 (78.1)	0 (-)	4 (12.5)	3 (9.4)	32
45 - 54	31 (75.6)	2 (4.9)	3 (7.3)	5 (12.2)	41
55 - 64	9 (45.0)	0 (-)	4 (20.0)	7 (35.0)	20
21 - 64	85 (66.4)	3 (2.3)	25 (19.5)	15 (11.7)	123

Table 55. Mached sample.
 Status of miners aged 21 years and over in the follow-up of
 Mullens on July 31, 1972, by Cigarette Smoking Status at the
 ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21 - 34	2 (25.0)	0 (-)	6 (75.0)	0 (-)	8
35 - 44	3 (27.3)	0 (-)	8 (72.7)	0 (-)	11
45 - 54	2 (28.6)	0 (-)	4 (57.1)	1 (14.3)	7
55 - 64	3 (75.0)	0 (-)	0 (-)	1 (25.0)	4
21 - 64	10 (33.3)	0 (-)	18 (60.0)	2 (6.7)	30
<u>Exsmokers</u>					
21 - 34	2 (40.0)	0 (-)	2 (40.0)	1 (20.0)	5
35 - 44	6 (75.0)	0 (-)	1 (12.5)	1 (12.5)	8
45 - 54	7 (50.0)	0 (-)	6 (42.9)	1 (7.1)	14
55 - 64	3 (42.9)	0 (-)	4 (57.1)	0 (-)	7
21 - 64	18 (52.9)	0 (-)	13 (38.2)	3 (8.8)	34
<u>Cigarette smokers</u>					
21 - 34	14 (45.2)	2 (6.5)	14 (45.2)	1 (3.2)	31
35 - 44	30 (53.6)	1 (1.8)	19 (33.9)	6 (10.7)	56
45 - 54	26 (49.1)	1 (1.9)	18 (34.0)	8 (15.1)	53
55 - 64	12 (57.1)	0 (-)	8 (38.1)	1 (4.8)	21
21 - 64	82 (50.9)	4 (2.5)	59 (36.6)	16 (9.9)	161

Table 56. Matched sample.
 Status of non-miners' wives aged 21 years and over in the
 follow-up of Mullens on July 31, 1972, by Cigarette Smoking Status
 at the ORC Interview.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21 - 34	25 (71.4)	0 (-)	10 (28.6)	0 (-)	35
35 - 44	23 (92.0)	0 (-)	1 (4.0)	1 (4.0)	25
45 - 54	22 (73.3)	2 (6.7)	5 (16.7)	1 (3.3)	30
55 - 64	9 (60.0)	0 (-)	3 (20.0)	3 (30.0)	15
21 - 64	79 (75.2)	2 (1.9)	19 (18.1)	5 (4.8)	105
<u>Exsmokers</u>					
21 - 34	2 (66.7)	0 (-)	1 (33.3)	0 (-)	3
35 - 44	4 (100.0)	0 (-)	0 (-)	0 (-)	4
45 - 54	5 (100.0)	0 (-)	0 (-)	0 (-)	5
55 - 64	2 (66.7)	0 (-)	0 (-)	1 (33.3)	3
21 - 64	13 (86.7)	0 (-)	1 (6.7)	1 (6.7)	15
<u>Cigarette smokers</u>					
21 - 34	9 (50.0)	0 (-)	9 (50.0)	0 (-)	18
35 - 44	21 (84.0)	0 (-)	4 (16.0)	0 (-)	25
45 - 54	15 (93.8)	0 (-)	0 (-)	1 (6.3)	16
55 - 64	3 (75.0)	0 (-)	1 (25.0)	0 (-)	4
21 - 64	48 (76.2)	0 (-)	14 (22.2)	1 (1.6)	63

Table 57. Status of Miners' wives aged 21 years and over in the follow-up of Mullens on July 31, 1972, by Cigarette Smoking Status at the ORC Interview.
Matched sample.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21 - 34	11 (61.1)	0 (-)	7 (38.9)	0 (-)	18
35 - 44	25 (65.8)	1 (2.6)	11 (28.9)	1 (2.6)	38
45 - 54	16 (57.1)	0 (-)	12 (42.9)	0 (-)	28
55 - 64	1 (25.0)	0 (-)	3 (75.0)	0 (-)	4
21 - 64	53 (60.2)	1 (1.1)	33 (37.5)	1 (1.1)	88
<u>Exsmokers</u>					
21 - 34	2 (66.7)	0 (-)	1 (33.3)	0 (-)	3
35 - 44	2 (40.0)	0 (-)	3 (60.0)	0 (-)	5
45 - 54	3 (100.0)	0 (-)	0 (-)	0 (-)	3
55 - 64	1 (100.0)	0 (-)	0 (-)	0 (-)	1
21 - 64	8 (66.7)	0 (-)	4 (33.3)	0 (-)	12
<u>Cigarette smokers</u>					
21 - 34	17 (51.5)	1 (3.0)	14 (42.4)	1 (3.0)	33
35 - 44	18 (62.1)	0 (-)	8 (27.6)	3 (10.3)	29
45 - 54	13 (52.0)	1 (4.0)	11 (44.0)	0 (-)	25
55 - 64	1 (50.0)	0 (-)	1 (50.0)	0 (-)	2
21 - 64	49 (55.1)	2 (2.2)	34 (38.2)	4 (4.5)	89

Table 58. Status of non-miners aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.
Matched sample.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21-34	7 (53.8)	0 (—)	6 (46.2)	0 (—)	13
35-44	6 (75.0)	1 (12.5)	0 (—)	1 (12.5)	8
45-54	3 (37.5)	1 (12.5)	4 (50.0)	0 (—)	8
55-64	4 (44.4)	1 (11.1)	2 (22.2)	2 (22.2)	9
21-64	20 (52.6)	3 (7.9)	12 (31.6)	3 (7.9)	38
<u>Exsmokers</u>					
21-34	5 (83.3)	0 (—)	1 (16.7)	0 (—)	6
35-44	6 (66.7)	0 (—)	2 (22.2)	1 (11.1)	9
45-54	3 (42.9)	1 (14.3)	1 (14.3)	2 (28.6)	7
55-64	11 (73.3)	0 (—)	3 (20.0)	1 (6.7)	15
21-64	25 (67.6)	1 (2.7)	7 (18.9)	4 (10.8)	37
<u>Cigarette smokers</u>					
21-34	21 (50.0)	2 (4.8)	16 (38.1)	3 (7.1)	42
35-44	26 (61.9)	3 (7.1)	10 (23.8)	3 (7.1)	42
45-54	27 (65.9)	1 (2.4)	8 (19.5)	5 (12.2)	41
55-64	9 (37.5)	2 (8.3)	2 (8.3)	11 (45.8)	24
21-34	83 (55.7)	8 (5.4)	36 (24.2)	22 (14.8)	149

Table 59. Status of miners aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.
Matched sample.

Age range in 1963	Seen, still in area	Away, unavailable, incapable,refused	Moved	Died	Total
<u>Nonsmokers</u>					
21-34	5 (45.5)	1 (9.1)	5 (45.5)	0 (—)	11
35-44	7 (58.3)	3 (25.0)	2 (16.7)	0 (—)	12
45-54	3 (33.3)	1 (11.1)	2 (22.2)	0 (—)	9
55-64	0 (—)	2 (66.7)	1 (33.3)	3 (33.3)	3
21-64	15 (42.9)	7 (20.0)	10 (28.6)	3 (8.6)	35
<u>Exsmokers</u>					
21-34	3 (50.0)	1 (16.7)	2 (33.3)	0 (—)	6
35-44	11 (73.3)	0 (—)	4 (26.7)	0 (—)	15
45-54	2 (28.6)	0 (—)	4 (57.1)	1 (14.3)	7
55-64	6 (50.0)	2 (16.7)	2 (16.7)	2 (16.7)	12
21-64	22 (55.0)	3 (7.5)	12 (30.0)	3 (7.5)	40
<u>Cigarette smokers</u>					
21-34	23 (56.1)	0 (—)	17 (41.5)	1 (2.4)	41
35-44	22 (44.9)	0 (—)	23 (46.9)	4 (8.2)	49
45-54	18 (50.0)	2 (5.6)	12 (33.3)	4 (11.1)	36
55-64	9 (37.5)	1 (4.2)	5 (20.8)	9 (37.5)	24
21-64	72 (48.0)	3 (2.0)	57 (38.0)	18 (12.0)	150

Table 60. Status of non-miners' wives aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview. Matched sample.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21-34	10 (47.6)	1 (4.8)	9 (42.9)	1 (4.8)	21
35-44	12 (54.5)	4 (18.2)	6 (27.3)	0 (—)	22
45-54	12 (85.7)	1 (7.1)	1 (7.1)	0 (—)	14
55-64	9 (75.0)	1 (8.3)	2 (16.7)	0 (—)	12
21-64	43 (62.3)	7 (10.1)	18 (26.1)	1 (1.4)	69
<u>Exsmokers</u>					
21-34	4 (80.0)	0 (—)	1 (20.0)	0 (—)	5
35-44	4 (100.0)	0 (—)	0 (—)	0 (—)	4
45-54	6 (85.7)	0 (—)	1 (14.3)	0 (—)	7
55-64	0 (—)	0 (—)	0 (—)	0 (—)	0
21-64	14 (87.5)	0 (—)	2 (12.5)	0 (—)	16
<u>Cigarette smokers</u>					
21-34	13 (59.1)	1 (4.5)	8 (36.4)	0 (—)	22
35-44	15 (71.4)	0 (—)	6 (28.6)	0 (—)	21
45-54	13 (56.5)	1 (4.3)	6 (26.1)	3 (13.0)	23
55-64	5 (71.4)	0 (—)	2 (28.6)	0 (—)	7
21-64	46 (63.0)	2 (2.7)	22 (30.1)	3 (4.1)	73

Table 61. Status of miners' wives aged 21 years and over in the follow-up of Richwood on January 31, 1974, by Cigarette Smoking Status at the ORC Interview.
Matched Sample.

Age range in 1963	Seen, still in area	Away, unavailable, incapable, refused	Moved	Died	Total
<u>Nonsmokers</u>					
21-34	15 (53.6)	2 (7.1)	11 (39.3)	0 (—)	28
35-44	23 (79.3)	3 (10.3)	3 (10.3)	0 (—)	29
45-54	11 (50.0)	1 (4.5)	7 (31.8)	3 (13.6)	22
55-64	4 (44.4)	1 (11.1)	1 (11.1)	3 (33.3)	9
21-64	53 (60.2)	7 (8.0)	22 (25.0)	6 (6.8)	88
<u>Exsmokers</u>					
21-34	6 (50.0)	6 (50.0)	0 (—)	0 (—)	12
35-44	4 (80.0)	1 (20.0)	0 (—)	0 (—)	5
45-54	1 (33.3)	0 (—)	0 (—)	2 (66.7)	3
55-64	0 (—)	0 (—)	0 (—)	1 (100.0)	1
21-64	11 (52.4)	7 (33.3)	0 (—)	3 (14.3)	21
<u>Cigarette smokers</u>					
21-34	21 (60.0)	0 (—)	14 (40.0)	0 (—)	35
35-44	14 (50.0)	1 (3.6)	13 (46.4)	0 (—)	28
45-54	12 (63.2)	2 (10.5)	5 (26.3)	0 (—)	19
55-64	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)	4
21-64	48 (55.8)	4 (4.7)	33 (38.4)	1 (1.2)	86

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Table 62. Status of miners on July 31, 1972, according to X-Ray Category of Pneumoconiosis in 1964.
Matched sample of Mullens examined in January and February, 1964.

	Seen	Away, Unavailable, Incapable, Refused	Moved	Died	Total
No Pneumoconiosis	72 (49.0)	0 (---)	60 (40.8)	15 (10.2)	147 (100.0)
Suspect Pneumoconiosis	4 (40.0)	1 (10.0)	4 (40.0)	1 (10.0)	10 (100.0)
Simple Pneumoconiosis (1, 2, 3)	8 (53.3)	0 (---)	6 (40.0)	1 (6.7)	15 (100.0)
Complicated Pneumoconiosis (A and B)	6 (60.0)	0 (---)	4 (40.0)	0 (---)	10 (100.0)
Total	90 (49.5)	1 (0.5)	74 (40.7)	17 (9.3)	182 (100.0)

Table 63. Status of miners on January 31, 1974, according to X-Ray Category of Pneumoconiosis in 1965.
Matched sample of Richwood examined in December, 1964-February, 1965.

	Seen	Away, Unavailable, Incapable, Refused	Moved	Died	Total
No Pneumoconiosis	83 (52.9)	7 (4.5)	51 (32.5)	16 (10.2)	157 (100.0)
Suspect Pneumoconiosis	2 (33.3)	1 (16.7)	3 (50.0)	0 (---)	6 (100.0)
Simple Pneumoconiosis (1, 2, 3)	2 (22.2)	1 (11.1)	4 (44.4)	2 (22.2)	9 (100.0)
Complicated Pneumoconiosis (A and B)	0 (---)	0 (---)	1 (50.0)	1 (50.0)	2 (100.0)
Total	87 (50.0)	9 (5.2)	59 (33.9)	19 (10.9)	174 (100.0)

Table 64. Comparison of prevalence of symptoms in 1964 and 1973 by Sex and Occupation.
Persons seen on two occasions in Mullens.

Symptoms	Men (192)		Women (197)		Non-Miners (111)		Miners & Ex-Miners (81)	
	<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>
Cough	17.2	40.3	8.1	11.3	15.3	24.3	19.8	62.5
Sputum	17.7	45.3	7.1	9.7	16.2	28.8	19.8	67.9
Cough & Sputum	10.4	38.7	4.6	6.2	8.1	23.4	13.6	60.0
Dyspnea	10.5	28.1	11.7	8.8	9.9	12.4	11.4	48.0
Wheeze 1	42.7	31.9	26.4	20.4	39.6	22.7	46.9	44.9
Wheeze 2	8.3	17.6	4.1	4.6	7.2	10.9	9.9	26.9

Table 65. Comparison of prevalence of symptoms in 1964 and 1973 by Sex and Smoking habits. Men and women aged 21 to 64 seen on two occasions in Mullens.

Symptom	Non-Smokers (33)		Cigarette Smokers (127)		Ex-Smokers (32)		
	1964	1973	1964	1973	1964	1973	
Men	Cough	12.1	24.2	22.8	46.8	0.0	31.3
	Sputum	12.1	27.3	21.3	53.5	9.4	31.3
	Cough & Sputum	6.1	24.2	14.2	45.2	0.0	28.1
	Dyspnea	3.1	20.0	12.7	31.5	9.4	22.5
	Wheeze 1	33.3	21.9	48.0	37.1	31.3	21.9
	Wheeze 2	3.0	3.1	11.0	22.6	3.1	12.5
Symptom	Non-Smokers (107)		Cigarette Smokers (71)		Ex-Smokers (19)		
	1964	1973	1964	1973	1964	1973	
Women	Cough	2.8	4.8	16.9	22.5	5.3	5.3
	Sputum	1.9	3.8	14.1	16.9	10.5	15.8
	Cough & Sputum	1.9	1.0	8.5	14.1	5.3	5.3
	Dyspnea	13.1	7.6	8.5	8.5	15.8	15.8
	Wheeze 1	20.6	15.1	35.2	29.6	26.3	15.8
	Wheeze 2	2.8	3.8	5.6	4.2	5.3	10.5

Table 66. Comparison of prevalence of symptoms in 1964 and 1973 by Occupation and Smoking Habits. Non-miners, miners, and ex-miners aged 21 to 64 in Mullens.

	Symptom	Non-Smokers (25)		Cigarette Smokers (67)		Ex-Smokers (19)	
		<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>
Non Miners	Cough	16.0	12.0	19.4	32.8	0.0	10.5
	Sputum	12.0	16.0	19.4	37.3	10.5	15.8
	Cough & Sputum	8.0	12.0	10.4	31.3	0.0	10.5
	Dyspnea	4.0	9.1	10.4	15.4	15.8	5.6
	Wheeze 1	40.0	8.0	41.8	30.3	31.6	15.8
	Wheeze 2	4.0	4.0	10.4	13.6	0.0	10.5
	Symptom	Non-Smokers (8)		Cigarette Smokers (60)		Ex-Smokers (13)	
		<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>	<u>1964</u>	<u>1973</u>
Miners & Ex Miners	Cough	0.0	62.5	26.7	62.7	0.0	61.5
	Sputum	12.5	62.5	23.3	71.7	7.7	53.8
	Cough & Sputum	0.0	62.5	18.3	61.0	0.0	53.8
	Dyspnea	0.0	50.0	15.3	49.2	0.0	46.2
	Wheeze 1	12.5	71.4	55.0	44.8	30.8	30.8
	Wheeze 2	0.0	0.0	11.7	32.8	7.7	15.4

Table 67. Prevalence of symptoms in 1965 and 1974 by Sex and Occupation.
Men and women aged 21 to 64 examined on two occasions in Richmond.

Symptom	Men (180)		Women (175)		Non-Miners (90)		Miners & Ex-Miners (90)	
	1965	1974	1965	1974	1965	1974	1965	1974
Cough	15.1	43.6	7.4	13.2	18.0	38.2	12.2	48.9
Sputum	11.2	50.3	4.6	16.7	13.5	40.4	8.9	60.0
Cough & Sputum	11.2	36.9	4.6	9.8	13.5	29.2	8.9	44.4
Dyspnea	5.6	32.4	10.9	21.4	1.1	21.6	10.1	43.2
Wheeze 1	43.9	34.5	31.4	22.4	42.2	32.6	45.6	36.4
Wheeze 2	6.1	22.6	0.6	5.7	4.4	14.6	7.8	30.7

Table 68. Comparison of prevalence of symptoms in 1965 and 1974 by Sex and Smoking Habits.
Men and women aged 21 to 64 seen on two occasions in Richmond.

	Symptom	Non-Smokers (28)		Cigarette Smokers (115)		Ex-Smokers (37)	
		1965	1974	1965	1974	1965	1974
Men	Cough	0.0	14.3	21.7	50.9	5.4	43.2
	Sputum	0.0	21.4	16.5	55.3	2.7	56.8
	Cough & Sputum	0.0	10.7	16.5	43.0	2.7	37.8
	Dyspnea	3.7	17.9	4.3	34.8	11.1	36.1
	Wheeze 1	35.7	17.9	45.2	40.2	45.9	29.7
	Wheeze 2	3.6	14.3	7.8	24.1	2.7	24.3
Women		Non-Smokers (83)		Cigarette Smokers (73)		Ex-Smokers (18)	
		1965	1974	1965	1974	1965	1974
	Cough	2.4	11.0	15.1	16.4	0.0	11.1
	Sputum	0.0	14.6	11.0	20.5	0.0	11.1
	Cough & Sputum	0.0	8.5	11.0	12.3	0.0	5.6
	Dyspnea	8.4	18.5	15.1	27.4	5.6	11.1
Wheeze 1	24.1	19.5	43.8	24.7	16.7	27.8	
Wheeze 2	0.0	2.4	1.4	8.2	0.0	11.1	

Table 69. Comparison of prevalence of respiratory symptoms in 1965 and 1974 by Occupation and Smoking Habits. Non-miners, miners, and ex-miners aged 21 to 64 seen on two occasions in Richmond.

Symptom	Non-Smokers (15)		Cigarette Smokers (59)		Ex-Smokers (16)		
	1964	1974	1964	1974	1964	1974	
Non Miners	Cough	0.0	13.3	25.4	50.0	6.3	18.8
	Sputum	0.0	13.3	18.6	46.6	6.3	43.8
	Cough & Sputum	0.0	6.7	18.6	37.9	6.3	18.8
	Dyspnea	0.0	20.0	1.7	22.8	0.0	18.8
	Wheeze 1	33.3	20.0	44.1	37.9	43.8	25.0
	Wheeze 2	6.7	20.0	5.1	15.5	0.0	6.3
Symptom	Non-Smokers (13)		Cigarette Smokers (56)		Ex-Smokers (21)		
	1964	1974	1964	1974	1964	1974	
Miners & Ex Miners	Cough	0.0	15.4	17.9	51.8	4.8	61.9
	Sputum	0.0	30.8	14.3	64.3	0.0	66.7
	Cough & Sputum	0.0	15.4	14.3	48.2	0.0	52.4
	Dyspnea	7.7	15.4	7.1	47.3	20.0	50.0
	Wheeze 1	38.5	15.4	46.4	42.6	47.6	33.3
	Wheeze 2	0.0	7.7	10.7	33.3	4.8	38.0

Table 70. Mean FEV_{1.0} and change in FEV_{1.0} in follow-up of men in the matched sample in Mullens, West Va. (Those tested on the two occasions)

Age	Occupation	Non-Smokers				Cigarette Smokers				Ex-Smokers				Total			
		No.	Mean 1964	Mean 1973	Change	No.	Mean 1964	Mean 1973	Change	No.	Mean 1964	Mean 1973	Change	No.	Mean 1964	Mean 1973	Change
21-24	Non-Miners	2	3.45	3.60	+0.15	4	3.47	3.82	+0.35	0	--	--	--	6	3.47	3.74	+0.27
	Miners & Ex-Miners	0	--	--	--	1	1.60	3.96	+2.36	0	--	--	--	1	1.60	3.96	+2.36
25-34	Non-Miners	3	3.87	4.16	+0.29	5	3.36	3.39	+0.03	2	3.82	4.07	+0.25	10	3.60	3.76	+0.16
	Miners & Ex-Miners	1	3.60	4.08	+0.48	5	3.55	3.38	-0.17	1	2.80	3.82	+1.02	7	3.45	3.54	+0.09
35-44	Non-Miners	4	3.25	3.34	+0.09	16	3.48	3.29	-0.19	3	3.03	3.42	+0.39	23	3.38	3.32	-0.06
	Miners & Ex-Miners	2	2.80	2.27	-0.53	16	3.10	2.64	-0.46	4	3.40	3.11	-0.29	22	3.13	2.69	-0.44
45-54	Non-Miners	5	3.08	2.96	-0.12	10	3.24	3.17	-0.07	8	3.37	3.02	-0.35	23	3.25	3.07	-0.18
	Miners & Ex-Miners	1	3.00	2.84	-0.16	10	2.74	2.29	-0.45	4	2.38	1.79	-0.59	15	2.66	2.20	-0.46
55-64	Non-Miners	5	3.05	2.89	-0.16	6	2.31	1.88	-0.43	4	2.96	2.84	-0.12	15	2.73	2.47	-0.26
	Miners & Ex-Miners	1	3.20	2.55	-0.65	5	1.91	1.94	+0.03	1	3.30	2.99	-0.31	7	2.29	2.18	-0.12
21-64	Non-Miners	19	3.27	3.28	+0.01	41	3.24	3.12	-0.12	17	3.27	3.17	-0.10	77	3.25	3.17	-0.08
	Miners & Ex-Miners	5	3.08	2.80	-0.28	37	2.86	2.59	-0.27	10	2.92	2.64	-0.28	52	2.89	2.62	-0.27

Table 71. Mean FEV_{1.0} and change in FEV_{1.0} in follow-up of men in the matched sample in Richwood, West Va.
(Those tested on the two occasions)

Age	Occupation	Non-Smokers			Cigarette Smokers			Ex-Smokers			Total						
		No.	Mean 1964	Mean 1973	Change	No.	Mean 1964	Mean 1973	Change	No.	Mean 1964	Mean 1973	Change				
21-24	Non-Miners	0	--	--	--	3	3.98	3.55	-0.33	0	--	--	---	3	3.88	3.55	-0.33
	Miners & Ex-Miners	1	5.00	4.88	-0.12	2	3.45	2.78	-0.73	0	--	--	--	3	3.97	3.48	-0.49
25-34	Non-Miners	1	4.00	3.85	-0.15	6	3.73	3.23	-0.50	4	3.92	3.62	-0.30	11	3.83	3.43	-0.40
	Miners & Ex-Miners	2	4.14	3.94	-0.20	12	3.66	2.97	-0.69	2	2.70	2.83	-0.13	16	3.60	3.08	-0.52
35-44	Non-Miners	5	3.53	3.10	-0.43	14	3.41	2.60	-0.81	3	3.34	3.12	-0.22	22	3.43	2.78	-0.65
	Miners & Ex-Miners	5	3.86	3.30	-0.56	17	3.45	2.89	-0.56	6	3.40	2.81	-0.59	28	3.51	2.95	-0.56
45-54	Non-Miners	2	3.18	3.02	-0.16	11	3.06	2.73	-0.33	1	3.90	3.29	-0.61	14	3.14	2.81	-0.33
	Miners & Ex-Miners	2	3.75	1.95	-1.80	7	2.62	2.16	-0.46	1	3.20	2.89	-0.31	10	2.90	2.19	-0.71
55-64	Non-Miners	3	2.72	2.44	-0.28	6	2.72	1.98	-0.74	3	2.67	2.17	-0.50	12	2.71	2.14	-0.57
	Miners & Ex-Miners	0	--	--	--	3	3.11	1.84	-1.27	4	3.76	2.60	-1.16	7	3.49	2.28	-1.21
21-64	Non-Miners	11	3.28	2.97	-0.29	40	3.30	2.71	-0.59	11	3.42	3.06	-0.36	62	3.32	2.82	-0.50
	Miners & Ex-Miners	10	4.01	3.32	-0.69	41	3.35	2.71	-0.64	13	3.39	2.76	-0.63	64	3.46	2.81	-0.65

Table 72. Prevalence (percent) of respiratory symptoms by Age and Occupation.
 Non-miners, miners and ex-miners aged 20 to 74 in Mullens, West Va. in 1973.
 (Trailer Visits)

Symptom	Occupation	Age Groups						Total
		20-24	25-34	35-44	45-54	55-64	65-74	
Cough	Non-miners	11.1	4.8	6.2	16.5	12.5	12.5	10.8
	Miners & Ex-miners	7.1	16.9	38.0	46.0	56.3	53.3	39.1
Sputum	Non-miners	6.7	11.7	9.2	16.7	19.4	15.6	13.7
	Miners & Ex-miners	16.7	24.6	48.0	46.5	60.2	53.3	43.9
Cough & Sputum	Non-miners	4.4	5.0	6.2	13.1	11.1	12.5	8.9
	Miners & Ex-miners	4.8	12.3	34.7	41.6	53.1	46.7	35.2
Chest Illness: Once	Non-miners	6.8	1.6	1.5	7.1	5.6	6.3	4.7
	Miners & Ex-miners	7.1	4.6	12.0	6.1	10.4	6.7	7.8
2 & more	Non-miners	0.0	0.0	0.0	0.0	2.8	0.0	0.6
	Miners & Ex-miners	2.4	1.5	2.0	6.1	8.3	3.3	4.8
Total	Non-miners	6.8	1.6	1.5	7.1	8.3	6.3	5.3
	Miners & Ex-miners	9.5	6.2	14.0	12.3	18.8	10.0	12.6
Wheeze	Non-miners	0.0	0.0	1.5	3.5	2.8	6.3	2.2
	Miners & Ex-miners	2.4	3.1	14.0	15.9	24.2	25.0	14.8
Breathlessness: 3 & over	Non-miners	0.0	0.0	1.7	0.0	7.0	13.3	2.9
	Miners & Ex-miners	2.4	6.6	22.9	27.5	44.6	44.4	26.2
4 & over	Non-miners	0.0	0.0	1.7	0.0	4.2	6.7	1.7
	Miners & Ex-miners	0.0	3.3	14.6	15.6	32.6	25.9	16.7

Table 73. Smoking habits by age and occupation.
 Non-miners, miners and ex-miners aged 20-74 examined at the trailer
 in Mullens, West Virginia, in 1973.

Age Group	Non-miners					Miners and Ex-miners				
	Non-Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non-Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total
20 - 24	27	14	1	3	45	19	21	2	0	42
25 - 34	17	26	5	14	62	12	41	3	9	65
35 - 44	19	31	5	10	65	9	29	3	10	51
45 - 54	20	34	7	24	85	15	67	3	28	113
55 - 64	12	26	14	20	72	9	49	8	32	98
65 - 74	7	8	7	10	32	6	13	3	8	30
20 - 74	102	139	39	81	361	70	220	22	87	399
20 - 24	60.0	31.1	2.2	6.7	100.0	45.2	50.0	4.8	--	100.0
25 - 34	27.4	41.9	8.1	22.6	100.0	18.5	63.1	4.6	13.8	100.0
35 - 44	29.2	47.7	7.7	15.4	100.0	17.6	56.9	5.9	19.6	100.0
45 - 54	23.5	40.0	8.2	28.2	99.9	13.3	59.3	2.7	24.8	100.1
55 - 64	16.7	36.1	19.4	27.8	100.0	9.2	50.0	8.2	32.7	99.9
65 - 74	21.9	25.0	21.9	31.3	100.1	20.0	43.3	10.0	26.7	100.0
20 - 74	28.3	38.5	10.8	22.4	100.0	17.5	55.1	5.5	21.8	99.9

*The numbers differ slightly from those in table because a few persons were not asked about smoking.

Table 74. Prevalence (%) of respiratory symptoms according to Age, Occupation and Smoking.
Men aged 20-74 in Mullens, West Virginia, in 1973. Trailer Visits.

Symptom	Smoking Habits	Age and Occupation Group														
		20-24		25-34		35-44		45-54		55-64		65-74		Total		
		Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	
Cough	Non-smoker	0.0	10.5	0.0	8.3	5.3	22.2	0.0	13.3	0.0	22.2	0.0	33.3	1.0	15.7	
	Cigarette Smoker	28.6	4.8	11.5	22.0	9.7	46.4	26.5	54.5	23.1	70.2	25.0	51.8	19.4	45.8	
	Other Smoker	100.0	0.0	0.0	33.3	0.0	66.7	0.0	66.7	7.1	75.0	28.6	33.3	10.3	54.5	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	20.0	20.8	39.3	10.0	40.6	0.0	75.0	8.6	36.8	
	Total	11.1	7.1	4.8	16.9	6.2	38.0	16.5	48.5	12.5	56.3	12.5	53.3	10.8	39.0	
Sputum	Non-smoker	0.0	26.3	0.0	16.7	5.3	22.2	0.0	26.7	16.7	33.3	0.0	33.3	2.9	25.7	
	Cigarette Smoker	21.4	4.8	24.0	29.3	16.1	58.6	30.3	56.7	30.8	71.4	37.5	53.8	25.5	50.0	
	Other Smoker	0.0	50.0	0.0	66.7	0.0	66.7	0.0	33.3	7.1	75.0	28.6	66.7	7.7	63.6	
	Ex-smoker	0.0	0.0	7.7	0.0	0.0	33.3	16.7	32.1	15.0	46.9	0.0	62.5	10.0	37.2	
	Total	6.7	16.7	11.7	24.6	9.2	48.0	16.7	46.0	19.4	60.2	15.6	53.3	13.7	43.7	
Cough & Sputum	Non-smoker	0.0	5.3	0.0	0.0	5.3	22.2	0.0	13.3	0.0	22.2	0.0	33.3	1.0	12.9	
	Cigarette Smoker	14.3	4.8	12.0	17.1	9.7	42.9	21.2	51.5	23.1	66.0	25.0	46.2	10.8	42.1	
	Other Smoker	0.0	0.0	0.0	33.3	0.0	66.7	0.0	33.3	7.1	75.0	28.6	33.3	7.7	50.0	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	11.1	16.7	32.1	5.0	37.5	0.0	62.5	6.3	31.4	
	Total	4.4	4.8	8.0	12.3	6.2	34.7	13.1	41.1	11.1	53.1	12.5	46.7	8.9	35.0	
Chest Illness	Non-smoker	3.8	15.8	0.0	8.3	0.0	11.1	5.0	13.3	16.7	22.2	14.3	0.0	5.0	12.9	
	Cigarette Smoker	14.3	0.0	3.8	7.3	3.2	10.7	6.1	4.0	7.7	18.8	0.0	0.0	5.8	9.0	
	Other Smoker	0.0	50.0	0.0	0.0	0.0	33.3	0.0	33.3	0.0	12.5	0.0	33.3	0.0	22.7	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	20.0	12.5	17.9	10.0	19.4	10.0	25.0	7.4	17.4	
	Total	6.8	4.5	1.6	6.2	1.5	14.0	7.1	12.4	8.3	18.8	6.3	10.0	5.3	19.6	
Wheeze	Non-smoker	0.0	0.0	0.0	0.0	0.0	12.5	5.0	6.7	0.0	0.0	0.0	0.0	1.0	2.9	
	Cigarette Smoker	0.0	4.8	0.0	2.4	3.2	20.7	5.9	21.2	7.7	31.3	12.5	25.0	4.3	18.4	
	Other Smoker	0.0	0.0	0.0	33.3	0.0	0.0	0.0	33.3	0.0	28.6	0.0	33.3	0.0	23.8	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	19.4	10.0	37.5	1.2	12.8	
	Total	0.0	2.4	0.0	3.1	1.5	14.0	3.5	16.1	2.8	24.2	6.3	25.0	2.2	14.6	
Breathlessness	Moderate	Non-smoker	0.0	5.6	0.0	0.0	0.0	0.0	7.7	9.1	22.2	0.0	33.3	1.0	9.4	
		Cigarette Smoker	0.0	0.0	0.0	10.3	3.4	39.4	0.0	16.2	7.7	41.7	25.0	30.0	3.6	38.3
		Other Smoker	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.7	0.0	57.1	28.6	66.7	2.7	42.9
		Ex-smoker	0.0	0.0	0.0	0.0	0.0	10.0	0.0	33.3	10.0	53.6	10.0	62.5	3.8	36.8
		Total	0.0	2.4	0.0	6.6	1.7	22.9	0.0	26.9	7.0	44.6	11.3	41.4	2.9	26.0
Severe	Non-smoker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	11.1	0.0	16.7	0.0	4.7	
	Cigarette Smoker	0.0	0.0	0.0	5.1	3.4	18.5	0.0	16.9	3.8	29.2	25.0	10.0	2.9	13.7	
	Other Smoker	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	57.1	0.0	33.3	0.0	20.6	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	10.0	0.0	18.5	10.0	39.3	0.0	50.0	2.6	25.6	
	Total	0.0	0.0	0.0	3.3	1.7	14.6	0.0	15.7	4.2	32.6	6.7	25.9	1.7	14.7	

Table 75. Mean FEV_{1.0} according to age, occupation and smoking habits.
Men aged 20-74 examined at trailer in Mullens, West Virginia in 1973.

Age Group	<u>Non-smokers</u>				<u>Cigarette Smokers</u>				<u>Ex-smokers</u>				<u>Others</u>			
	Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	27	4.50	18	4.52	14	4.35	19	4.32	3	4.30	0	--	1	4.95	2	4.77
25 - 34	17	4.27	12	4.31	26	4.18	41	3.92	13	4.19	9	4.09	5	3.43	3	4.32
35 - 44	18	3.81	9	3.79	31	3.46	27	3.23	10	3.91	9	3.51	5	3.51	3	3.16
45 - 54	20	3.45	15	3.31	34	3.25	65	2.65	23	3.27	28	3.05	7	3.64	3	2.95
55 - 64	12	3.16	9	2.80	25	2.56	43	2.53	19	2.76	30	2.39	14	3.40	8	2.76
65 - 74	7	2.71	5	2.66	8	2.09	10	1.99	10	2.69	5	2.08	7	2.15	3	1.63
20 - 74	101	3.84	68	3.76	138	3.39	205	3.08	78	3.35	81	2.91	39	3.28	22	3.08
Age-adjusted		3.64		3.52		3.31		3.06		3.48		(2.72)		3.56		3.27
(25 - 74)		3.53		3.39		3.18		2.90		3.37		3.07		3.38		3.08
20 - 74 Age height adjusted from regression of non-miners		3.57		3.56		3.32		3.09		3.49		3.18		3.56		3.29

Table 76. Prevalence (%) of respiratory symptoms by age and occupation.
 Non-miners, miners and ex-miners aged 20 to 74 in Richwood, West Virginia,
 in 1974. (Trailer Visits)

Symptom	Occupation	Age Groups						Total
		20-24	25-34	35-44	45-54	55-64	65-74	
Cough	Number of Non-miners	53	74	47	55	55	38	322
	Number of Miners & Ex-miners	7	37	60	95	48	35	282
	Non-miners	24.5	15.1	15.2	27.8	29.1	28.9	22.9
	Miners & Ex-miners	14.3	24.3	35.6	53.2	59.6	51.4	45.5
Sputum	Non-miners	20.8	24.7	21.7	18.5	34.5	28.9	24.8
	Miners & Ex-miners	14.3	24.3	45.8	63.8	55.3	57.1	51.3
Cough & Sputum	Non-miners	15.1	13.7	15.2	16.7	18.2	13.2	15.4
	Miners & Ex-miners	0.0	10.8	32.2	50.0	51.1	48.6	39.8
Chest Illness: Once	Non-miners	1.9	8.3	4.3	5.7	7.4	5.3	5.7
	Miners & Ex-miners	14.3	16.2	10.2	13.8	6.5	0.0	10.5
2 & more	Non-miners	3.8	0.0	0.0	0.0	1.9	2.6	1.3
	Miners & Ex-miners	0.0	5.4	0.0	5.3	6.5	9.1	4.7
Total	Non-miners	5.7	8.3	4.3	5.7	9.3	7.9	7.0
	Miners & Ex-miners	14.3	21.6	10.2	19.1	13.0	9.1	15.2
Wheeze	Non-miners	0.0	0.0	8.7	5.6	9.1	5.3	4.4
	Miners & Ex-miners	0.0	16.2	13.6	26.9	26.7	31.4	22.5
Breathlessness: 3 & over	Non-miners	5.7	1.4	8.7	13.0	18.2	26.3	11.0
	Miners & Ex-miners	14.3	18.9	20.0	40.4	43.5	52.9	34.5
4 & over	Non-miners	3.8	1.4	6.5	9.3	7.3	15.8	6.6
	Miners & Ex-miners	14.3	8.1	13.3	24.5	32.6	29.4	21.6

Table 77. Smoking habits by age and occupation.
 Non-miners, miners and ex-miners aged 20-74 examined at the trailer in
 Richwood, West Virginia, in 1974.

Age Group	Non-miners					Miners and Ex-miners				
	Non-Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non-Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total
20 - 24	25	20	1	7	53	3	4	0	0	7
25 - 34	28	32	2	11	73	12	19	1	4	36
35 - 44	14	15	2	14	45	15	27	3	15	60
45 - 54	9	22	7	16	54	8	50	5	31	94
55 - 64	13	24	3	15	55	5	20	9	13	47
65 - 74	11	8	4	15	38	6	11	3	15	35
20 - 74	100	121	19	78	318	49	131	21	78	279
20 - 24	47.2	37.7	1.9	13.2	100.0	42.9	57.1	--	--	100.0
25 - 34	38.4	43.8	2.7	15.1	100.0	33.3	52.8	2.8	11.1	100.0
35 - 44	31.1	33.3	4.4	31.1	99.9	25.0	45.0	5.0	25.0	100.0
45 - 54	16.7	40.7	13.0	29.6	100.0	8.5	53.2	5.3	33.0	100.0
55 - 64	23.6	43.6	5.5	27.3	100.0	10.6	42.6	19.1	27.7	100.0
65 - 74	28.9	21.1	10.5	39.5	100.0	17.1	31.4	8.6	42.9	100.0
20 - 74	31.4	38.1	6.0	24.5	100.0	17.6	47.0	7.5	28.0	100.1

Numbers

Percentages

Table 78. Prevalence (%) of respiratory symptoms according to Age, Occupation and Smoking.
Men aged 20-74 in Richwood, West Virginia, in 1974. Trailer Visits.

Symptom	Smoking Habits	Age and Occupation Group														
		20-24		25-34		35-44		45-54		55-64		65-74		Total		
		Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	Non-Miners	Miners & Ex-miners	
Cough	Non-smoker	12.0	0.0	7.1	16.7	0.0	13.3	11.1	37.5	7.7	20.0	27.3	50.0	10.0	22.4	
	Cigarette Smoker	40.0	25.0	28.1	31.6	40.0	57.7	54.5	72.0	41.7	55.0	50.0	63.6	40.5	59.5	
	Other Smoker	0.0	0.0	0.0	0.0	50.0	0.0	14.3	0.0	0.0	66.7	75.0	33.3	26.3	33.3	
	Ex-smoker	28.6	0.0	0.0	25.0	0.0	26.7	6.3	35.5	33.3	76.9	6.7	46.7	11.5	42.3	
	Total	24.5	14.3	15.1	25.0	15.6	35.6	27.8	51.2	29.1	59.6	28.9	51.4	23.0	45.7	
Sputum	Non-smoker	16.0	33.3	14.3	8.3	7.1	26.7	11.1	62.5	23.1	40.0	36.4	50.0	17.0	32.7	
	Cigarette Smoker	35.0	0.0	37.5	31.6	46.7	53.8	36.4	82.0	41.7	50.0	50.0	72.7	39.7	60.8	
	Other Smoker	0.0	0.0	0.0	0.0	50.0	0.0	0.0	20.0	0.0	66.7	25.0	66.7	10.5	42.9	
	Ex-smoker	0.0	0.0	18.2	50.0	7.1	60.0	6.3	41.9	40.0	61.5	13.3	46.7	15.4	50.0	
	Total	20.8	14.3	24.7	25.0	22.2	45.8	18.5	61.8	34.5	55.3	28.9	57.1	24.8	51.4	
Cough & Sputum	Non-smoker	8.0	0.0	7.1	0.0	0.0	13.3	11.1	37.5	0.0	20.0	18.2	50.0	7.0	18.4	
	Cigarette Smoker	30.0	0.0	25.0	21.1	40.0	50.0	31.8	70.0	20.8	45.0	25.0	63.6	28.1	52.3	
	Other Smoker	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	66.7	25.0	33.3	10.5	33.3	
	Ex-smoker	0.0	0.0	0.0	0.0	0.0	26.7	6.3	29.0	33.3	61.5	0.0	40.0	7.7	34.6	
	Total	15.1	0.0	13.7	11.1	15.6	32.2	16.7	50.0	18.2	51.1	13.2	48.6	15.4	39.9	
Chest Illness	Non-smoker	0.0	0.0	7.4	8.3	14.3	7.1	11.1	0.0	0.0	0.0	18.2	0.0	7.1	4.2	
	Cigarette Smoker	10.0	25.0	9.4	31.6	0.0	14.8	4.5	26.0	4.3	10.0	0.0	11.1	5.8	20.9	
	Other Smoker	0.0	0.0	0.0	100.0	0.0	33.3	0.0	0.0	33.3	11.1	0.0	0.0	5.3	14.3	
	Ex-smoker	14.3	0.0	9.1	0.0	0.0	0.0	6.7	16.1	20.0	25.0	6.7	13.3	9.1	13.0	
	Total	5.7	14.3	8.3	22.2	4.4	10.2	5.7	21.1	9.3	13.0	7.9	9.1	7.0	15.3	
Wheeze	Non-smoker	0.0	0.0	0.0	8.3	7.1	20.0	11.1	37.5	0.0	0.0	9.1	16.7	3.0	16.3	
	Cigarette Smoker	0.0	0.0	0.0	26.3	13.3	7.7	0.0	34.7	12.5	26.3	12.5	54.5	5.0	27.3	
	Other Smoker	0.0	0.0	0.0	0.0	0.0	33.3	14.3	0.0	0.0	25.0	0.0	33.3	5.3	20.0	
	Ex-smoker	0.0	0.0	0.0	0.0	7.1	13.3	6.3	16.1	13.3	38.5	0.0	20.0	5.1	19.2	
	Total	0.0	0.0	0.0	16.7	8.9	13.6	5.6	26.9	9.1	26.7	5.3	31.4	4.4	22.5	
Breathlessness	Moderate	Non-smoker	4.0	0.0	3.6	16.7	7.1	13.3	11.1	37.5	7.7	20.0	27.3	50.0	8.0	22.4
		Cigarette Smoker	10.0	25.0	0.0	26.3	6.7	25.9	18.2	50.0	25.0	55.0	50.0	40.0	14.0	40.8
		Other Smoker	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	33.3	25.0	66.7	10.5	23.8
		Ex-smoker	0.0	0.0	0.0	0.0	7.1	20.0	12.5	32.3	20.0	41.7	13.3	60.0	10.3	35.1
		Total	5.7	14.3	1.4	19.4	8.9	20.0	13.0	40.4	18.2	43.5	26.3	52.9	11.0	34.7
	Severe	Non-smoker	4.0	0.0	3.6	0.0	7.1	6.7	11.1	12.5	7.7	0.0	9.1	33.3	6.0	8.2
		Cigarette Smoker	5.0	25.0	0.0	15.8	6.7	22.2	13.6	32.0	12.5	50.0	37.5	20.0	9.1	29.2
		Other Smoker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	25.0	66.7	5.3	19.0
		Ex-smoker	0.0	0.0	0.0	0.0	7.1	6.7	6.3	19.4	0.0	25.0	6.7	26.7	3.8	18.2
		Total	3.8	14.3	1.4	8.3	6.7	13.3	9.3	24.5	7.3	32.6	15.8	29.4	6.6	21.7

Table 79. Mean FEV_{1,0} according to age, occupation and smoking habits.
Men aged 20-74 examined at trailer in Richwood, West Virginia, in 1974.

Age Group	Non-smokers				Cigarette Smokers				Ex-smokers				Others			
	Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners		Non-miners		Miners and Ex-miners	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	23	4.38	3	4.50	20	3.88	4	4.13	6	4.35	0	--	1	3.37	0	--
25 - 34	27	3.95	12	3.84	29	4.11	18	3.64	10	4.37	4	4.07	2	4.74	1	4.19
35 - 44	13	3.74	14	3.31	14	3.44	25	3.21	13	3.81	14	3.51	2	3.47	3	3.94
45 - 54	8	3.15	7	2.82	20	3.19	44	2.46	13	3.36	24	3.01	7	3.55	5	3.06
55 - 64	9	3.27	5	2.76	20	2.62	17	2.29	14	2.77	9	2.54	3	2.96	8	2.84
65 - 74	10	2.70	6	1.58	7	1.90	6	1.83	15	2.46	13	2.41	3	2.44	3	1.66
20 - 74	90	3.75	47	3.17	110	3.40	114	2.81	71	3.36	64	3.00	18	3.38	20	2.95
Age-adjusted		3.49		3.10		3.22		2.87		3.51		(2.84)		3.50		(2.91)
(25 - 74)		3.39		2.95		3.15		2.73		3.42		3.16		3.52		3.23
20 - 74 Age height adjusted from regression of non-miners		3.52		3.11		3.23		2.86		3.51		3.24		3.59		3.38

Table 80. Mean FEV_{1.0} according to age and number of years in mining.
Miners and ex-miners aged 20 to 74 in Mullens, West Virginia, in 1973.

Age Group	Number of Years in Mining													
	< 1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	0	--	39	4.44	0	--	0	--	0	--	0	--	39	4.44
25 - 34	0	--	53	4.09	12	3.80	0	--	0	--	0	--	65	4.03
35 - 44	0	--	12	3.14	18	3.45	17	3.48	0	--	0	--	47	3.38
45 - 54	0	--	24	2.94	11	2.94	55	2.81	20	2.71	0	--	110	2.83
55 - 64	0	--	17	3.00	11	2.63	13	2.38	34	2.36	14	2.46	89	2.54
65 - 74	0	--	6	2.69	6	2.12	1	2.30	5	1.46	5	1.99	23	2.10
20 - 74	0	--	151	3.74	58	3.13	86	2.87	59	2.40	19	2.34	373	3.16

Table 81. Mean FEV_{1,0} according to age and number of years underground.
Miners and ex-miners aged 20 to 74 in Mullens, West Virginia, in 1973.

Age Group	Number of Years Underground													
	< 1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	4	4.69	35	4.41	0	--	0	--	0	--	0	--	39	4.44
25 - 34	10	4.01	47	4.08	8	3.77	0	--	0	--	0	--	65	4.03
35 - 44	7	3.46	9	3.04	14	3.43	17	3.48	0	--	0	--	47	3.38
45 - 54	8	3.22	38	3.05	8	2.37	37	2.72	18	2.61	0	--	109	2.83
55 - 64	7	3.08	19	2.77	9	2.60	12	2.38	31	2.36	11	2.41	89	2.54
65 - 74	1	2.09	6	2.53	7	1.93	2	2.24	3	0.64	3	1.75	22	2.04
20 - 74	37	3.58	154	3.62	46	2.92	68	2.83	52	2.39	14	2.27	371	3.16

Table 82. Mean FEV_{1.0} according to age and number of years at the coal face.
Miners and ex-miners aged 20 to 74 in Mullens, West Virginia, in 1973.

Age Group	Number of Years at the Coal Face													
	< 1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	10	4.27	29	4.49	0	--	0	--	0	--	0	--	39	4.44
25 - 34	13	4.06	48	4.04	4	3.91	0	--	0	--	0	--	65	4.03
35 - 44	8	3.49	11	3.17	15	3.40	12	3.45	0	--	0	--	46	3.37
45 - 54	15	3.04	40	2.99	15	2.68	27	2.68	12	2.53	0	--	109	2.83
55 - 64	12	2.84	22	2.62	17	2.62	7	2.36	22	2.28	9	2.52	89	2.54
65 - 74	2	2.44	9	2.28	7	1.89	1	2.30	1	0.81	2	1.51	22	2.04
20 - 74	60	3.47	159	3.50	58	2.84	47	2.82	35	2.33	11	2.34	370	3.16

Table 83. Mean FEV_{1.0} according to age and number of years in mining.
Miners and ex-miners aged 20 to 74 in Richwood, West Virginia, in 1974.

Age Group	Number of Years in Mining													
	< 1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	0	--	7	4.29	0	--	0	--	0	--	0	--	7	4.29
25 - 34	1	4.45	25	3.81	10	3.71	0	--	0	--	0	--	36	3.80
35 - 44	1	3.91	19	3.22	22	3.62	14	3.05	0	--	0	--	56	3.35
45 - 54	0	--	19	2.72	19	2.66	34	2.63	8	2.99	0	--	80	2.69
55 - 64	1	3.44	9	2.55	10	2.31	9	2.64	7	2.71	3	2.04	39	2.52
65 - 74	1	2.39	6	2.33	7	2.57	7	1.49	3	1.02	4	2.25	28	2.03
20 - 74	4	3.55	85	3.24	68	3.06	64	2.60	18	2.55	7	2.16	246	2.95

Table 84. Mean FEV_{1.0} according to age and number of years underground.
Miners and ex-miners aged 20 to 74 in Richwood, West Virginia, in 1974.

Age Group	Number of Years Underground													
	<1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	1	5.44	6	4.10	0	--	0	--	0	--	0	--	7	4.29
25 - 34	12	3.78	20	3.80	4	3.84	0	--	0	--	0	--	36	3.80
35 - 44	14	3.49	14	3.22	17	3.56	11	3.00	0	--	0	--	56	3.35
45 - 54	10	2.84	21	2.92	18	2.65	27	2.51	4	2.56	0	--	80	2.69
55 - 64	9	2.94	10	2.59	9	2.26	7	2.62	1	1.16	3	2.04	39	2.52
65 - 74	5	2.45	8	2.25	6	2.21	3	1.03	4	1.69	2	1.76	28	2.03
20 - 74	51	3.27	79	3.18	54	2.91	48	2.55	9	2.02	5	1.93	246	2.95

Table 85. Mean FEV_{1.0} according to age and number of years at the coal face.
Miners and ex-miners aged 20 to 74 in Richwood, West Virginia, in 1974.

Age Group	Number of Years at the Coal Face													
	< 1		1 - 9		10 - 19		20 - 29		30 - 39		40 & Over		Total	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20 - 24	3	4.52	4	4.12	0	--	0	--	0	--	0	--	7	4.29
25 - 34	13	3.85	19	3.76	4	3.84	0	--	0	--	0	--	36	3.80
35 - 44	17	3.49	16	3.12	15	3.60	8	3.02	0	--	0	--	56	3.35
45 - 54	15	2.72	25	2.79	16	2.61	21	2.61	3	2.72	0	--	80	2.69
55 - 64	11	2.79	9	2.63	10	2.41	8	2.31	1	1.31	0	--	39	2.52
65 - 74	6	2.46	10	2.29	6	2.03	3	0.69	2	1.73	1	1.49	28	2.03
20 - 74	65	3.22	83	3.06	51	2.89	40	2.49	6	2.16	1	1.49	246	2.95

Table 86. X-ray Category of Pneumoconiosis by age and occupation.
Mullens, West Virginia, 1973.
Non-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	44 (97.8)	1 (2.2)	0 (-)	0 (-)	1 (2.2)	0 (-)	45
25 - 34	59 (98.3)	1 (1.7)	0 (-)	0 (-)	1 (1.7)	0 (-)	60
35 - 44	62 (95.4)	3 (4.6)	0 (-)	0 (-)	3 (4.6)	0 (-)	65
45 - 54	83 (97.6)	1 (1.2)	1 (1.2)	0 (-)	2 (2.4)	0 (-)	85
55 - 64	66 (93.0)	4 (5.6)	0 (-)	0 (-)	4 (5.6)	1 (1.4)*	71
65 - 74	28 (90.3)	3 (9.7)	0 (-)	0 (-)	3 (9.7)	0 (-)	31
20 - 74	342 (95.8)	13 (3.6)	1 (0.3)	0 (-)	14 (3.8)	1 (0.3)	357

*Review indicated probable past tuberculosis.

Table 87. X-ray Category of Pneumoconiosis by age and occupation.
 Mullens, West Virginia, 1973.
Miners and Ex-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	42 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	42
25 - 34	61 (93.8)	4 (6.2)	0 (--)	0 (--)	4 (6.2)	0 (--)	65
35 - 44	40 (78.4)	3 (5.9)	6 (11.8)	0 (--)	9 (17.6)	2 (3.9)	51
45 - 54	84 (74.3)	14 (12.4)	8 (7.1)	3 (2.7)	25 (22.1)	4 (3.5)	113
55 - 64	58 (59.8)	18 (18.6)	10 (10.3)	2 (2.1)	30 (30.9)	9 (9.3)	97
65 - 74	22 (75.9)	4 (13.8)	0 (--)	0 (--)	4 (13.8)	3 (10.3)	29
20 - 74	307 (77.3)	43 (10.8)	24 (6.0)	5 (1.3)	72 (18.1)	18 (4.5)	397

Table 88. X-ray Category of Pneumoconiosis by age and occupation.
 Mullens, West Virginia, 1973.
Railroad Workers.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	0
25 - 34	18 (94.7)	1 (5.3)	0 (--)	0 (--)	1 (5.3)	0 (--)	19
35 - 44	16 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	16
45 - 54	33 (97.1)	1 (2.9)	0 (--)	0 (--)	1 (2.9)	0 (--)	34
55 - 64	29 (90.6)	3 (9.4)	0 (--)	0 (--)	3 (9.4)	0 (--)	32
65 - 74	4 (80.0)	1 (20.0)	0 (--)	0 (--)	1 (20.0)	0 (--)	5
20 - 74	100 (94.3)	6 (5.7)	0 (--)	0 (--)	6 (5.7)	0 (--)	106

Table 89. X-ray Category of Pneumoconiosis by age and occupation.
 Mullens, West Virginia, 1973.
Non-Dusty.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	44 (97.8)	1 (2.2)	0 (--)	0 (--)	1 (2.2)	0 (--)	45
25 - 34	41 (100.0)	0 (--)	0 (--)	0 (--)	0 (--)	0 (--)	41
35 - 44	46 (93.9)	3 (6.1)	0 (--)	0 (--)	3 (6.1)	0 (--)	49
45 - 54	50 (98.0)	0 (--)	1 (2.0)	0 (--)	1 (2.0)	0 (--)	51
55 - 64	37 (94.9)	1 (2.6)	0 (--)	0 (--)	1 (2.6)	1 (2.6)*	39
65 - 74	24 (92.3)	2 (7.7)	0 (--)	0 (--)	2 (7.7)	0 (--)	27
20 - 74	242 (96.4)	7 (2.8)	1 (0.4)	0 (--)	8 (3.2)	1 (0.4)	251

*Review indicated probable past tuberculosis.

Table 90. X-ray Category of Pneumoconiosis by age and occupation.
 Richwood, West Virginia, 1974.
Non-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	52 (100.0)	0 (-)			0 (-)		52
25 - 34	72 (100.0)	0 (-)			0 (-)		72
35 - 44	47 (97.9)	1 (2.1)			1 (2.1)		47
45 - 54	51 (100.0)	0 (-)			0 (-)		51
55 - 64	50 (100.0)	0 (-)			0 (-)		50
65 - 74	35 (100.0)	0 (-)			0 (-)		35
20 - 74	306 (99.7)	1 (0.3)			1 (0.3)	0 (-)	307

Table 91. X-ray Category of Pneumoconiosis by age and occupation.
 Richwood, West Virginia, 1974.
Miners and Ex-Miners.

Age Range	None	Simple Pneumoconiosis				PMF	Total
		(1)	(2)	(3)	Total		
20 - 24	7 (100.0)	0 (--)	0 (-)	0 (-)	0 (--)	0 (-)	7
25 - 34	36 (97.3)	1 (2.7)	0 (-)	0 (-)	1 (2.7)	0 (-)	37
35 - 44	58 (96.7)	1 (1.7)	0 (-)	1 (1.7)	2 (3.3)	0 (-)	60
45 - 54	76 (84.4)	9 (10.0)	4 (4.4)	0 (-)	13 (14.4)	1 (1.1)	90
55 - 64	37 (78.7)	6 (12.8)	3 (6.4)	0 (-)	9 (19.1)	1 (2.1)	47
65 - 74	29 (87.9)	1 (3.0)	1 (3.0)	0 (-)	2 (6.1)	2 (6.1)	33
20 - 74	243 (88.7)	18 (6.6)	8 (2.9)	1 (0.4)	27 (9.9)	4 (1.5)	274

Table 92. Educational level by age of men and women seen at the examination trailer in Mullens, W. Va., in 1972-73

	Age Range	Grade 8 or less	Grades 9-11	High School Grad.	Any Post-Secondary	Total
Men	20-24	2(2.3)	7(8.0)	39(44.8)	39(44.8)	87
	25-34	11(8.7)	16(12.6)	71(55.9)	29(22.8)	127
	35-44	33(28.4)	22(19.0)	39(33.6)	22(19.0)	116
	45-54	54(27.1)	35(17.6)	85(42.7)	25(12.6)	199
	55-64	73(43.2)	36(21.3)	39(23.1)	21(12.4)	169
	65-74	42(68.9)	6(9.8)	4(6.6)	9(14.8)	61
	20-74	215(28.3)	122(16.1)	277(36.5)	145(19.1)	759*

* Three (3) cases of 762 did not report educational level.

Women	20-24	6(6.5)	18(19.4)	52(55.9)	17(18.3)	93
	25-34	8(5.3)	36(24.0)	71(47.3)	35(23.3)	150
	35-44	26(17.6)	41(27.7)	58(39.2)	23(15.5)	148
	45-54	58(26.6)	55(25.2)	71(32.6)	34(15.6)	218
	55-64	49(32.0)	32(20.9)	47(30.7)	25(16.3)	153
	65-74	39(49.4)	13(16.5)	15(19.0)	12(15.2)	79
	20-74	186(22.1)	195(23.2)	314(37.3)	146(17.4)	841**

** Eighteen (18) cases of 859 did not report educational level.

Table 93. Educational level by age and occupation of men seen at the examination trailer in Mullens, W. Va., in 1972-73.

	Age Range	Grade 8 or less	Grades 9-11	High School Grad.	Any Post-Secondary	Total
Non-Miners	20-24	1(2.2)	1(2.2)	15(33.3)	28(62.2)	45
	25-34	1(1.6)	5(8.1)	31(50.0)	25(40.3)	62
	35-44	10(15.2)	8(12.1)	28(42.4)	20(30.3)	66
	45-54	7(8.2)	9(10.6)	54(63.5)	15(17.6)	85
	55-64	18(25.4)	12(16.9)	24(33.8)	17(23.9)	71
	65-74	17(53.1)	4(12.5)	3(9.4)	8(25.0)	32
	20-74	54(15.0)	39(10.8)	155(42.9)	113(31.3)	361*

*One (1) case of 362 did not report educational level.

Miners & Ex-Miners	20-24	1(2.4)	6(14.3)	24(57.1)	11(26.2)	42
	25-34	10(15.4)	11(16.9)	40(61.5)	4(6.2)	65
	35-44	23(46.0)	14(28.0)	11(22.0)	2(4.0)	50
	45-54	47(41.2)	26(22.8)	31(27.2)	10(8.8)	114
	55-64	55(56.1)	24(24.5)	15(15.3)	4(4.1)	98
	65-74	25(86.2)	2(6.9)	1(3.4)	1(3.4)	29
	20-74	161(40.5)	83(20.9)	122(30.7)	32(8.0)	398**

**Two (2) cases of 400 did not report educational level.

Table 94. Mean number of years of education by age, occupation and smoking habits.
Men seen at trailer in Mullens, W. Va., in 1972-73.

AGE GROUP	NON-SMOKERS				CIGARETTE SMOKERS				EX-SMOKERS				OTHER SMOKERS				TOTAL			
	Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20-24	27	13.7	19	12.6	14	13.1	21	12.1	3	13.7	--	--	1	12.0	2	12.0	45	13.5	42	12.3
25-34	17	13.8	12	12.3	26	12.7	41	10.4	14	12.8	9	11.2	5	12.0	3	12.0	62	13.0	65	11.0
35-44	19	13.2	8	8.8	31	11.2	29	9.1	10	13.4	10	9.0	5	11.4	3	10.0	65	12.1	50	9.1
45-54	20	12.0	15	11.4	34	11.8	67	8.8	24	11.5	28	9.9	7	12.3	3	9.3	85	11.8	113	9.4
55-64	12	11.5	9	11.1	25	10.2	49	8.2	20	11.3	32	7.7	14	11.4	8	7.5	71	11.0	98	8.3
65-74	7	10.0	5	9.6	8	7.8	13	6.3	10	11.4	8	6.3	7	8.4	3	8.0	32	9.5	29	7.0
20-74	102	12.8	68	11.4	138	11.4	220	9.2	81	12.0	87	8.8	39	11.1	22	9.2	360	11.9	397	9.5

Table 95. Educational level by age of men and women seen at the examination trailer in Richwood, W. Va., in 1974.

	Age Range	Grade 8 or less	Grades 9-11	High School Grad.	Any Post-Secondary	Total
Men	20-24	0	5(8.3)	23(38.3)	32(53.3)	60
	25-34	8 (7.2)	10(9.0)	59(53.2)	34(30.6)	111
	35-44	25(23.4)	22(20.6)	44(41.1)	16(15.0)	107
	45-54	52(34.9)	30(20.1)	47(31.5)	20(13.4)	149
	55-64	40(38.8)	19(18.4)	27(26.2)	17(16.5)	103
	65-74	51(70.8)	5(6.9)	9(12.5)	7(9.7)	72
	20-74	176(29.2)	91(15.1)	209(34.7)	126(20.9)	602*
* Two (2) cases of 604 did not report educational level.						
Women	20-24	3(4.8)	3(4.8)	33(53.2)	23(37.1)	62
	25-34	8(6.5)	26(21.0)	73(58.9)	17(13.7)	124
	35-44	22(14.4)	35(22.9)	76(49.7)	20(13.1)	153
	45-54	46(24.5)	39(20.7)	77(41.0)	26(13.8)	188
	55-64	80(49.7)	22(13.7)	34(21.1)	25(15.5)	161
	65-74	61(62.2)	16(16.3)	7(7.1)	14(14.3)	98
	20-74	220(28.0)	141(17.9)	300(38.2)	125(15.9)	786**
**Four (4) cases of 790 did not report educational level.						

Table 96. Educational level by age and occupation of men seen at the examination trailer in Richwood, W. Va., in 1974.

	Age Range	Grade 8 or less	Grades 9-11	High School Grad.	Any Post-Secondary	Total
Non-Miners	20-24	0	4(7.5)	19(35.8)	30(56.6)	53
	25-34	5(6.8)	3(4.1)	39(52.7)	27(36.5)	74
	35-44	10(21.3)	7(14.9)	15(31.9)	15(31.9)	47
	45-54	7(13.0)	9(16.7)	22(40.7)	16(29.6)	54
	55-64	18(32.7)	8(14.5)	20(36.4)	9(16.4)	55
	65-74	24(63.2)	3(7.9)	5(13.2)	6(15.8)	38
	20-74	64(19.9)	34(10.6)	120(37.4)	103(32.1)	321*
* One (1) of 322 cases did not report educational level.						
Miners & Ex-Miners	20-24	0	1(14.3)	4(57.1)	2(28.6)	7
	25-34	3(8.1)	7(18.9)	20(54.1)	7(18.9)	37
	35-44	15(25.0)	15(25.0)	29(48.3)	1(1.7)	60
	45-54	45(47.4)	21(22.1)	25(26.3)	4(4.2)	95
	55-64	22(45.8)	11(22.9)	7(14.6)	8(16.7)	48
	65-74	27(79.4)	2(5.9)	4(11.8)	1(2.9)	34
	20-74	112(39.9)	57(20.3)	89(31.7)	23(8.2)	281
** One (1) of 282 cases did not report educational level.						

Table 97. Mean educational level by age, occupation and smoking.
Men seen at trailer in Richwood, W. Va., in 1974.

AGE GROUP	NON-SMOKERS				CIGARETTE SMOKERS				ALL EX-SMOKERS				OTHER SMOKERS				TOTAL			
	Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners		Non-Miners		Miners & Ex-Miners	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
20-24	25	13.6	3	12.7	20	12.8	4	12.3	7	13.6	--	--	1	13.0	--	--	53	13.3	7	12.4
25-34	28	12.5	12	12.3	32	12.4	19	11.8	11	13.8	4	10.8	2	14.0	1	12.0	73	12.7	36	11.9
35-44	14	12.0	15	10.1	15	11.5	27	10.0	14	11.9	15	11.1	2	10.5	3	8.0	45	11.7	60	10.2
45-54	8	12.6	8	8.6	22	12.1	50	9.1	16	11.3	31	9.3	7	14.0	5	11.8	53	12.2	94	9.3
55-64	13	11.1	5	10.4	24	9.5	20	9.5	15	11.7	13	8.8	3	12.7	9	11.0	55	10.6	47	9.7
65-74	11	9.4	6	8.5	8	8.6	10	7.8	15	8.3	15	6.6	4	7.8	3	6.0	38	8.6	34	7.2
20-74	99	12.2	49	10.4	121	11.5	130	9.8	78	11.5	78	9.1	19	12.1	21	10.1	317	11.7	278	9.7

Table 98. Mean FEV_{1.0} and adjusted mean FEV_{1.0} for men and women seen at trailer in Mullens, W. Va., 1972-73.

	Grade 8 or less	Grades 9-11	High School Grad.	Any Post- Secondary
<u>Men aged 20-74</u>				
number	199	117	268	144
mean age (years)	53.6	47.2	40.6	38.9
" height (cm)	172.9	172.9	174.8	175.7
" years school	6.3	9.9	12.0	15.0
" FEV _{1.0} (l)	2.76	3.15	3.57	3.79
adj. for age & height	3.15(±.048)	3.29(±.060)	3.37(±.040)	3.50(±.055)
" " " " & ed.	3.23(±.093)	3.30(±.061)	3.35(±.046)	3.41(±.095)
<u>Women aged 20-74</u>				
number	177	189	308	139
mean age (years)	53.3	43.7	40.4	43.3
" height (cm)	160.1	159.9	160.9	161.4
" years school	6.7	10.0	12.0	15.0
" FEV _{1.0} (l)	2.19	2.44	2.59	2.54
adj. for age & height	2.43(±.034)	2.44(±.032)	2.48(±.025)	2.49(±.037)
" " " " & ed.	2.36(±.065)	2.43(±.034)	2.50(±.029)	2.55(±.065)

Table 99. Mean FEV_{1.0} and adjusted mean FEV_{1.0} by occupation:
Men seen at trailer in Mullens, West Va. in 1972-73.

	Grade 8 or less	Grades 9-11	High School Grad.	Any Post- Secondary
<u>Non-Miners</u>				
number	52	38	152	113
mean age (years)	56.7	49.3	42.9	38.8
" height (cm)	172.5	172.0	175.3	175.9
" years school	6.2	9.8	12.0	15.2
" FEV _{1.0} (L)	2.83	3.28	3.55	3.81
adj. for age & height	3.34(± .086)	3.55(± .096)	3.48(± .047)	3.58(± .056)
" " " " & ed.	3.52(± .158)	3.62(± .107)	3.48(± .047)	3.48(± .093)
<u>Miners & Ex-Miners</u>				
number	147	79	116	31
mean age (years)	52.5	46.3	37.5	39.2
" height (cm)	173.0	173.2	174.2	174.9
" years school	6.4	10.0	12.0	14.5
" FEV _{1.0} (L)	2.73	3.09	3.59	3.69
adj. for age & height	3.09(± .060)	3.15(± .076)	3.20(± .067)	3.35(± .128)
" " " " & ed.	3.10(± .106)	3.14(± .077)	3.19(± .094)	3.33(± .184)

Table 100. Mean FEV_{1.0} and adjusted mean FEV_{1.0} for men and women seen at trailer in Richwood, W. Va., in 1974

	Grade 8 or less	Grades 9-11	High School Grad.	Any Post- Secondary
<u>Men aged 20-74</u>				
number	144	82	190	115
mean age (years)	54.9	45.6	40.5	38.0
" height (cm)	172.1	174.1	174.4	176.6
" years school	6.8	9.9	12.0	15.2
" FEV _{1.0} (l.)	2.59	3.12	3.47	3.77
adj. for age & height	3.02(±.058)	3.15(±.071)	3.32(±.047)	3.45(±.062)
" " " " & ed.	3.04(±.112)	3.15(±.075)	3.32(±.053)	3.44(±.115)
<u>Women aged 20-74</u>				
number	187	119	277	118
mean age (years)	57.2	46.0	40.3	44.2
" height (cm)	160.2	159.7	160.8	162.8
" years school	7.2	9.9	12.0	14.7
" FEV _{1.0} (l.)	2.03	2.24	2.53	2.47
adj. for age & height	2.28(±.036)	2.25(±.042)	2.39(±.028)	2.38(±.042)
" " " " & ed.	2.29(±.077)	2.26(±.045)	2.39(±.036)	2.37(±.083)

Table 101. Mean FEV_{1.0} and adjusted mean FEV_{1.0} by occupation.
Men seen at trailer in Richwood, West Va. in 1974.

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	Grade 8 or less	Grades 9-11	High School Grad.	Any Post- Secondary
<u>Non-Miners</u>				
number	54	30	109	93
mean age (years)	56.5	46.2	39.8	36.4
" height (cm)	171.4	173.8	174.3	176.7
" years school	6.5	9.8	12.0	15.3
" FEV _{1.0} (l)	2.76	3.26	3.62	3.87
adj. for age & height	3.33(± 0.86)	3.39(± .106)	3.54(± .056)	3.59(± .063)
" " " " & ed.	3.44(± .170)	3.44(± .119)	3.53(± .057)	3.52(± .114)
<u>Miners & Ex-Miners</u>				
number	90	52	81	22
mean age (years)	54.0	45.2	41.5	44.9
" height (cm)	172.5	174.2	174.4	176.0
" years school	6.9	9.9	12.0	14.6
" FEV _{1.0} (l)	2.49	3.04	3.28	3.33
adj. for age & height	2.80(± .077)	2.95(± .095)	3.04(± .079)	3.17(± .147)
" " " " & ed.	2.75(± .138)	2.95(± .095)	3.07(± .111)	3.24(± .233)

Table 102. Selected respiratory symptoms by occupation and educational level. Men seen at the Examination Trailer, in Mullens, W. Va., in 1972-73.

Symptom	NON-MINERS				MINERS & EX-MINERS			
	Grade 8 or Less	Grades 9-11	High School Grad.	Any Post-Secondary	Grade 8 or Less	Grades 9-11	High School Grad.	Any Post-Secondary
Number	54	39	155	113	161	83	122	32
Cough: %								
Unadj.	18.9	10.3	11.6	5.3	55.0	47.0	21.7	6.5
Age-Adj.	16.8	9.7	11.2	4.8	42.7	43.8	23.0	6.8
Cough & Sputum: %								
Unadj.	18.9	10.5	7.8	4.5	50.0	44.6	16.5	6.5
Age-Adj.	16.8	10.0	9.7	4.9	38.8	43.2	19.7	8.9
Moderate Shortn. of Breath only: %								
Unadj.	3.9	0.0	0.7	0.9	15.8	11.0	0.9	6.9
Age-Adj.	1.8	0.0	0.9	1.0	14.0	9.2	0.5	5.8
Severe Shortn. of Breath only: %								
Unadj.	5.9	0.0	0.7	1.9	26.3	15.9	8.8	0.0
Age-Adj.	2.7	0.0	0.9	2.6	19.5	16.6	12.2	0.0

NOTE: Age-adjusted to the total population of men with education data (759)

Table 103. Selected respiratory symptoms by occupation and educational level. Men seen at the Examination Trailer, in Richwood, in 1974.

Symptom	NON-MINERS				MINERS & EX-MINERS			
	Grade 8 or Less	Grades 9-11	High School Grad.	Any Post-Secondary	Grade 8 or Less	Grades 9-11	High School Grad.	Any Post-Secondary
Number	64	34	120	103	112	57	89	23
Cough: %								
Unadj.	29.0	23.5	23.5	18.4	53.6	57.9	31.5	27.3
Age-Adj.	23.4	19.7	25.1	18.3	42.9	46.3	38.0	15.0
Cough & Sputum: %								
Unadj.	17.7	17.6	17.6	10.7	48.2	52.6	27.0	13.6
Age-Adj.	18.5	14.2	19.2	9.6	32.9	41.3	32.7	7.5
Moderate Shortn. of Breath Only: %								
Unadj.	12.9	5.9	1.7	1.9	21.8	5.3	10.1	0.0
Age-Adj.	10.9	6.1	1.4	3.6	20.0	4.3	11.4	0.0
Severe Shortn. of Breath Only: %								
Unadj.	19.4	11.8	2.5	1.9	29.4	31.6	10.1	4.5
Age-Adj.	17.1	10.4	4.7	0.7	20.7	24.9	13.0	2.4

Note: Age adjusted to the total population of men with educational data (602)

Table 104. Smoking habits by educational attainment.
Persons aged 20-74 seen at the examination trailer in Mullens, W. Va., in 1972-73.
Frequencies, percentages and age-adjusted percentages.

	Grade 8 or less					Grades 9-11					High School Graduation					Any Post - Secondary				
	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total
Men																				
<i>f</i>	21	111	21	60	213	17	73	12	20	122	68	133	18	58	277	64	41	10	30	145
<i>%</i>	9.9	52.1	9.9	28.2		13.9	59.8	9.8	16.4		24.5	48.0	6.5	20.9		44.1	28.3	6.9	20.7	
<i>Adj. %</i>	13.3	58.5	6.5	21.7		17.3	57.7	10.0	15.0		23.7	47.0	6.7	22.7		38.3	27.2	8.7	25.7	
Women																				
<i>f</i>	98	66	--	30	184	95	82	--	18	195	186	107	--	19	312	89	45	--	10	144
<i>%</i>	53.3	35.9	--	10.9		48.7	42.1	--	9.2		59.6	34.3	--	6.1		61.8	31.2	--	6.9	
<i>Adj. %</i>	52.7	36.8	--	10.5		50.0	40.5	--	9.5		60.7	33.1	--	6.2		62.0	30.5	--	7.5	
Non-Miners																				
<i>f</i>	11	22	9	11	53	6	14	7	12	39	35	71	15	34	155	50	31	8	24	113
<i>%</i>	20.8	41.5	17.0	20.8		15.4	35.9	17.9	30.8		22.6	45.8	9.7	21.9		44.2	27.4	7.1	21.2	
<i>Adj. %</i>	27.5	46.7	11.1	14.8		22.0	30.5	14.8	32.7		22.3	43.9	10.0	23.7		38.3	26.5	9.8	25.3	
Miners																				
<i>f</i>	10	89	12	49	160	11	59	5	8	83	33	62	3	24	122	14	10	2	6	32
<i>%</i>	6.3	55.6	7.5	30.6		13.3	71.1	6.0	9.6		27.0	50.8	2.5	19.7		43.8	31.3	6.3	18.8	
<i>Adj. %</i>	5.4	65.3	5.3	24.0		19.7	66.7	5.4	8.3		24.1	52.5	13.7	22.0		35.6	31.0	11.8	21.6	

Table 105. Smoking habits by educational attainment.
 Persons aged 20-74 seen at the examination trailer in Richwood, W. Va. in 1974
 Frequencies, percentages and age-adjusted percentages.

	Grade 8 or less					Grades 9 - 11														
	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total	Non Smokers	Cigarette Smokers	Other Smokers	Ex-Smokers	Total
Men																				
#	35	71	11	54	171	10	50	6	25	91	54	91	12	51	208	49	39	11	26	125
%	20.5	41.5	6.4	31.6		11.0	54.9	6.6	27.5		26.0	43.7	5.8	24.5		39.2	31.2	8.8	20.8	
Adj. %	24.2	37.1	4.6	24.1		11.5	53.9	5.2	29.4		24.1	42.5	6.9	26.5		34.3	29.3	11.2	25.2	
Women																				
#	136	50	--	31	217	51	72	--	17	140	149	115	--	35	299	74	31	--	18	124
%	62.7	23.0	--	14.3		36.4	51.4	--	12.1		49.8	38.5	--	11.7		59.7	25.0	--	15.3	
Adj. %	56.6	25.1	--	18.4		35.2	53.3	--	11.5		50.2	32.6	--	17.2		57.4	26.6	--	16.0	
Non-Miners																				
#	17	23	5	16	61	5	16	--	13	34	35	51	7	26	119	42	31	7	23	103
%	27.9	37.7	8.2	26.2		14.7	47.1	--	38.2		29.4	42.9	5.9	21.8		40.8	30.1	6.8	22.3	
Adj. %	26.9	33.3	4.7	25.1		16.1	44.0	--	39.9		28.0	40.4	8.2	23.3		36.2	27.4	8.7	27.7	
Miners																				
#	18	48	6	38	110	5	34	6	12	57	19	40	5	25	89	7	8	4	3	22
%	16.4	43.6	5.5	34.5		8.8	59.6	10.5	21.1		21.3	44.9	5.6	28.1		31.8	36.4	18.2	13.6	
Adj. %	21.9	31.3	4.5	32.3		7.4	64.4	8.2	20.1		19.8	43.8	7.4	29.0		29.9	30.2	13.5	26.4	