

FINAL REPORT

EARLY DETECTION OF HEALTH HAZARDS DUE TO
ASBESTOS EXPOSURE

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16. Abstract (Limit: 200 words) The main objectives of the investigation were to study the prevalence of non-specific respiratory symptoms in workers engaged in asbestos mining and processing, to assess lung function and radiological changes in these workers, and, particularly, to study the relationship between concentration of airborne dust, length of exposure and total exposure on one, and pulmonary impairment on the other side. Two asbestos (chrysotile) mines, two factories producing asbestos-cement products and one factory manufacturing asbestos-textiles and friction materials were studied. A total of 1,242 asbestos workers were examined as well as a control group of 1,950 workers (801 men and 1,149 women) with no known exposure to asbestos and matching the study group in age and sex distribution and socioeconomic status. The ages of the asbestos workers were in the range 16-59 years and their duration of exposure to asbestos 1-27 years.			
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OBJECTIVES

The main objectives of the investigation were to study the prevalence of non-specific respiratory symptoms in workers engaged in asbestos mining and processing, to assess lung function and radiological changes in these workers, and, particularly, to study the relationship between concentration of airborne dust, length of exposure and total exposure on one, and pulmonary impairment on the other side.

STUDY SITES AND POPULATION

Two asbestos (chrysotile) mines, two factories producing asbestos - cement products and one factory manufacturing asbestos - textiles and friction materials were studied.

A total of 1242 asbestos workers were examined as well as a control group of 1950 workers (801 men and 1149 women) with no known exposure to asbestos and matching the study group in age and sex distribution and socioeconomic status. The ages of the asbestos workers were in the range 16-59 years, and their duration of exposure to asbestos 1-27 years.

The following typical operations were identified for the purpose of asbestos fibre and total dust sampling and assessment of total exposures of workers:

Minesminingseparation

drilling

crushing

sorting

milling, drying, screening

transportation

packing

Asbestos - cement productionpipesplatesmillboard

storing

storing

mixing

mixing

mixing

finishing

pipe forming

plate forming

packing

pipe finishing

plate finishing

Asbestos textile and friction material productiontextilefriction productsasbestos tapes

fibre preparation

mixing, coating,
extruding

pressing

spinning

forming, pressing, cutting
baking

twisting

cutting, drilling

weaving

finishing

M E T H O D S

Evaluation of exposure

Airborne particles were collected on millipore AA filters (37 mm, 0.8 μ m pore size) by means of personal samplers (Casella, London) with millipore field monitors as sampling heads, at the flow rate 1.2. - 2.0 l/min.

Personal samplers were fixed on the working clothes at the breathing zone whenever they did not interfere with the regular activities of the worker. These workers were randomly selected at each typical working operation. Where the personal sampler could interfere with the work or it was considered likely that the sample could be damaged, the technicians - surveyors followed the worker holding the sampling head of the personal sampler as close as possible to his breathing zone.

The number of samples collected at a typical operation depended on the variations of the concentrations during work shift and duration of collection of individual samples which, in turn, was dependent on the dust level. Depending on the dust level, the samples were collected through periods from 1 minute to 3 hours. Sampling was performed in the course of all the work shifts in the seasons winter/early spring and summer/early fall. It was planned to carry out sampling in all the four seasons of the year, but testing the difference between variances of concentrations obtained in various seasons did not give more significant dispersions of results between than within seasons. It was therefore decided to carry out the

airborne dust sampling through two seasons of the year at the site of each typical operation.

A total of 2116 samples were collected.

In order to collect samples of optimal dust density, the sample was checked in the course of sampling with a magnifying glass, under a simultaneous horizontal illumination with a strong pocket torch. In such a way samples with dust density suitable for counting were obtained in the majority of cases.

Fibres were sized and counted at 400 magnification, using phase contrast illumination, with sample mounted in high viscosity solution of membrane filter material. Dimethyl phthalate and diethyl oxalate (1:1) were used as mounting chemicals. Clean filter material was added to reach the described viscosity. Fibres greater than 5 μm in length, with maximum diameter 3 μm , were counted using a calibrated Porton reticle. Only fibres with an aspect ratio greater than or equal to 3:1 were counted.

Total particles and fibres were counted simultaneously on the same sample.

Count concentrations were calculated in the usual standard way on the basis of the number of particles or fibres within the Porton reticle, the area surface of the reticle, the surface area of the dust sample, and the

volume of air from which the sample was separated. A calculation sheet is presented as Annex I.

The daily weighted exposures to total particles and, separately, fibres were calculated in the usual way on the basis of mean concentrations measured during typical work cycles and the corresponding duration of exposures to these concentrations. All work shifts in both seasons of the year were treated in the same way, and the final characteristic exposure at a typical operation was described by the mean of all the weighted daily exposures.

A complete work history was obtained for each worker, including his/her length of stay at each work place since the beginning of his/her employment. On the basis of these elements and the weighted daily exposures assessed for each typical operation, the total exposure of each worker was calculated as the sum of the products of the time spent at an operation and the corresponding weighted exposure.

Respiratory Symptoms

Information on chronic respiratory symptoms and smoking habits was recorded by a modified form of the British Medical Research Council questionnaire. Data were obtained by the interview method, in a standardized way, without suggestive additional questions. In addition to questions on respiratory symptoms (cough, expectoration,

dispnoea, wheezing and nasal catarrh), the questionnaire contained questions on detailed occupational history, past illness and some clinical findings (clubbed fingers, bronchial ronchi, warts on the skin). Special attention was paid to chest illness in the last three years preceding the survey. The questionnaire is presented in Annex II.

Definitions

Chronic cough and/or phlegm: cough and/or phlegm production on most days for at least three months per year.

Chronic bronchitis: cough and phlegm on most days for a minimum of three months in the year and for not less than two successive years;

Dyspnoea grades: 3 - shortness of breath when walking with other people at an ordinary pace on the level; grade 4 - shortness of breath when walking at own pace on the level.

Lung Function Testing

Pulmonary function testing included measurement of ventilatory capacity.

From the forced expiratory spirogram recorded with a spirometer (Pulmonor, Jones Medical Instrument Company), the forced vital capacity (FVC) and the one-second forced

expiratory volume (FEV_1) were obtained and the ratio $FEV_1/FVC\%$ was calculated.

Maximum expiratory flow-volume (MEFV) curves were recorded with a portable flow-volume spirometer (Peters, Mead and Van Ganse, 1969). The maximum flow rates at 50% and the last 25% of the control vital capacity (MEF50%, MEF25%) and peak expiratory flow (PEF) were read from these curves. Three forced expiratory spiograms and three MEFV curves were recorded for each subject, and the mean of the two highest values was used as the result of the test.

Normal values

FVC and FEV_1 were compared with predicted normal values of Morris, Koski and Johnson (1971). PEF, MEF50% and MEF25% were compared with the normal values of Cherniack and Raber (1972).

X-ray survey

Radiological evaluation of the respiratory tract was made on the basis of one x-ray of the thorax in the posterior anterior projection, using the standard technique. As the x-rays were taken in the field, employing x-ray equipment available on the spot, the equipment was not of exactly the same type or model. However, the same batch of films and chemicals were used, and identical developing techniques applied. Sanix-5 films (35.6 x 35.6 cm) of the Fotokemika Co., Zagreb, were used. X-ray exposures

were made at 80-85 kilovolts and 15-20 milliamperseconds. Developing was performed at 20°C through 7 minutes.

As equipment available in the field was not of high quality at some sites, the focus-film distance of at least 180 cm could not always be achieved. As a consequence, magnifying of all anatomical structures and pathological details resulted in some x-ray films.

The films were read by three independent readers (one from the country, two from England) using the full ILO/UC classification of radiographs of pneumoconioses (ILO, 1971).

Asbestos bodies

Asbestos bodies were identified in smears prepared from workers' sputa on standard microscope slides. Slides were dried, dehydrated in alcohol and put in DPX. Three hundred fields were scanned at 80 magnification, whereupon every body suspected to be an asbestos body was checked at 320 and 800 magnifications.

Phase contrast illumination was used by means of a microscope "Carl Zeiss-Opton".

Statistical analysis

Regression and correlation analyses were mainly used. Graded radiological changes and changes in lung function tests were treated as continuous variables and regressed on the exposure indices (years of exposure, weighted

total exposure in fibre-years and total particle-years) and age.

All the statistical analyses have been done using the MINITAB statistical package (except the Shapiro-Wilks tests for normality of distribution of residual variations) at the Clinical Research Center, Harrow, U.K. (Dr. Charles E. Rossiter). The histograms, analyses etc. are presented in four Annexes as produced by MINITAB, with annotations added.

R E S U L T S

RESPIRATORY SYMPTOMS AND SIGNS

Symptoms and signs of a total of 1146 asbestos workers (897 males and 245 females) have been analysed. The results are presented in the Annex III, pp. 2-33.

Distribution of basic data, exposure indices and symptoms

Distribution histograms of age and smoking habit are presented on page 2 of the Annex III. Distributions of workers among the five plants studied and the distribution histograms of durations of exposure to asbestos, years when first employed in plant, fibre-years and total particle-years of exposure are shown on pages 3 and 4.

The distributions of the presence or absence of chronic cough, chronic phlegm, chronic bronchitis, asbestos bodies in the sputum and dyspnoea of various

grades are presented on page 5.

Average exposure indices for groups without and with symptoms or signs

The tables on pages 6-8 illustrate the relationships between absence or presence of chronic cough, chronic phlegm, chronic bronchitis, asbestos bodies and dyspnoea of various grades, and mean age, duration of exposure to asbestos, fibre-years and total particle years, for each symptom or sign, separately for males and females and combined.

Both male and female asbestos workers with cough, phlegm or bronchitis were older compared to those without the symptoms, and they had all the mean exposure indices higher (duration of exposure, asbestos fibre-years and total particle-years). Increasing dyspnoea grades were related to increasing mean age, but not to exposure indices except for particle-years.

Prevalence of symptoms and signs by age and exposure groups

In order to calculate the prevalences of symptoms and signs in different age groups and exposure groups, the indices of age, duration of exposure, and total exposure, expressed in asbestos fibre-years and total particle-years, have been re-grouped as shown on page 9.

Prevalences of cough, phlegm, bronchitis, asbestos bodies and dyspnoea (3+) by age (5 age groups: 15-64 years), years of exposure (6 groups: 1 to 20 years), fibre-years (7 groups: 5 to 160 fibre-years), total particle-years (7 groups: 500 to 16000 particle-years), separately for

male non-smokers and smokers, and female non-smokers and smokers, and combined, are presented on pages 10-13. Prevalences are expressed as proportions of positive findings.

The prevalences of all the respiratory symptoms increase steadily with age both in non-smokers and smokers (page 10). The prevalences are higher in smokers than in non-smokers. The pattern of dependence of the prevalence on age is similar in non-smoking men and women; the number of female smokers was small. The prevalence of asbestos bodies is not related to age.

The patterns of prevalences related to years of exposure to asbestos (page 11) are similar to those related to age except for phlegm and bronchitis in non-smoking men which are hardly related to duration of exposure. The prevalences of dyspnoea in both men and women smokers are related to duration of exposure while those in non-smokers are much less.

The relationships between the prevalences of respiratory symptoms and indices of exposure level (fibre-years and total particle-years) are less well pronounced, particularly for separate groups of men and women, smokers and non-smokers (pages 12 and 13).

Relation between symptoms and age, exposure duration and exposure indices by sex and smoking habit

The exposure indices have been transformed into logarithms (to base 10). Distribution histograms of the transformed indices (duration of exposure, fibre-years

and total particle-years) are presented on page 14.

On pages 15-33, the presence or absence of chronic cough, chronic phlegm, chronic bronchitis, asbestos bodies, dyspnoea grade 3 and dyspnoea grades 4 or above is related to age, duration of exposure, fibre-years and total particle-years for male non-smokers, female non-smokers, male smokers and female smokers.

As expected, cough is most significantly related to smoking habit and age (page 15). It is related to duration of exposure in a similar way (page 16). Women had higher total exposure (fibre-years and total particle-years) than men although they were younger and had shorter average duration of exposure, (pages 17 and 18).

Phlegm is also most significantly related to age and smoking habit (page 19). It is approximately well related to duration of exposure (page 20) and particle-years (page 22); the relation to fibre-years is less significant (page 21).

Chronic bronchitis is, of course, related to smoking habit and age (page 23). The relations to duration of exposure (page 24) and particle-years (page 26) are similar.

Asbestos bodies are not related to either age (page 27), or duration of exposure (page 21) and total particle-years (page 33) and, to a lesser degree, fibre-years (page 32).

Summary of main findings

1. Each symptom analysed was more common in males than in females and in smokers than in non-smokers.

2. Among non-smokers, the relations of chronic cough, chronic phlegm, chronic bronchitis and dyspnoea grade 3 or grades 4+ were similar for the two sexes.

3. Asbestos bodies were recorded in 41 of the 897 men.

4. Chronic cough was most significantly related to smoking habit and age, to a lesser degree to duration of exposure, and least to fibre-years and particle-years.

5. Chronic phlegm was most significantly related to smoking habit and age. The relations to duration of exposure and total particle-years were equal.

6. The pattern of the dependence of chronic bronchitis on smoking habit, age and exposure indices was similar to that of chronic phlegm. Chronic bronchitis was most significantly related to smoking habit and age, with duration of exposure and particle-years following an approximately equal level of significance.

7. Dyspnoea (grades 3 and 4 +, resp.) was most significantly related to smoking habits and age, followed by duration of exposure and total particle-years, and, to a lesser degree, fibre-years.

8. All the symptoms were found much less related to asbestos fibre-years than to total particle-years.

9. Asbestos bodies were not at all related to age, duration of exposure or either of the two indices of total exposure level.

10. Excluding those for asbestos bodies, the relations of respiratory symptoms to the indices of asbestos or total particle exposures accounted for additional variation in

their prevalence compared to that accounted for by sex or smoking.

LUNG FUNCTION TESTING

PREDICTION EQUATIONS

The control group consisted of 801 men and 1145 women with no known occupational exposure to asbestos or any other dust. Subjects with respiratory symptoms (cough, phlegm, bronchitis, dyspnoea) were excluded. Subjects in the age range 25-64 years were included in the analysis. Thus the analyses were performed on data collected in 518 men and 861 women.

The regression analyses were done, for each, sex, for FVC, FEV₁, Peakflow, MEF50% and MEF25% on

Age and Height

Age, Height and Cigarettes smoked per day

Age, Height, Cigarettes, and their 3 interactions

Age and Height for non-smokers and smokers separately

Age and Height (non-smokers) and Age, Height and

Cigarettes/day (smokers)

The extent to which each extra term in the equations added to the precision of the prediction was the basis for the selection of the regression equation to be used for the prediction of expected "normal" lung function for the asbestos workers.

The results are presented in the Annex IV.

For each lung function test the distribution of residuals is shown; the probabilities have been calculated from the Shapiro and Wilks test for the normality.

Forced vital capacity

A satisfactory fits were obtained by the regression on age and height alone. None of the other regression equations fitted significantly better. The results are shown on pages 3 and 4 of the Annex IV.

The prediction equations for men and women, respectively, are as follows (FVC in litres, age in years, height in metres):

$$\text{FVC (men)} = 4.626 - 0.0325 \text{ age} + 6.17 \text{ height}$$

$$\text{FVC (women)} = 2.832 - 0.0224 \text{ age} + 4.50 \text{ height}$$

Forced expiratory volume in one second

The forced expiratory volume was found to significantly depend on smoking in addition to age and height. A single relation to age and height was found acceptable for smokers and non-smokers. The results of statistical analyses are shown on pages 5 and 6 of the Annex IV.

The prediction equations are as follows (smoking in cigarettes/day):

$$\begin{aligned} \text{FEV}_1(\text{men}) &= -2.647 - 0.0351 \text{ age} + 4.51 \text{ height} \\ &\quad - 0.00307(\text{smoking}) \end{aligned}$$

$$\begin{aligned} \text{FEV}_1(\text{women}) &= -1.516 - 0.0275 \text{ age} + 3.40 \text{ height} \\ &\quad - 0.00244(\text{smoking}) \end{aligned}$$

Peakflow

The regressions of peakflow values on independent variables were not satisfactory. This is best shown by the distribution of residuals after fitting the best regression lines and confirmed by the normal plots and the Shapiro-Wilks test for the normality of distributions of residuals (for men, page 7, for women page 8).

The data were reanalysed after transforming the original peakflow values to logarithms (pages 9 and 10). This removed much of the skewness but did not give a satisfactory distribution of residuals for women (distribution and Shapiro-Wilks test on page 10).

A combined regression equation for smokers and non-smokers fitted neither the male data nor female data satisfactorily, separate regressions were therefore fitted for smokers and non-smokers. The following are the best fit regression equations (peakflow in litres/min):

men non-smokers $\log e (\text{peakflow}) = 2.108 - 0.00311 \text{ age} + 0.022 \text{ height}$

men smokers $\log e (\text{peakflow}) = 0.321 - 0.00168 \text{ age} + 1.038 \text{ height}$

women non-smokers $\log e (\text{peakflow}) = 0.934 - 0.00409 \text{ age} + 0.631 \text{ height}$

women smokers $\log e (\text{peakflow}) = 0.848 - 0.00040 \text{ age} + 0.627 \text{ height}$

Maximum expiratory flow at 50% vital capacity

A single regression equation for smokers and non-smokers did not describe the results

satisfactorily; therefore, separate equations for smokers and non-smokers had to be developed. In addition, smoking (cigarettes/day) had to be included as a predictor variable for men smokers (pages 11 and 12).

The following are the best fit regression equations:

men non-smokers	$MEF50\% = 2.61 - 0.0307 \text{ age} + 2.65 \text{ height}$
men smokers	$MEF50\% = -9.05 - 0.0508 \text{ age} + 10.03 \text{ height} - 0.03068 \text{ smoking}$
women non-smokers	$MEF50\% = 1.35 - 0.0282 \text{ age} + 2.917 \text{ height}$
women smokers	$MEF50\% = 5.30 - 0.0542 \text{ age} + 1.032 \text{ height}$

Maximum expiratory flow at 25% of vital capacity

The regressions of MEF25% values on the independent variables were not satisfactorily. This is shown by the distributions of residuals after fitting the best regression lines and confirmed by the normal plots and the Shapiro-Wilks test for normality of distributions of residuals (pages 13 and 14).

The data were reanalysed after transforming the MEF25% values into natural logarithms (pages 15 and 16). The residuals were satisfactorily normally distributed. Single regression equations for fitting the data on smokers and non-smokers did not prove satisfactory; separate equations were therefore developed for smokers and non-smokers. For men smokers, it was found necessary to include smoking (cigarettes/day) as an independent vari-

able.

The following are the best fit regression equations:

men non-smokers $\log e (\text{MEF25\%}) = 0.486 - 0.01796 \text{ age} + 0.552 \text{ height}$

men smokers $\log e (\text{MEF25\%}) = -0.02563 \text{ age} + 1.642 \text{ height} - 0.00453 \text{ smoking}$

women non-smokers $\log e (\text{MEF25\%}) = 0.401 - 0.02269 \text{ age} + 0.720 \text{ height}$

women smokers $\log e (\text{MEF25\%}) = 0.754 - 0.02652 \text{ age} + 0.540 \text{ height}$

BASIC DATA ON ASBESTOS WORKERS AND EXPOSURES

Out of 1233 subjects exposed to asbestos, 1126 (888 men and 238 women) underwent lung function testing. The results are presented in Annex V, pages 2-63.

Distribution histograms of age and smoking habits are shown on page 2 of the Annex V. Distributions of workers among the plants studied and the distribution histograms of duration of exposure, years first employed in plant, fibre-years and total particle-years of exposure are shown on pages 3 and 4.

PREDICTIONS OF NORMAL LUNG FUNCTION VALUES IN STUDY GROUP

Predicted values of forced vital capacity (FVC.P), forced expiratory volumen in one second (FEV_1 .P), peakflow ($\log e$ peakflows : LPFLW.P), maximum expiratory flow at 50% vital capacity (MEF50%.P) and maximum expiratory flow at 25% vital capacity ($\log e$ MEF25% : LMEF25%.P) were calculated for each asbestos worker using the prediction equations developed from data on the control groups (pages 6-8 of this Annex).

In addition, predicted values of FVC and FEV_1

(FVC.PR, FEV₁.PR) were estimated from nomograms developed by Morris, Koski and Johnson (1971) and C.E.C.A. (1971). Prediction relations proposed by Cherniak and Raber (1972) were used to estimate the predicted normal values of peak-flow, MEF50% and MEF25% (PFLW.PR, MEF50%.PR, MEF25%.PR) for all the asbestos workers.

The relations between the predicted values calculated by means of the prediction equations developed from data on the control groups (indices of lung function P) and those derived on the basis of published information (indices of lung function PR), as well as the corresponding correlation coefficients, are presented on pages 5-11 of the Annex V. Practically all the correlations were satisfactory.

Comparing the results of the analyses based on the prediction equations developed on control data and those based on the published equations, the former yielded somewhat better relations of indices of lung function deficit expressed as differences (lung function test. D = lung function value measured - lung function value predicted) to (asbestos) dust exposure. For the statistically less satisfactory ratio indices (lung function test. R = lung function value measured/lung function value predicted%) the fits were about equal. Only for peakflow the published relations proved to yield slightly better fits, but these results were not considered reliable enough because of the considerable number of subjects both in the control and study group who failed to do the peakflow test.

For all the above reasons, only the results based on the prediction equations developed from the data on the control groups are shown on pages 12-63 of Annex V.

CORRELATIONS BETWEEN LUNG FUNCTION DEFICIT AND INDEPENDENT VARIABLES

Correlations between the indices of lung function deficit and age, height, duration of exposure, fibre-years, total particle-years and smoking, respectively, are preceded in two tables on page 12, separately for male and female asbestos workers.

The highest correlation between an index of lung function deficit and an exposure index was found for the duration of exposure (of the order of 0.2), similar to correlation between the indices of lung function deficit and age. The correlations with asbestos fibre-years and total particle-years were much lower, rarely exceeding 0.1.

DISTRIBUTIONS OF INDICES OF LUNG FUNCTION DEFICIT

Histograms distributing distributions of the 12 indices of lung function deficit (FVC.D, FEV₁.D, LPFLW.D, MEF50.D, LMEF25.D, PFLW.D, MEF25.D; FVC.R, FEV₁.R, PFW.R, MEF50.R, MEF25.R), separately for male and female asbestos workers, are on pages 13-21 of the Annex V.

Taking into account that the expected normal values of the "difference" indices (D) is zero, and that negative values indicate lung function values poorer than normal, the distributions of all the indices, for both men and women without exception, show that asbestos workers had

lowered lung function..

The expected normal value of the "ratio" indices (.R) being 100% and lower values indicating poorer lung function than normal, the distributions of all the indices, for both men and women, also show that asbestos workers had lowered values of all the lung function indices measured.

REGRESSION ANALYSES

Regression analyses were performed of each index of lung function deficit on years of exposure (first regression) and on exposure years plus any other independent variable for which the partial regression coefficient was significantly different from zero (second regression).

The results of the regression analyses, together with histograms showing the distributions of residual variations about the regression lines, are shown on pages 23-63 of the Annex V.

Regression analysis for FVC.D

In addition to exposure years, only the partial regression coefficient for height in men (pages 23,24) and for age in women (pages 46,47) were significant. The first and second regression equations were as follows:

<u>men</u>	FVC.D = -0.169 - 0.0135 exposure years
	FVC.D = 1.13 - 0.0145 exposure years -
	- 0.7430 height

Women $FVC.D. = - 0.323 - 0.016 \text{ exposure years}$
 $FVC.D = - 0.605 - 0.0292 \text{ exposure years} +$
 $+ 0.0116 \text{ age.}$

Distribution of residuals were satisfactory.

Regression analysis for FEV₁.D

In addition to exposure years, the partial regression coefficients for age, height and smoking in men (pages 25,26) and none for women (page 48) were significantly different from zero. The first and second regression equations, respectively, were as follows:

men $FEV_1.D = -0.0664 - 0.0175 \text{ exposure years}$
 $FEV_1.D = 1.88 - 0.0124 \text{ exposure years} - 0.0061 \text{ age} -$
 $- 0.991 \text{ height} - 0.0039 \text{ smoking}$
women $FEV_1.D = -0.373 - 0.0099 \text{ exposure years}$

The distributions of residuals were acceptable.

Regression analysis For LPFLW.D.

The residual variations about the regression line were not normally distributed. The linear regression analyses applied were not satisfactory (pages 27,28,49,50).

Regression analysis for MEF50.D

In addition to exposure years, the partial regression coefficients for age, height and smoking for men (pages 29, 30), while none for women (page 51) were significantly different from zero. The first and second regression equations, respectively, were as follows:

men MEF50.D = -1.30 - 0.04223 exposure years

MEF50.D = 10.6 - 0.0223 exposure years - 0.0204
age - 6.22 height - 0.0406 smoking

women MEF50.D = 1.50 + 0.0148 exposure years

Regression analysis for LMEF25.D

The partial regression coefficients for age, height and smoking for men (pages 31,32), while more for women (page 52), were significant. The following were the first and second regression equations, respectively:

men LMEF25.D = -0.266 - 0.0127 exposure years

LMEF25.D = 0.939 - 0.0056 exposure years - 0.0065

age - 0.534 height - 0.0081

smoking

women LMEF25.D = -0.535 - 0.0113 exposure years

The distribution of residual variations was good for the first regression for men; not so for the other equations.

Regression analysis for PFLW.D

In addition to those for exposure years, the partial regression coefficients for age, height and smoking for both men and women were significantly different from zero (pages 33,34 and 53,54 resp.). The first and second regression equations for men were the following:

PFLW.D = -2.44 - 0.0135 exposure years

PFLW.D = 3.44 - 0.0017 exposure years - 0.0138 age -
- 3.03 height - 0.0145 smoking

The distributions of residual variations about the regression lines for women were not normal.

Regression analysis for MEF25.D

The distributions of residuals about the regression lines were not normal.

Regression analysis for FVC.R

The partial regression coefficients for age for women was significantly different from zero. The distribution of residual variations about the regression lines were normal. The regression equations were as follows (pages 37 and 57, 58):

men $FVC.R = 97.0 - 0.326 \text{ exposure years}$

women $FVC.R = 92.4 - 0.560 \text{ exposure years}$

$FVC.R = 86.6 - 0.827 \text{ exposure years} + 0.239 \text{ age}$

Regression analysis for FEV₁.R

In addition to those for exposure years, the partial regression coefficients for age, height and smoking for men (pages 38, 39), while none for women (page 59), were significant. The following were the first and second regressions:

men $FEV_1.R = 98.7 - 0.520 \text{ exposure years}$

$FEV_1.R = 135 - 0.349 \text{ exposure years} - 0.182 \text{ age} -$
 $- 16.9 \text{ height} - 0.115 \text{ smoking}$

women $FEV_1.R = 84.4 - 0.501 \text{ exposure years}$

The distribution of residuals were satisfactory.

Regression analysis for PFLW.R

The partial regression coefficients for age and smoking were significantly different from zero for men (pages 40,41) and women (pages 60,61), but the residual variations about regression for women were not normally distributed. The first and second regressions for men were as follows:

$$\text{PFLW.R} = 69.2 - 0.266 \text{ exposure years}$$

$$\text{PFLW.R} = 77.8 - 0.0160 \text{ exposure years} - 0.228 \text{ age} - 0.146 \text{ smoking}$$

Regression analysis for MEF50.R

The coefficients for age, height and smoking for men were significantly different from zero. The distribution of residual variations about regression for women (page 62) were better than those for men (pages 42,43). The regression equations are the following:

men $\text{MEF50.R} = 81.7 - 0.873 \text{ exposure years}$

$$\text{MEF50.R} = 208.0 - 0.370 \text{ exposure years} - 0.479 \text{ age} - 60.7 \text{ height} - 0.584 \text{ smoking}$$

women $\text{MEF50.R} = 72.5 + 0.0963 \text{ exposure years}$

Regression analysis for MEF25.R

The residual variations about regression lines were not normally distributed indicating that the applied linear regression analyses were not satisfactory (pages 44,45 and 63).

Summary of main findings

1. The distribution of all the indices of lung function deficit (both the "difference" and the "ratio" indices), for both male and female asbestos workers, showed that asbestos workers had all the lung function values measured lower than predicted for population without exposure to dust.

2. The highest correlation between an index of lung function deficit and an index of exposure to asbestos was found for the duration of exposure (of the order 0.2).

3. The correlations between an index of lung function deficit and asbestos fibre-years or total particle-years were much lower, rarely exceeding 0.1.

4. In no case did asbestos fibre-years or total particle-years add significantly to the explanation of the lung function deficit after allowing for the duration of exposure to asbestos.

5. Smoking contributed significantly to the explanation of the reduction of all indices of lung function except FVC, even though the specific prediction equations used contained terms for the effect of smoking. This suggests a possible potentiating effect of smoking in the case of asbestos fibre (or specific total dust) exposure.

X-RAY SURVEY

Five hundred fifty one X-rays of male and 214 of female asbestos workers, for whom the evaluations of total asbestos exposure could be made, were analysed. The results are presented in the Annex VI, pages 2-50.

Comparison of readers

Histograms of each reader's readings of X-ray variables and tables of the X-ray variables inter-relating readings by the three readers are presented on pages 3-28. Results are presented of the assessment of film quality and visibility of parenchyma; the readings of profusion, predominant size and second size of small opacities; the readings of large opacities (no sizes B or C were found); pleural thickening: diffuse, plaques, width, face on, extent, diaphragm thickening, costophrenic angle; pleural calcification: diaphragm, wall, other, extent.

With few exceptions, the agreement among the three readers was acceptable.

Basic and exposure data

Histograms of age distribution, smoking habit and distribution among the five plants studied are shown on page 29. Distributions of duration of exposure to asbestos, years when first employed and total exposure in asbestos fibre-years and total particle years are presented on pages 30 and 31.

Representative X-ray scores

The medians of the readings of the three readers were taken as representative and included in all the subsequent analyses.

The distributions of the medians of radiographic scores are presented on pages 32 and 33. The distributions are shown for profusion and predominant size of small opacities, large opacities (only one positive case, size A!), pleural thickening - extent, diaphragm thickening (only one positive case!), costophrenic angle, and pleural calcification - extent (only three positive cases!).

Regression of X-ray indices on age and exposure indices

The results of stepwise regression analyses of radiographic indices on age and indices of exposure (duration of exposure, fibre-years and total particle-years), for male and female asbestos workers, are presented on pages 35-39.

For each radiographic index, the best fit regression equation has been calculated. The distributions of residual variations about the regression are presented. Regression coefficients are given for small opacities - profusion, pleural thickening-extent and costophrenic angle.

The residual variations about the best regression line are not normally distributed, indicating that the method of regression analysis applied could not adequately describe the relations between the radiographic

indices, and age and indices of exposure.

Average age and exposure indices for different X-ray scores

The relations between radiographic scores and the mean values of age and indices of exposure to asbestos (duration of exposure, asbestos fibre-years and total particle-years) are shown on pages 40-45. The relations are shown for eight classes of the profusion of small opacities, five classes of the extent of pleural thickening, diaphragm thickening, costophrenic angle and four classes of pleural thickening.

No significant conclusions can be derived from the results obtained.

Prevalence of radiographic findings by age and exposure

Age groups and groups by duration of exposure, fibre-years and total particle-years have been regrouped as shown on page 64.

On page 47, the prevalences in five different age groups are shown, for men, women and combined, of small opacities 0/1 plus and 1/1 plus, large opacities A plus, pleural thickening-extent right and left 1 plus, diaphragm thickening right and left, costophrenic angle right and left, and pleural calcification-extent right and left 1 plus. The prevalences of small opacities, pleural thickening, thickening of costophrenic angle and pleural calcification show tendencies of increase with age.

The prevalences of the same radiographic indices

in six groups of exposure duration, for men, women and combined, are presented on page 48. Unlike in the case of age, the prevalences of the majority of radiographic indices do not seem to be related to duration of exposure, except for small opacities the prevalence of which shows a general tendency to increase with increasing duration of exposure.

The prevalences of radiographic indices in seven groups of fibre-years and seven groups of total particle-years, respectively are shown on pages 49 and 50, respectively. Only the prevalences of small opacities were related to the indices of exposure, particularly to total particle-years.

Summary of main findings

1. Prevalence of small opacities of category 1/0 or more was 10.5% (men: 13.6%) and that of small opacities 1/1 or more 4.7% (men 5.8%); prevalence of pleural thickening of category 1 or more was 6.8 (men 8.7%); prevalence of obliteration of costophrenic angle was 3.3% (men 4.8%).

Other radiological findings were much less frequent.

2. Linear regression analysis was not appropriate for relating the radiographic indices to dust exposure.

3. Prevalences of practically all the radiographic indices increased with age.

4. Only the prevalences of small opacities increased more or less consistently with duration of exposure to asbestos, asbestos fibre-years and total particle-years.

There was no consistent pattern of the relation of pleural thickening to indices of exposure.

FAMILY MEMBERS

It is stipulated in the plan of operation that attempts will be made to study lung function in a group of family members of asbestos workers who are not occupationally exposed to asbestos but who live in the vicinity of asbestos industry or mines. Hundred-sixteen adult family members were examined (62 men and 54 women). No increase in the prevalence of chronic bronchitis as compared with that found in other unexposed population samples in Yugoslavia was observed. Their mean measured and predicted values of FVC, FEV_1 and MEF 50% are presented in Table 1 along with the results of significance testing of differences between the mean predicted and measured values.

Table 1

Mean measured and predicted values of FVC, FEV₁
male and female inhabitants

	N	Meas- ured	FVC Pred- icted	P	Meas- ured	FEV ₁ Pred- icted	P	Meas- ured	MEP50% Pred- icted	P
Male smokers	40	4469 (103.8)	4601 (452.1)	>0.05	3454 (932.6)	3610 (487.8)	>0.05	5.0 (2.3)	5.7 (0.5)	>0.05
Male non smokers	22	4937 (106.1)	5082 (514.1)	>0.05	4050 (876.1)	4065 (475.6)	>0.05	5.6 (1.8)	6.0 (0.4)	>0.05
Female non smokers	54	3181 (732.6)	3492 (505.4)	<0.05	2543 (637.4)	2721 (461.9)	>0.05	3.8 (1.3)	4.5 (0.4)	<0.05

Numbers in parentheses are standard deviations.

No significant differences were found between the mean predicted and measured values in male examinees irrespective of their smoking habit. The difference observed in nonsmoking females is of doubtful significance because it was very difficult to obtain satisfactory collaboration in functional tests in this group and the difference is likely to be the consequence of technically unsatisfactory blows, and thus an artefact.

RETIRED WORKERS

Twenty-five retired workers were examined. Eighty per cent of them had spent more than 15 years in asbestos mining or processing. The results of their lung function testing are presented in Table 2 as the mean difference between their predicted and measured values, and the standard error of this difference. The results of the t-testing of the difference between the predicted and measured values are also presented in the Table (t-test for paired variables).

Table 2

The mean differences between predicted and measured FVC, FEV_1 and MEF50% values in retired workers (M = 25)

	FVC	FEV_1	MEF50%
d	639.6	332.0	1.65
s	499.9	428.1	0.92
t	6.39	3.87	9.82
P	<0.01	<0.01	<0.01

As can be seen from Table 2, the mean values of all the three measured lung function tests in the group of retired workers were significantly lower than the normal values expected for their ages and heights ($P \ll 0.01$).

NEW WORKERS

The plan of operations called also for lung function measurements in a group of new workers at the very beginning of their asbestos exposure followed by periodic repeated measurements in the course of the study. A group of 32 women in the asbestos spinning and weaving sections in Ploče were followed through four years. The differences between their FVC and FEV_1 measured in their first and their fourth year of employment are presented in Table 3.

Table 3

The mean differences of FVC and FEV_1 measurements in the first and the fourth year of employment in a group of women newly employed in asbestos spinning and weaving

	FVC	FEV_1
N	32	32
d	233.8	125.6
s	265.8	296.2
t	4.97	2.39
P	<0.01	<0.05

The mean annual decline in the group of new workers of both FVC and FEV_1 was greater than would be expected from the prediction equations.

DISCUSSION AND CONCLUSIONS

A total of 1242 asbestos workers were studied, employed in two chrysotile mines, two plants producing asbestos-cement products and one plant manufacturing asbestos textile and friction materials. In addition, a control group of a total of 1950 subjects without significant dust exposure were examined.

The results have been presented in the main body of the Report with details of statistical analyses in six Annexes.

Surprisingly enough, there was more evidence of relations to exposure, after allowing for smoking, for respiratory symptoms than for either the lung function or radiographic changes. The prevalence of all the respiratory symptoms were most significantly related to smoking habit and age, but there was also a strong relation to duration of exposure and total particle-years, particularly in the case of chronic cough and dyspnoea. As all the symptoms were much less related to asbestos fibre-years than to total particle-years, they are most likely the effect of the general exposure to particles rather than the specific exposure to asbestos fibres.

The distributions of all the indices used to express lung function deficit (7 "difference" and 5 "ratio" indices), for both male and female asbestos workers, without

exception showed that asbestos workers had lung function values lower than expected for a population of corresponding sex, age, and height distribution with no significant exposure to dust. However, the only index of exposure which contributed significantly to lung function reduction was duration of exposure and an index of lung function deficit was of the order of 0.2, while that between asbestos fibre-years or total particle-years and an index of lung function deficit exceeded 0.1 rarely. Highly significant lung function reduction was found in retired workers after allowing for their age. Greater average annual decline of lung function than expected on the basis of prediction equations was found in the course of the first four years of employment in 32 newly employed female workers. In contrast, no significant differences between measured and predicted lung function values were found in a group of 116 family members.

As to radiographic changes, prevalence of small opacities of category 1/0 or more was 10.5% and of category 1/1 or more 4.7%, prevalence of pleural thickening of category 1 or more 6.8 % and the prevalence of thickening of the costophrenic angle 3.3%. Other radiological findings were far less frequent. Prevalences of practically all the radiographic indices increased with age, but only the prevalences of small opacities showed significant relations to duration of exposure, total particle-years and asbestos fibre-years for smokers and

non-smokers. However, even though the regression analysis suggested that the significant relation to the exposure indices are largely due to their correlation with age. As to the pleural thickening, after allowing for smoking there remained a residual relation to age but not to the indices of exposure.

Table 4

Prevalence of some lung function deficits, radiographic indices and symptoms for smokers and non-smokers (males only)

Index	Prevalence %	
	Smokers	Non-smokers
FVC 70% pred.	2.5	3.9
FEV ₁ 70% pred.	6.9	5.8
Peakflow 70% pred.	63.3	48.2
MEF 50 70% pred.	52.7	31.9
MEF 25 70% pred.	55.4	35.8
Small opacities 1/0 +	17.0	8.8
Small opacities 1/1 +	6.5	4.8
Pleural thickening (Right)	11.1	5.7
Pleural thickening (Left)	9.9	6.6
Cough	49.0	19.2
Phlegm	37.5	16.4
Bronchitis	16.1	13.8
Dyspnoea (grade 3 +)	43.2	31.4

As has been found in many other studies of asbestos

workers, smoking was the most significant contribution to health impairment, however defined, in our study too. Table 4 shows, for males by smoking habit, the prevalences of some respiratory symptoms, the proportions of subjects with lung function tests less than 70% of predicted, and the prevalences of small opacities 1/o +, and the prevalence of pleural thickening on the right and left. Except for FVC, which is recognized as not being affected by smoking, all indices show worse values for smokers than non-smokers. However, the predicted values for lung function take into account the effect of smoking on lung function. Therefore, the increased prevalences of low values relative to the predicted among the smokers must reflect the additional interaction between smoking and exposure to (asbestos) dust. Nevertheless, the correlations between the reduction of lung function indices and the indices of exposure were all low and were not increased by considering compound smoking exposure indices. Obviously, the form of the interaction between smoking and exposure effects cannot be simply described.

Summarizing, respiratory symptoms showed most evidence of response to (asbestos) dust. Lung function and radiographic changes, while existing, were much less related to exposure. There was, however, some evidence of a harmful effect of simultaneous smoking and exposure.

A C K N O W L E D G E M E N T

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Annex I

[illegible]

QUESTIONNAIRE ON RESPIRATORY SYSTEM

No.

CATEGORY OF SUBJECT

- | | |
|------------------|------------|
| 1. Exposed | Mining |
| 2. Retired | Confection |
| 3. Family member | |
| 4. Control | |

City

Enterprise

Name

Age

Sex M F

Date of interview: Day Month Year

Interviewer -----

RESPIRATORY SYMPTOMS

COUGH

- | | |
|--|--------|
| Do you usually cough when you get up in the morning in winter? | Yes No |
| Do you usually cough when you get up in the morning in summer? | Yes No |
| Do you usually cough during the day or at night in winter? | Yes No |
| Do you usually cough during the day or night in summer? | Yes No |
| Do you cough on most days for as much as 3 months each year? | Yes No |

PHLEGM

- | | |
|--|--------|
| Do you usually bring up phlegm when you get up in the morning in winter? | Yes No |
| Do you usually bring up phlegm when you get up in the morning in summer? | Yes No |
| Do you usually bring up phlegm during the day or night in winter? | Yes No |
| Do you usually bring up phlegm during the day or night in summer? | Yes No |
| Do you bring up phlegm on most days for as much as 3 months each year? | Yes No |

How long have you had this cough and/or phlegm?

less than 2 years

two years or more

Have you ever coughed up blood? Yes No

BREATHLESSNESS

Are you ever troubled by shortness of breath, when hurrying on the level or walking up a slight hill? Yes No

Do you get short of breath walking with other people at an ordinary pace on the level? Yes No

Do you have to stop for breath when walking at your own pace on the level? Yes No

Are you short of breath on washing or dressing? Yes No

WHEEZING

Does your chest ever sound wheezy or whistling? Yes No

Does your chest sound wheezy occasionally apart from cold? Yes No

Does your chest sound wheezy regularly during the day or night? Yes No

Have you ever had attack of shortness of breath? Yes No

When did you have it the first time

before 30 yrs of age

at the age of 30 or later

do you still have it

NASAL CATARRH

Do you usually have a stuffy nose or catarrh in the winter? Yes No

Do you usually have this in the summer? Yes No

Do you have this for as much as 3 months a year? Yes No

CHEST ILLNESS

During the past 3 years have you had any chest illness that has kept you of work, indoors at home or in bed?

PAST ILLNESS

YWS

NO

Age

Have you had:

Bronchitis

Pneumonia

Pleurisy

Pulmonary tuberculosis

Bronchial asthma

Other chest diseases

SMOKING HISTORY

Do you smoke?

Yes No

Have you ever smoked

Are you troubled by shortness of breath while working in dust?

Number of cigarettes smoked daily Now Previously

At what age did you start regular smoking _____

At what age did you stop regular smoking _____

OCCUPATIONAL HISTORY

Name of the industry _____

Number of years exposed to dust _____

Type of the industry _____

Type of the work _____

Asbest /asbest used for/:

textile _____

friction material _____

asbest-cement _____

isolation material _____

Have you ever been exposed to dust, gas
and/or fumes?

Exposure

duration of exposure

type of work

CLINICAL FINDINGS

Yes No

Clubbed fingers

Bronchial ronchi

Warts on the skin

ANTHROPOMETRIC MEASUREMENTS

Standing height /cm/ _____

Circumference of the chest /cm/ _____

Annex III

SGZ Asbestos Study
=====

Symptoms -- Initial Analysis
=====

SAZ Asbestos Study
=====

Page 1

Symptoms -- Initial analysis
=====

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=====

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SNZ Asbestos Study
=====

Page 2

Symptoms -- initial analysis
=====

There were 1146 people, 897 male and 249 female, out of the 1233 people in the SNZ asbestos study for whom the following signs and symptoms were recorded: cough, phlegm, bronchitis, asbestos bodies in the sputum and dyspnoea grade.

The statistical analyses have been done using the MINITAB statistical package at the Clinical Research Centre, Harrow, UK. The histograms, tables etc. have been presented as produced by MINITAB, with annotations added alongside.

1. Basic and exposure data
=====

This section presents information about the age, smoking and exposure to asbestos dust for the 146 workers with symptoms recorded. The exposure data have been calculated at SNZ from the detailed occupational histories.

AGE
EACH * REPRESENTS 5 OBSERVATIONS

AGE DISTRIBUTION
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
15.	8
20.	145
25.	145
30.	162
35.	227
40.	220
45.	141
50.	93
55.	23
60.	2

SMOKER
EACH * REPRESENTS 15 OBSERVATIONS

SMOKER
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	548
1.	598

SEX.SMOK
EACH * REPRESENTS 15 OBSERVATIONS

SEX * SMOKING TABLE
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	318
2.	230
3.	579
4.	19

Codes:
1 - Male Non-smokers
2 - Female Non-smokers
3 - Male Smokers
4 - Female Smokers

PLANT
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	316
2.	134
3.	265
4.	148
5.	283

ASBESTOS PLANT
=====

Codes:

1 - PLOCE
2 - VRANJIC
3 - ANHCVO
4 - KOREACE
5 - B.P.S.

EXPYRS
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	70
2.	229
4.	164
6.	84
8.	105
10.	101
12.	117
14.	89
16.	79
18.	45
20.	23
22.	28
24.	8
26.	3
28.	2
30.	1

YEARS OF EXPOSURE
=====

YRIEMP
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
46.	2
48.	6
50.	6
52.	38
54.	25
56.	66
58.	74
60.	84
62.	117
64.	123
66.	90
68.	76
70.	207
72.	232

YEAR FIRST EMPLOYED IN PLANT
=====

FIBYRS
EACH * REPRESENTS 25 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	1084
200.	51
400.	4
600.	1
800.	0
1000.	1
1200.	0
1400.	1
1600.	0
1800.	2
2000.	1
2200.	0
2400.	0
2600.	0
2800.	0
3000.	1

FIFTEEN-YEARS OF DUST EXPOSURE
=====

TOTYRS
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	817
50.	239
100.	52
150.	17
200.	8
250.	3
300.	2
350.	2
400.	2
450.	3
500.	0
550.	0
600.	0
650.	1

PARTICLE YEARS OF DUST EXPOSURE/100
=====

2. Symptoms analysed

The distribution of the presence or absence of signs and symptoms as recorded at interview is given in this section.

COUGH
EACH * REPRESENTS 20 OBSERVATIONS

COUGH
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	755
2.	391

PHLEGM
EACH * REPRESENTS 20 OBSERVATIONS

PHLEGM
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	844
2.	322

BRONCHIT
EACH * REPRESENTS 20 OBSERVATIONS

BRONCHITIS
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	867
2.	279

ASB. BODY
EACH * REPRESENTS 25 OBSERVATIONS

ASBESTOS FIBRES
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	1125
2.	27

DYSPNOEA
EACH * REPRESENTS 15 OBSERVATIONS

DYSPNOEA GRADE
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	162
2.	527
3.	335
4.	77
5.	16
6.	9

3. Average exposure indices for presence or absence of signs and symptoms

=====

The tables in this section show how the mean values for the exposure indices are related to the absence or presence of cough, phlegm, bronchitis and asbestos bodies. For dyspnoea grade, the mean values are given for each grade. In each table the number of subjects, the number of smokers and the mean values for age, years of exposure, fibre-years of exposure and total particle-years of exposure (/100) are shown for each sign and symptom and for each sex separately and combined.

ROWS: SEX		COLUMNS: COUGH			COUGH =====
	1	2	ALL		
1	552	345	897	Number	
	295	284	579	Smokers	
	33.286	39.246	35.579	Age	
	7.628	10.181	8.610	Exposure-years	
	13.73	28.66	19.47	Fibre-years	
	19.072	31.388	23.809	Particle-years	
2	203	46	249		
	14	5	19		
	31.133	39.043	32.594		
	6.263	11.672	7.262		
	55.62	191.54	80.73		
	27.437	82.407	37.592		
ALL	755	391	1146		
	309	289	598		
	32.707	39.223	34.934		
	7.261	10.356	8.317		
	24.99	47.82	32.78		
	21.321	37.390	26.804		

67
68
A

ROWS: SEX

COLUMNS: FHLEGM

	1	2	ALL	
1	628	269	897	Number
	362	217	579	Smokers
	33.978	39.316	35.579	Age
	7.939	10.177	8.610	Exposure-years
	15.14	29.57	19.47	Fibre-years
	20.318	31.959	23.809	Particle-years
2	216	33	249	
	17	2	19	
	31.745	38.152	32.594	
	6.562	11.046	7.262	
	65.83	178.24	80.73	
	29.759	88.865	37.592	
ALL	844	302	1146	
	379	219	598	
	33.466	39.189	34.930	
	7.587	10.359	8.317	
	28.12	45.82	32.78	
	22.734	38.177	26.604	

FHLEGM
=====

ROWS: SEX

COLUMNS: BRONCHIT

	1	2	ALL	
1	644	253	897	Number
	370	209	579	Smokers
	33.981	39.644	35.579	Age
	7.983	10.207	8.610	Exposure-years
	14.77	31.44	19.47	Fibre-years
	20.394	32.501	23.809	Particle-years
2	223	26	249	
	17	2	19	
	31.789	39.500	32.594	
	6.664	12.391	7.262	
	68.93	181.67	80.73	
	31.275	91.773	37.592	
ALL	867	279	1146	
	367	211	598	
	33.418	39.631	34.930	
	7.644	10.410	8.317	
	28.70	45.46	32.78	
	23.193	38.725	26.604	

BRONCHITIS
=====

ROWS: SEX

COLUMNS: ASH.BODY

	1	2	3	ALL	
1	856	27	14	897	Number
	546	21	12	579	Smokers
	35.491	36.519	39.143	35.579	Age
	8.562	9.213	10.405	8.610	Exposure-years
	19.50	21.26	14.04	19.47	Fibre-years
	23.550	31.237	25.280	23.809	Particle-years
2	249	0	0	249	
	19	--	--	19	
	32.594	--	--	32.594	
	7.262	--	--	7.262	
	80.73	--	--	80.73	
	37.592	--	--	37.592	
ALL	1105	27	14	1146	
	565	21	12	598	
	34.838	36.519	39.143	34.930	
	8.269	9.213	10.405	8.317	
	33.30	21.26	14.04	32.78	
	26.715	31.237	25.280	26.864	

ASBESTOS FIBRES
=====

ROWS: SEX

COLUMNS: DYSPNOEA

	1	2	3	4	5	6	ALL	
1	161	386	264	67	13	0	897	Number
	86	243	187	50	8	5	579	Smokers
	33.963	32.668	38.674	41.761	42.077	46.833	35.579	Age
	7.255	7.032	10.756	12.190	8.878	11.528	8.610	Exposure-years
	14.48	18.05	25.19	19.27	11.82	12.35	19.47	Fibre-years
	12.727	20.629	31.813	33.740	37.972	31.977	23.809	Particle-years
2	19	141	71	10	5	3	249	
	1	11	6	1	0	0	19	
	37.211	30.035	34.986	37.500	40.800	37.000	32.594	
	9.237	5.891	8.076	12.233	13.067	13.694	7.262	
	26.28	58.50	127.82	58.32	142.16	327.72	80.73	
	16.840	27.987	49.558	67.333	59.374	201.617	37.592	
ALL	180	527	335	77	18	9	1146	
	87	254	193	51	6	5	598	
	34.306	31.964	37.693	41.208	41.722	43.556	34.930	
	7.464	6.727	10.188	12.196	10.042	12.250	8.317	
	15.72	28.87	46.94	24.34	48.03	117.47	32.78	
	13.161	22.598	35.574	38.103	43.917	38.590	26.864	

DYSPNOEA GRADE
=====C7
1
A

Grouping of age and exposure indices =====

Page 5

The indices age, years of exposure, fibre-years of exposure and total particle-years of exposure have been grouped as shown below for the analyses described in section 5.

AGE.GP
EACH * REPRESENTS 10 OBSERVATIONS

INTERVAL	NUMBER OF OBSERVATIONS
15 - 24.	239
25 - 34.	322
35 - 44.	460
45 - 54.	202
55 - 64.	10

AGE GROUP
=====

EXPY.GP
EACH * REPRESENTS 10 OBSERVATIONS

INTERVAL	NUMBER OF OBSERVATIONS
0 - 1.	99
1 - 2.	106
2 - 5.	304
5 - 10.	267
10 - 20.	390
20 -	57

YEARS OF EXPOSURE GROUP
=====

FIBY.GP
EACH * REPRESENTS 10 OBSERVATIONS

INTERVAL	NUMBER OF OBSERVATIONS
0 - 5.	494
5 - 10.	205
10 - 20.	183
20 - 40.	142
40 - 80.	120
80 - 160.	52
160 -	37

FIBRE YEARS OF EXPOSURE GROUP
=====

TOTY.GP
EACH * REPRESENTS 10 OBSERVATIONS

INTERVAL	NUMBER OF OBSERVATIONS
0 - 5.	378
5 - 10.	181
10 - 20.	243
20 - 40.	198
40 - 80.	142
80 - 160.	57
160 -	34

PARTICLE YEARS OF EXPOSURE GROUP (1/100)
=====

5. Prevalence of signs and symptoms by age and exposure groups.
 =====

Page 10

The four tables show for the groups described in section 4. the prevalence of signs and symptoms.

```
-- table 'sex' 'smoker' 'age.gp';
-- layout 2 1;
-- count;
-- prop 2 6 c25-c27 c29;
-- prop 3 6 c28.
```

ROWS: SEX / SMOKER		COLUMNS: AGE.GP					PREVALENCE BY AGE GROUP	
		1	2	3	4	5	ALL	
Male	Non-smoker	64	95	105	52	2	318	Number
		0.0469	0.1263	0.2286	0.4038	0.5000	0.1915	Proportion with COUGH
		0.0781	0.0947	0.2000	0.3269	0.0000	0.1635	Proportion with PHLEGM
		0.0313	0.0947	0.1524	0.3269	0.0000	0.1384	Proportion with BRONCHITIS
		0.0000	0.0526	0.0190	0.0192	0.0000	0.0252	Proportion with ASBESTOS MODIFES
		0.1094	0.2105	0.4095	0.5577	0.5000	0.3145	Proportion with DYSPOEA Grade 3 plus
	Smoker	70	140	247	101	5	579	
		0.1923	0.3784	0.5789	0.6634	0.6000	0.4905	
		0.1410	0.2770	0.4332	0.5446	0.6000	0.3745	
		0.1410	0.2568	0.4170	0.5347	0.6000	0.3610	
		0.0385	0.0608	0.0526	0.0693	0.2000	0.0570	
Female	Non-smoker	69	55	69	35	2	230	
		0.0560	0.1091	0.2609	0.3429	0.5000	0.1703	
		0.0290	0.1091	0.2174	0.2000	0.5000	0.1346	
		0.0290	0.0545	0.1594	0.2000	0.5000	0.1043	
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
		0.1884	0.3636	0.4638	0.4286	1.0000	0.3505	
	Smoker	10	4	2	3	1	19	
		0.1000	0.2500	0.5000	0.6667	--	0.2632	
		0.1000	0.0000	0.0000	0.3333	--	0.1053	
		0.1000	0.0000	0.0000	0.3333	--	0.1053	
		0.0000	0.0000	0.0000	0.0000	--	0.0000	
ALL	ALL	271	302	423	191	9	1146	
		0.1041	0.2483	0.4397	0.5340	0.5556	0.3412	
		0.0860	0.1854	0.3381	0.4188	0.4444	0.2635	
		0.0724	0.1656	0.3073	0.4136	0.4444	0.2135	
		0.0136	0.0464	0.0355	0.0419	0.1111	0.0358	
		0.1629	0.2781	0.4752	0.5612	0.7778	0.3831	

```
-- table 'sex' 'smoker' 'expy.gr';
-- layout 2 1;
-- count;
-- prop 2 6 c25-c27 c29;
-- prop 3 6 c28.
```

ROWS: SEX / SMOKER

COLUMNS: EXPY.GP

	1	2	3	4	5	6	ALL
Male							
Non-smoker	33	26	73	74	96	16	318
	0.0626	0.0000	0.1781	0.2027	0.2013	0.2500	0.1918
	0.0606	0.0385	0.1644	0.1486	0.2604	0.0625	0.1635
	0.0909	0.0000	0.1233	0.0946	0.2500	0.0625	0.1384
	0.0000	0.0000	0.0274	0.0270	0.0313	0.0625	0.0252
	0.1212	0.0769	0.2466	0.2162	0.5625	0.3750	0.3145
Smoker	37	42	135	128	204	33	579
	0.2432	0.3571	0.4148	0.5000	0.5833	0.6364	0.4965
	0.2432	0.2381	0.2889	0.3984	0.4461	0.5152	0.3746
	0.2432	0.2381	0.2889	0.3828	0.4167	0.5152	0.3610
	0.0811	0.0238	0.0593	0.0469	0.0637	0.0606	0.0578
	0.1892	0.1667	0.2563	0.5000	0.5343	0.6970	0.4318
Female							
Non-smoker	17	27	64	54	66	2	230
	0.0000	0.0370	0.0781	0.1667	0.3788	0.5000	0.1783
	0.0000	0.0000	0.0937	0.0741	0.3030	0.5000	0.1348
	0.0000	0.0000	0.0625	0.0370	0.2576	0.5000	0.1043
	0.0000	0.0000	0.0000	0.0000	0.0000	0.4000	0.0000
	0.0588	0.2593	0.2188	0.5185	0.4697	0.5000	0.3565
Smoker	2	2	12	2	3	1	19
	0.0000	0.0000	0.0833	0.5000	1.0000	0.0000	0.2632
	0.0000	0.0000	0.0833	0.0000	0.3333	0.0000	0.1853
	0.0000	0.0000	0.0833	0.0000	0.3333	0.0000	0.1853
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.3333	0.5000	0.6667	0.0000	0.3684
ALL							
ALL	87	97	284	258	369	51	1146
	0.1264	0.1649	0.2641	0.3450	0.4715	0.5098	0.3412
	0.1264	0.1134	0.2042	0.2558	0.3713	0.3725	0.2635
	0.1379	0.1031	0.1866	0.2248	0.3442	0.3725	0.2435
	0.0345	0.0103	0.0352	0.0310	0.0434	0.0588	0.0356
	0.1379	0.1649	0.2676	0.4225	0.5312	0.5682	0.3831

PREVALENCE BY YEARS OF EXPOSURE

Number
Proportion with COUGH
Proportion with PHLEGM
Proportion with BRONCHITIS
Proportion with ASBESTOS MODIFS
Proportion with DYSPNOEA Grade 3 plus

```
-- table 'sex' 'smoker' 'fiby.gp';
-- layout 2 1;
-- count;
-- prop 2 6 c25-c27 c29;
-- prop 3 6 c28.
```

ROWS: SEX / SMOKER COLUMNS: FIBY.GP

	1	2	3	4	5	6	7	ALL
Male								
Non-smoker	140	65	53	30	14	11	5	318
	0.1500	0.1538	0.2453	0.2667	0.3571	0.0909	0.6000	0.1918
	0.1357	0.1538	0.1887	0.1667	0.3571	0.0909	0.4000	0.1635
	0.1000	0.1385	0.1321	0.1667	0.3571	0.1818	0.4000	0.1384
	0.0286	0.0154	0.0189	0.0000	0.0714	0.0909	0.0000	0.0252
	0.2500	0.3538	0.3774	0.3000	0.6429	0.2727	0.2000	0.3145
Smoker	276	107	82	55	39	14	6	579
	0.4275	0.4860	0.6220	0.5273	0.5385	0.6429	0.6667	0.4905
	0.3080	0.4206	0.4756	0.4000	0.4615	0.5000	0.1667	0.3748
	0.3007	0.3925	0.4390	0.4000	0.4615	0.5000	0.1667	0.3610
	0.0652	0.0187	0.0610	0.0364	0.1026	0.1429	0.0000	0.0570
	0.3188	0.4486	0.5854	0.5818	0.5128	0.7857	0.5000	0.4316
Female								
Non-smoker	36	25	34	42	52	21	26	236
	0.0833	0.1200	0.0882	0.0952	0.2885	0.2657	0.3500	0.1783
	0.0278	0.0800	0.0568	0.1190	0.2115	0.1905	0.3000	0.1346
	0.0278	0.0800	0.0588	0.0714	0.1923	0.1429	0.1500	0.1043
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.2222	0.1600	0.1471	0.3333	0.5385	0.5238	0.6000	0.3565
Smoker	3	1	4	5	4	6	2	19
	0.0000	0.0000	0.2500	0.2000	0.5000	--	0.5000	0.2632
	0.0000	0.0000	0.2500	0.0000	0.2500	--	0.0000	0.1053
	0.0000	0.0000	0.2500	0.0000	0.2500	--	0.0000	0.1053
	0.0000	0.0000	0.0000	0.0000	0.0000	--	0.0000	0.0000
	0.0000	0.0000	0.2500	0.4000	0.7500	--	0.5000	0.3684
ALL								
ALL	455	198	173	132	109	46	33	1146
	0.3121	0.3283	0.3931	0.3182	0.3945	0.3476	0.4545	0.3412
	0.2328	0.2879	0.3006	0.2424	0.3211	0.2609	0.2727	0.2635
	0.2154	0.2677	0.2659	0.2273	0.3119	0.2609	0.1818	0.2435
	0.0484	0.0152	0.0347	0.0152	0.0459	0.0652	0.0000	0.0358
	0.2879	0.3798	0.4277	0.4318	0.5505	0.5435	0.5152	0.3831

PREVALENCE BY FIBRE-YEARS OF EXPOSURE
=====

Number
Proportion with COUGH
Proportion with PHLEGM
Proportion with BRONCHITIS
Proportion with ASBESTOS EMBOLI
Proportion with DYSPNOEA Grade 3 plus

```
-- table 'sex' 'smoker' 'toty.gp';
-- layout 2 1;
-- count;
-- prop 2 6 c25-c27 c29;
-- prop 3 6 c28.
```

ROWS: SEX / SMOKER

COLUMNS: TOTY.GP

	1	2	3	4	5	6	7	ALL
Male								
Non-smoker	99	49	67	56	29	12	6	318
	0.1212	0.1429	0.1940	0.2500	0.4138	0.0833	0.3333	0.1918
	0.1111	0.1429	0.1493	0.2321	0.2759	0.0833	0.3333	0.1635
	0.0808	0.1020	0.1343	0.1964	0.2759	0.0833	0.3333	0.1384
	0.0303	0.0000	0.0299	0.0179	0.0345	0.0000	0.1667	0.0252
	0.2323	0.1020	0.4179	0.3750	0.5862	0.3333	0.3333	0.3145
Smoker	199	101	102	78	56	32	11	579
	0.3518	0.4752	0.5294	0.6282	0.5893	0.6563	0.8182	0.4905
	0.2714	0.3168	0.3725	0.5513	0.4643	0.5938	0.4545	0.3748
	0.2714	0.3069	0.3529	0.5000	0.4643	0.5625	0.4545	0.3610
	0.0754	0.0198	0.0196	0.1026	0.0536	0.0937	0.0000	0.0570
	0.2513	0.3762	0.4216	0.6795	0.6607	0.6563	0.7273	0.4318
Female								
Non-smoker	42	22	55	46	46	11	8	230
	0.0714	0.0455	0.1273	0.2391	0.2174	0.3636	0.6250	0.1783
	0.0238	0.0909	0.0727	0.1739	0.1739	0.3636	0.5000	0.1348
	0.0238	0.0455	0.0727	0.1522	0.1304	0.1818	0.3750	0.1043
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.1667	0.2273	0.2000	0.5217	0.5000	0.6364	0.6250	0.3565
Smoker	4	2	5	5	2	6	1	19
	0.0000	0.0000	0.2000	0.6000	0.0000	--	1.0000	0.2632
	0.0000	0.0000	0.2000	0.2000	0.0000	--	0.0000	0.1053
	0.0000	0.0000	0.2000	0.2000	0.0000	--	0.0000	0.1053
	0.0000	0.0000	0.6000	0.0000	0.0000	--	0.0000	0.0000
	0.0000	0.0000	0.4000	0.0000	0.5000	--	0.0000	0.3684
ALL								
ALL	344	174	229	185	133	55	26	1146
	0.2471	0.3218	0.3275	0.4162	0.4135	0.4727	0.6536	0.3412
	0.1919	0.2356	0.2314	0.3514	0.3158	0.4364	0.4231	0.2635
	0.1831	0.2126	0.2183	0.3135	0.3048	0.3818	0.3846	0.2435
	0.0523	0.0115	0.0175	0.0486	0.0301	0.0545	0.0385	0.0358
	0.2326	0.2759	0.3668	0.5514	0.5865	0.5816	0.5769	0.3831

PREVALENCE BY PARTICLE-YEARS OF EXPOSURE

```
=====
Number
Proportion with COUGH
Proportion with PHLEGH
Proportion with BRONCHITIS
Proportion with ASBESTOS BODIES
Proportion with DYSPNOEA Grade 3 plus
```

6. Logarithmic transformation of exposure indices.
=====

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For the analyses in section 7, the exposure indices have been transformed by taking logarithms (to base 10). Histograms of the transformed indices are shown below.

L10EXP
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-1.0	3	*
-0.8	11	**
-0.6	11	**
-0.4	9	*
-0.2	12	**
0.0	71	*****
0.2	65	*****
0.4	131	*****
0.6	155	*****
0.8	127	*****
1.0	245	*****
1.2	255	*****
1.4	51	*****

LOG10 (YEARS OF EXPOSURE)
=====

L10FIB
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-1.0	44	*****
-0.5	41	*****
0.0	183	*****
0.5	214	*****
1.0	324	*****
1.5	230	*****
2.0	84	*****
2.5	19	**
3.0	3	*
3.5	4	*

LOG10 (FIBRE YEARS OF EXPOSURE)
=====

L10TOT
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.0	2	*
-1.5	3	*
-1.0	14	**
-0.5	30	***
0.0	102	*****
0.5	269	*****
1.0	352	*****
1.5	303	*****
2.0	110	*****
2.5	26	**
3.0	1	*

LOG10 (TOTAL PARTICLE YEARS OF EXPOSURE/100)
=====

=====

It is clear from the preceding analyses that the signs and symptoms are related strongly to sex and smoking habit as well as to the indices of exposure. In the analyses in this section the presence or absence of each sign and symptom has been related to age and exposure separately for male non-smokers, female non-smokers, male smokers and female smokers.

-- let c34 = 'sex.smok' + 4*('cough'-1)

-- hist c34

=====

C34
EACH * REPRESENTS 12 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	257	*****
2.	189	*****
3.	295	*****
4.	14	**
5.	61	*****
6.	41	*****
7.	284	*****
8.	5	*

Male Non-smoker without cough
Female Non-smoker without cough
Male Smoker without cough
Female Smoker without cough
Male Non-smoker with cough
Female Non-smoker with cough
Male Smoker with cough
Female Smoker with cough

-- onew 'age' c34

ANALYSIS OF VARIANCE

=====

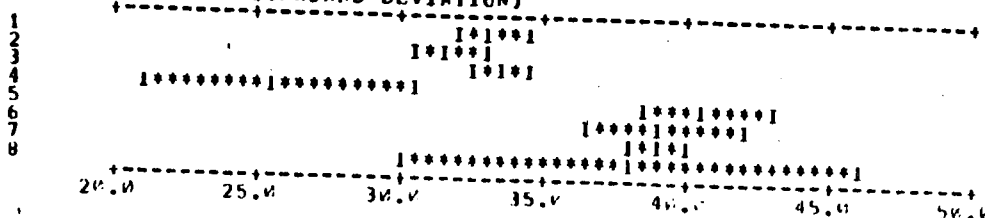
DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	2487.4	829.1	
COUGH	4	9728.9	2432.2	30.36
ERROR	1138	91150.2	80.1	
TOTAL	1145	103366.4		

LEVEL	N	MEAN	ST. DEV.
1	257	33.21	9.14
2	189	31.54	10.87
3	295	33.35	8.91
4	14	25.57	7.35
5	61	40.51	8.24
6	41	35.17	9.13
7	284	38.98	12.10
8	5	38.00	

Male Non-smoker without cough
Female Non-smoker without cough
Male Smoker without cough
Female Smoker without cough
Male Non-smoker with cough
Female Non-smoker with cough
Male Smoker with cough
Female Smoker with cough

POOLED ST. DEV. = 8.95

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



Male Non-smoker without cough
Female Non-smoker without cough
Male Smoker without cough
Female Smoker without cough
Male Non-smoker with cough
Female Non-smoker with cough
Male Smoker with cough
Female Smoker with cough

-- onew '110exp' c34

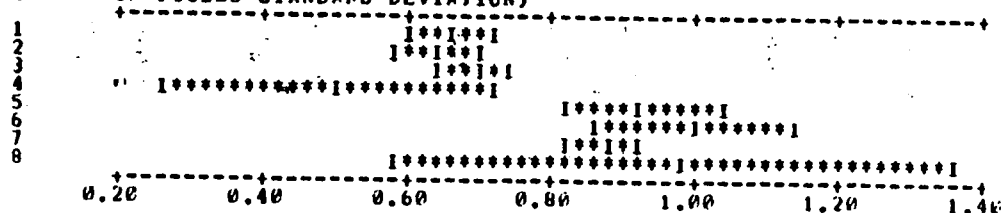
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	1.910	0.637	
COUGH	4	13.542	3.386	17.10
ERROR	1138	225.009	0.198	
TOTAL	1145	240.461		

COUGH * EXPOSURE YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	257	0.662	0.512
2	189	0.642	0.416
3	295	0.697	0.492
4	14	0.494	0.208
5	61	0.927	0.338
6	41	1.006	0.264
7	284	0.878	0.391
8	5	0.977	0.389

POOLED ST. DEV. = 0.445

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without cough
Female	Non-smoker	without cough
Male	Smoker	without cough
Female	Smoker	without cough
Male	Non-smoker	with cough
Female	Non-smoker	with cough
Male	Smoker	with cough
Female	Smoker	with cough

Male	Non-smoker	without cough
Female	Non-smoker	without cough
Male	Smoker	without cough
Female	Smoker	without cough
Male	Non-smoker	with cough
Female	Non-smoker	with cough
Male	Smoker	with cough
Female	Smoker	with cough

-- onew '110fib' c34

ANALYSIS OF VARIANCE

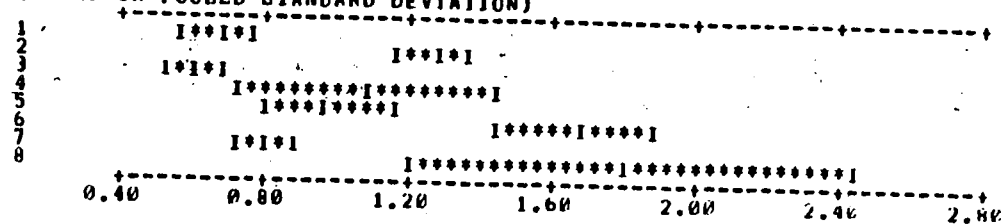
DUE TO	DF	SS	MS=SS/DF	F-HA110
SEX, SMOK	3	76.287	25.429	
COUGH	4	18.447	4.612	
ERROR	1138	568.768	0.500	9.22
TOTAL	1145	663.503		

COUGH * FIFTE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	257	0.665	0.722
2	189	1.274	0.673
3	295	0.603	0.712
4	14	1.074	0.832
5	61	0.970	0.788
6	41	1.667	0.851
7	284	0.817	0.682
8	5	1.814	0.621

Male Non-smoker without cough
 Female Non-smoker without cough
 Male Smoker without cough
 Female Smoker without cough
 Male Non-smoker with cough
 Female Non-smoker with cough
 Male Smoker with cough
 Female Smoker with cough

POOLED ST. DEV. = 0.707

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male Non-smoker without cough
 Female Non-smoker without cough
 Male Smoker without cough
 Female Smoker without cough
 Male Non-smoker with cough
 Female Non-smoker with cough
 Male Smoker with cough
 Female Smoker with cough

-- onew '110tot' c34

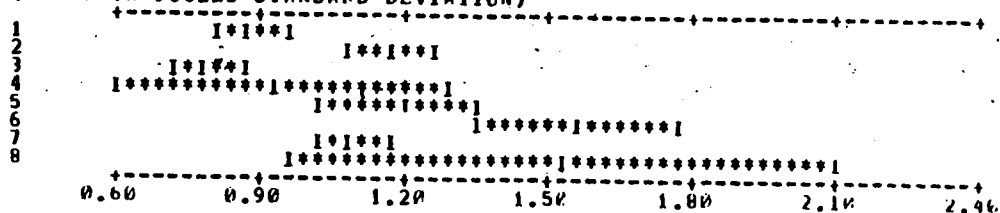
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	17.785	5.928	
COUGH	4	23.499	5.875	13.76
ERROR	1138	486.049	0.427	
TOTAL	1145	527.333		

COUGH * PARTICLE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	257	0.876	0.721
2	189	1.177	0.519
3	295	0.790	0.681
4	14	0.934	0.672
5	61	1.191	0.577
6	41	1.560	0.619
7	284	1.082	0.662
8	5	1.534	0.421

POOLED ST. DEV. = 0.654

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without cough
Female	Non-smoker	without cough
Male	Smoker	without cough
Female	Smoker	without cough
Male	Non-smoker	with cough
Female	Non-smoker	with cough
Male	Smoker	with cough
Female	Smoker	with cough

Male	Non-smoker	without cough
Female	Non-smoker	without cough
Male	Smoker	without cough
Female	Smoker	without cough
Male	Non-smoker	with cough
Female	Non-smoker	with cough
Male	Smoker	with cough
Female	Smoker	with cough

```
-- let c34 = 'sex.smok' + 4*('phlegm'-1)
-- hist c34
```

PHLEGM DISTRIBUTION
=====

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C34
EACH * REPRESENTS 12 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	266
2.	199
3.	362
4.	17
5.	52
6.	31
7.	217
8.	2

Male Non-smoker without phlegm
Female Non-smoker without phlegm
Male Smoker without phlegm
Female Smoker without phlegm
Male Non-smoker with phlegm
Female Non-smoker with phlegm
Male Smoker with phlegm
Female Smoker with phlegm

```
-- onew 'age' c34
```

ANALYSIS OF VARIANCE

PHLEGM * AGE
=====

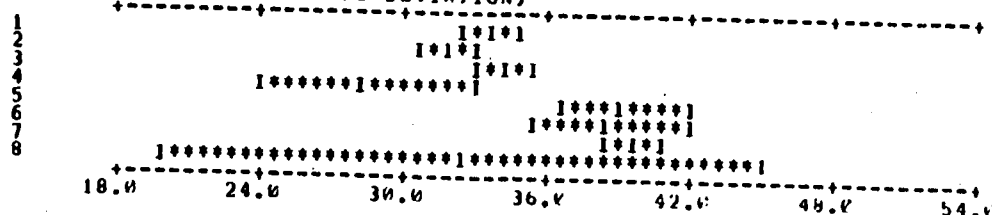
DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	2487.4	829.1	
PHLEGM	4	6097.4	1524.4	18.30
ERROR	1130	94781.7	83.3	
TOTAL	1145	103366.4		

LEVEL	N	MEAN	ST. DEV.
1	266	33.71	9.31
2	199	32.03	10.34
3	362	34.10	8.81
4	17	28.41	9.56
5	52	39.23	8.62
6	31	38.52	8.27
7	217	39.34	8.32
8	2	32.50	19.79

Male Non-smoker without phlegm
Female Non-smoker without phlegm
Male Smoker without phlegm
Female Smoker without phlegm
Male Non-smoker with phlegm
Female Non-smoker with phlegm
Male Smoker with phlegm
Female Smoker with phlegm

POOLED ST. DEV. = 9.13

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



Male Non-smoker without phlegm
Female Non-smoker without phlegm
Male Smoker without phlegm
Female Smoker without phlegm
Male Non-smoker with phlegm
Female Non-smoker with phlegm
Male Smoker with phlegm
Female Smoker with phlegm

-- onew '110exp' c34

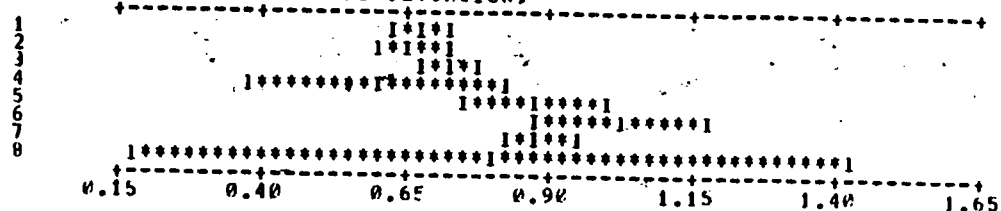
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	1.910	0.637	
PHLEGM	4	0.611	2.153	10.66
ERROR	1130	229.940	0.202	
TOTAL	1145	240.460		

PHLEGM * EXPOSURE YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	266	0.680	0.512
2	199	0.658	0.417
3	362	0.728	0.471
4	17	0.599	0.313
5	52	0.881	0.348
6	31	1.023	0.243
7	217	0.881	0.408
8	2	0.604	0.617

POOLED ST. DEV. = 0.450

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without phlegm
Female	Non-smoker	without phlegm
Male	Smoker	without phlegm
Female	Smoker	without phlegm
Male	Non-smoker	with phlegm
Female	Non-smoker	with phlegm
Male	Smoker	with phlegm
Female	Smoker	with phlegm

Male	Non-smoker	without phlegm
Female	Non-smoker	without phlegm
Male	Smoker	without phlegm
Female	Smoker	without phlegm
Male	Non-smoker	with phlegm
Female	Non-smoker	with phlegm
Male	Smoker	with phlegm
Female	Smoker	with phlegm

-- onew '110f1b' c34

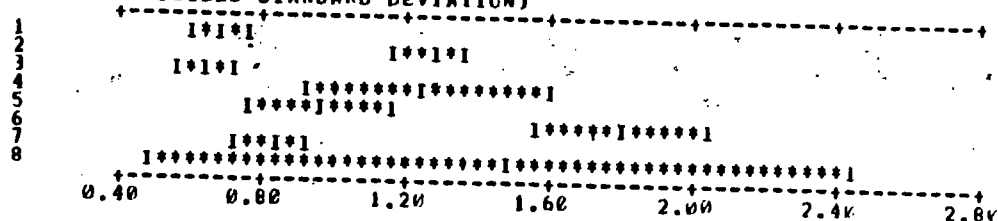
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	76.287	25.429	
PHLEGM	4	15.710	3.928	7.82
ERROR	1138	571.506	0.502	
TOTAL	1145	663.503		

PHLEGM * FIVE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	266	0.678	0.731
2	199	1.275	0.719
3	362	0.636	0.721
4	17	1.245	0.871
5	52	0.957	0.675
6	31	1.791	0.572
7	217	0.829	0.661
8	2	1.472	0.556

POOLED ST. DEV. = 0.709

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without phlegm
Female	Non-smoker	without phlegm
Male	Non-smoker	without phlegm
Male	Smoker	without phlegm
Female	Smoker	without phlegm
Male	Non-smoker	with phlegm
Female	Non-smoker	with phlegm
Male	Smoker	with phlegm
Female	Smoker	with phlegm

Male	Non-smoker	without phlegm
Female	Non-smoker	without phlegm
Male	Non-smoker	without phlegm
Male	Smoker	without phlegm
Female	Smoker	without phlegm
Male	Non-smoker	with phlegm
Female	Non-smoker	with phlegm
Male	Smoker	with phlegm
Female	Smoker	with phlegm

-- onew '110tot' c34

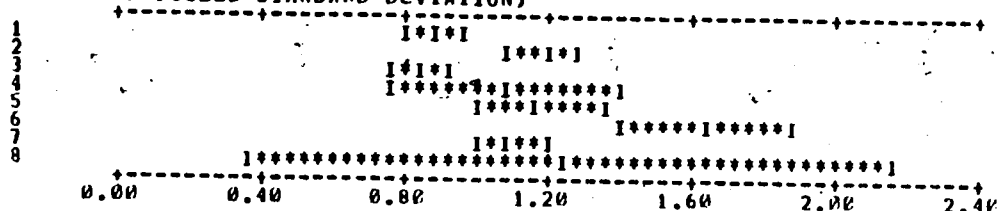
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	17.785	5.928	
PHLEGM	4	10.416	4.604	10.66
ERROR	1138	491.132	0.432	
TOTAL	1145	527.333		

PHLEGM * PARTICLE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	266	0.890	0.722
2	199	1.183	0.537
3	362	0.836	0.672
4	17	1.073	0.699
5	52	1.174	0.561
6	31	1.644	0.521
7	217	1.096	0.683
8	2	1.253	0.185

POOLED ST. DEV. = 0.657

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without	phlegm
Female	Non-smoker	without	phlegm
Male	Smoker	without	phlegm
Female	Smoker	without	phlegm
Male	Non-smoker	with	phlegm
Female	Non-smoker	with	phlegm
Male	Smoker	with	phlegm
Female	Smoker	with	phlegm

Male	Non-smoker	without	phlegm
Female	Non-smoker	without	phlegm
Male	Smoker	without	phlegm
Female	Smoker	without	phlegm
Male	Non-smoker	with	phlegm
Female	Non-smoker	with	phlegm
Male	Smoker	with	phlegm
Female	Smoker	with	phlegm

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```
-- let c34 = 'sex.smok' + 4*('bronchit'-1)
-- hist c34
```

BRONCHITIS DISTRIBUTION =====

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C34
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	274	*****
2.	206	*****
3.	370	*****
4.	17	**
5.	44	****
6.	24	***
7.	209	*****
8.	2	*

```
Male Non-smoker without bronchitis
Female Non-smoker without bronchitis
Male Smoker without bronchitis
Female Smoker without bronchitis
Male Non-smoker with bronchitis
Female Non-smoker with bronchitis
Male Smoker with bronchitis
Female Smoker with bronchitis
```

```
-- onew 'age' c34
```

ANALYSIS OF VARIANCE

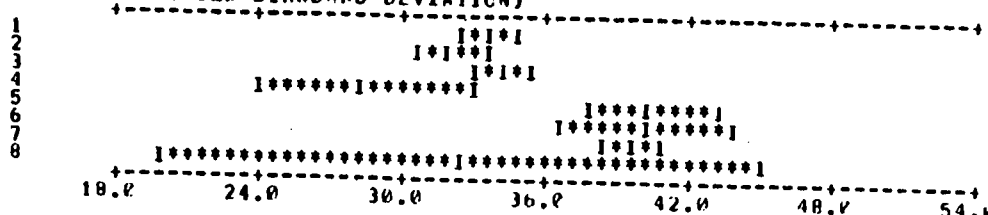
BRONCHITIS * AGE =====

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	2407.4	829.1	
BRONCHITIS	4	6857.6	1714.4	20.76
ERROR	1130	94021.4	82.6	
TOTAL	1145	103366.4		

LEVEL	N	MEAN	ST. DEV.
1	274	33.67	9.23
2	206	32.07	10.19
3	370	34.21	8.76
4	17	28.41	9.56
5	44	40.48	8.38
6	24	40.08	8.56
7	209	39.47	8.39
8	2	32.50	19.89

POOLED ST. DEV. = 9.09

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



```
Male Non-smoker without bronchitis
Female Non-smoker without bronchitis
Male Smoker without bronchitis
Female Smoker without bronchitis
Male Non-smoker with bronchitis
Female Non-smoker with bronchitis
Male Smoker with bronchitis
Female Smoker with bronchitis
```

```
Male Non-smoker without bronchitis
Female Non-smoker without bronchitis
Male Smoker without bronchitis
Female Smoker without bronchitis
Male Non-smoker with bronchitis
Female Non-smoker with bronchitis
Male Smoker with bronchitis
Female Smoker with bronchitis
```

-- onew '110exp' c34

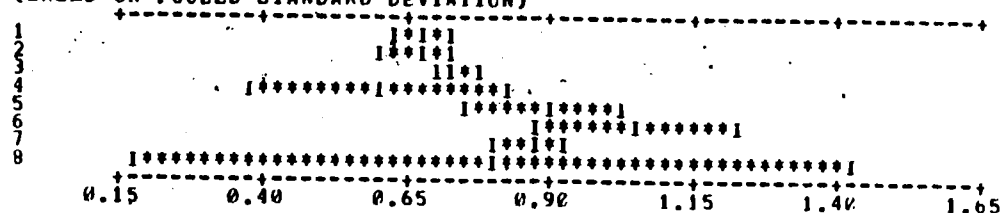
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	1.910	0.637	
BRONCHITIS	4	7.407	1.852	9.12
ERROR	1138	231.144	0.203	
TOTAL	1145	240.461		

BRONCHITIS * EXPOSURE YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	274	0.684	0.505
2	206	0.667	0.415
3	370	0.736	0.469
4	17	0.599	0.313
5	44	0.892	0.380
6	24	1.050	0.235
7	209	0.874	0.413
8	2	0.804	0.617

POOLED ST. DEV. = 0.451

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without bronchitis
Female	Non-smoker	without bronchitis
Male	Smoker	without bronchitis
Female	Smoker	without bronchitis
Male	Non-smoker	with bronchitis
Female	Non-smoker	with bronchitis
Male	Smoker	with bronchitis
Female	Smoker	with bronchitis

Male	Non-smoker	without bronchitis
Female	Non-smoker	without bronchitis
Male	Smoker	without bronchitis
Female	Smoker	without bronchitis
Male	Non-smoker	with bronchitis
Female	Non-smoker	with bronchitis
Male	Smoker	with bronchitis
Female	Smoker	with bronchitis

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-- one-way '11011b' c34

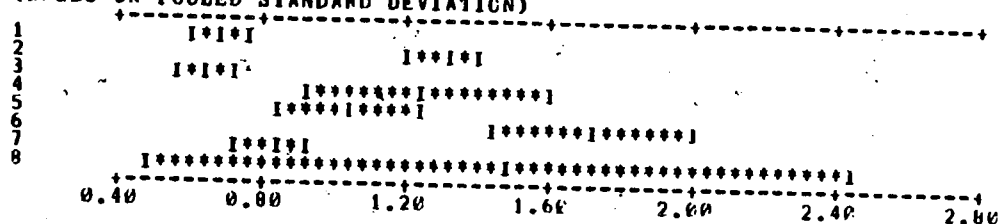
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	76.207	25.429	
BRONCHITIS	4	13.413	3.353	6.65
ERROR	1130	573.803	0.504	
TOTAL	1145	663.503		

BRONCHITIS * FIBRE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	274	0.674	0.717
2	206	1.300	0.725
3	370	0.641	0.715
4	17	1.245	0.871
5	44	1.033	0.728
6	24	1.724	0.586
7	209	0.826	0.672
8	2	1.472	0.556

POOLED ST. DEV. = 0.710

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without	bronchitis
Female	Non-smoker	without	bronchitis
Male	Smoker	without	bronchitis
Female	Smoker	without	bronchitis
Male	Non-smoker	with	bronchitis
Female	Non-smoker	with	bronchitis
Male	Smoker	with	bronchitis
Female	Smoker	with	bronchitis

Male	Non-smoker	without	bronchitis
Female	Non-smoker	without	bronchitis
Male	Smoker	without	bronchitis
Female	Smoker	without	bronchitis
Male	Non-smoker	with	bronchitis
Female	Non-smoker	with	bronchitis
Male	Smoker	with	bronchitis
Female	Smoker	with	bronchitis

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-- one-way '110tot' c34

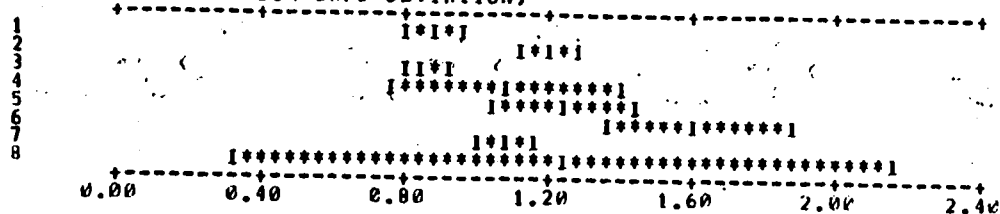
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	17.785	5.928	
BRONCHITIS	4	15.338	3.834	8.84
ERROR	1138	494.210	0.434	
TOTAL	1145	527.333		

BRONCHITIS * PARTICLE-YEARS

LEVEL	N	MEAN	ST. DEV.
1	274	0.890	0.715
2	206	1.202	0.542
3	370	0.849	0.672
4	17	1.073	0.699
5	44	1.226	0.571
6	24	1.617	0.547
7	209	1.083	0.691
8	2	1.253	0.185

POOLED ST. DEV. = 0.659

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without bronchitis
Female	Non-smoker	without bronchitis
Male	Smoker	without bronchitis
Female	Smoker	without bronchitis
Male	Non-smoker	with bronchitis
Female	Non-smoker	with bronchitis
Male	Smoker	with bronchitis
Female	Smoker	with bronchitis

Male	Non-smoker	without bronchitis
Female	Non-smoker	without bronchitis
Male	Smoker	without bronchitis
Female	Smoker	without bronchitis
Male	Non-smoker	with bronchitis
Female	Non-smoker	with bronchitis
Male	Smoker	with bronchitis
Female	Smoker	with bronchitis

-- let c34 = 'sex.smok' + 4*('asb.b.gd'-1)

-- hist c34

C34
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	310	*****
2.	230	*****
3.	546	*****
4.	19	**
5.	8	*
6.	0	
7.	33	***
8.	0	

Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Female Non-smoker with asbestos bodies
Male Smoker with asbestos bodies
Female Smoker with asbestos bodies

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ASBESTOS BODY DISTRIBUTION
=====

-- onev 'age' c34

ANALYSIS OF VARIANCE

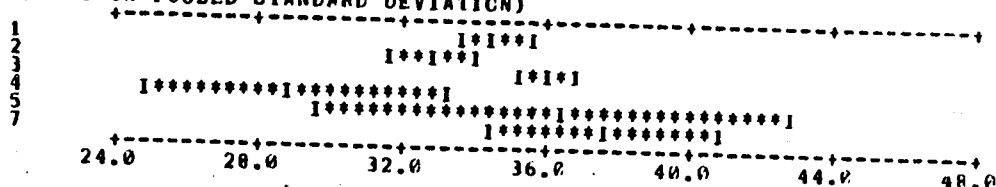
DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	2487.4	829.1	
ASB BODIES	2	110.2	55.1	
ERROR	1140	102768.9	89.4	0.62
TOTAL	1145	103366.4		

ASBESTOS BODY * AGE
=====

LEVEL	N	MEAN	ST. DEV.
1	310	34.57	9.45
2	230	32.90	10.31
3	546	36.01	8.92
4	19	28.84	10.16
5	8	36.25	8.08
7	33	37.70	9.86

POOLED ST. DEV. = 9.40

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

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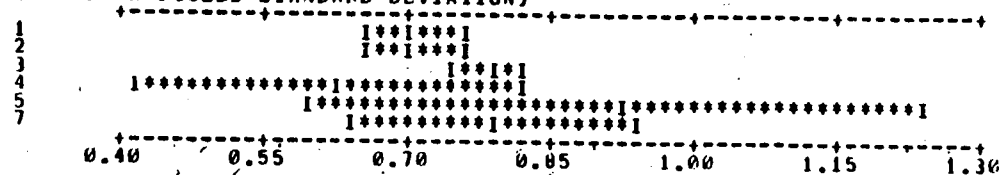
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	1.910	0.637	
ASB BODIES	2	0.353	0.176	0.84
ERROR	1140	238.198	0.209	
TOTAL	1145	240.461		

LEVEL	N	MEAN	ST. DEV.
1	310	0.707	0.497
2	230	0.707	0.417
3	546	0.785	0.451
4	19	0.621	0.336
5	8	0.920	0.364
7	33	0.791	0.514

POOLED ST. DEV. = 0.457

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



-- one-way 110f1b - c34

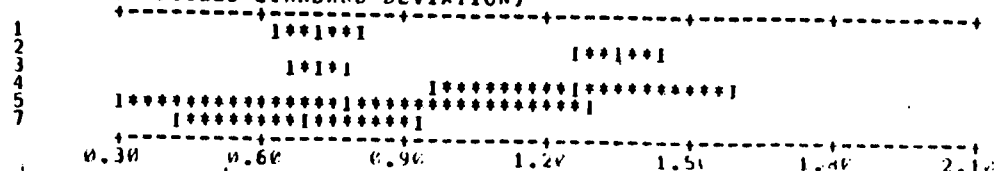
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	76.287	25.429	
ASB BODIES	2	0.072	0.036	0.07
ERROR	1140	587.144	0.515	
TOTAL	1145	663.503		

LEVEL	N	MEAN	ST. DEV.
1	310	0.722	0.728
2	230	1.344	0.722
3	546	0.710	0.699
4	19	1.269	0.835
5	8	0.791	0.774
7	33	0.677	0.802

POOLED ST. DEV. = 0.718

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

ASBESTOS BODY * FIBRE-YEARS
=====

Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

Male Non-smoker without asbestos bodies
Female Non-smoker without asbestos bodies
Male Smoker without asbestos bodies
Female Smoker without asbestos bodies
Male Non-smoker with asbestos bodies
Male Smoker with asbestos bodies

-- onew '110tot' c34

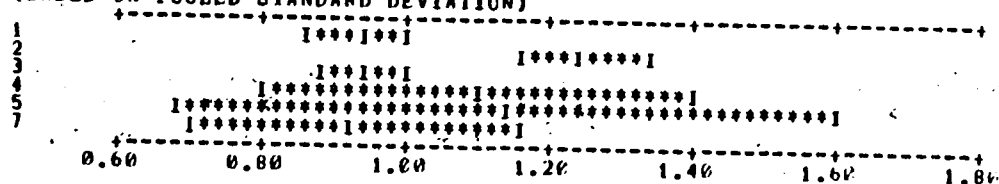
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	17.785	5.928	
ASB BODIES	2	0.352	0.176	
ERROR	1140	509.196	0.447	0.39
TOTAL	1145	527.333		

ASBESTOS BODY * PARTICLE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	310	0.931	0.706
2	230	1.245	0.556
3	546	0.534	0.681
4	19	1.092	0.662
5	0	1.143	0.720
7	33	0.925	0.796

POOLED ST. DEV. = 0.668

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without asbestos bodies
Female	Non-smoker	without asbestos bodies
Male	Smoker	without asbestos bodies
Female	Smoker	without asbestos bodies
Male	Non-smoker	with asbestos bodies
Male	Smoker	with asbestos bodies

Male	Non-smoker	without asbestos bodies
Female	Non-smoker	without asbestos bodies
Male	Smoker	without asbestos bodies
Female	Smoker	without asbestos bodies
Male	Non-smoker	with asbestos bodies
Male	Smoker	with asbestos bodies

```
-- let c34 = 'sex.smok' + 4*('dysp.gr'-2)
-- hist c34
```

C34
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	218
2.	148
3.	329
4.	12
5.	77
6.	65
7.	187
8.	6
9.	23
10.	17
11.	63
12.	1

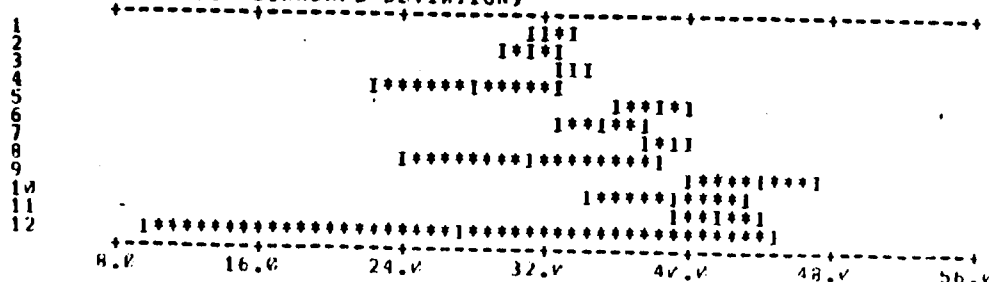
```
-- onew 'age' c34
ANALYSIS OF VARIANCE
```

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX.SMOK	3	2487.4	829.1	
DYSPNOEA	8	11075.9	1384.5	17.48
ERROR	1134	89803.2	79.2	
TOTAL	1145	103366.4		

LEVEL	N	MEAN	ST. DEV.
1	218	32.38	8.92
2	148	31.14	10.38
3	329	33.49	8.84
4	12	27.75	10.15
5	77	36.22	8.94
6	65	35.32	9.71
7	187	38.86	7.93
8	6	31.33	11.57
9	23	43.65	5.66
10	17	39.00	7.90
11	63	41.62	7.76
12	1	27.00	0.00

POOLED ST. DEV. = 8.90

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)



DYSPNOEA DISTRIBUTION
=====

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```
Male Non-smoker without dyspnoea
Female Non-smoker without dyspnoea
Male Smoker without dyspnoea
Female Smoker without dyspnoea
Male Non-smoker with dyspnoea grade 3
Female Non-smoker with dyspnoea grade 3
Male Smoker with dyspnoea grade 3
Female Smoker with dyspnoea grade 3
Male Non-smoker with dyspnoea grade 4+
Female Non-smoker with dyspnoea grade 4+
Male Smoker with dyspnoea grade 4+
Female Smoker with dyspnoea grade 4+
```

DYSPNOEA * AGE
=====

```
Male Non-smoker without dyspnoea
Female Non-smoker without dyspnoea
Male Smoker without dyspnoea
Female Smoker without dyspnoea
Male Non-smoker with dyspnoea grade 3
Female Non-smoker with dyspnoea grade 3
Male Smoker with dyspnoea grade 3
Female Smoker with dyspnoea grade 3
Male Non-smoker with dyspnoea grade 4+
Female Non-smoker with dyspnoea grade 4+
Male Smoker with dyspnoea grade 4+
Female Smoker with dyspnoea grade 4+
```

-- one-way '110exp' c34

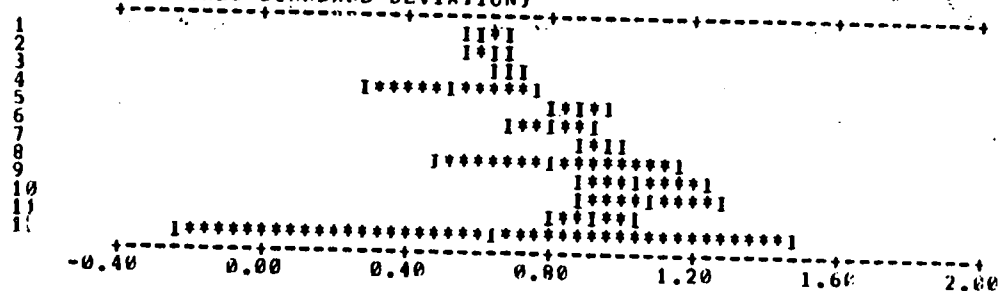
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	1.910	0.637	
DYSPOEA	8	21.062	2.633	13.71
ERROR	1134	217.489	0.192	
TOTAL	1145	240.460		

DYSPOEA * EXPOSURE YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	218	0.619	0.510
2	148	0.622	0.435
3	329	0.671	0.486
4	12	0.523	0.303
5	77	0.881	0.395
6	65	0.802	0.336
7	187	0.941	0.351
8	6	0.815	0.368
9	23	1.042	0.341
10	17	1.081	0.211
11	63	0.925	0.379
12	1	0.628	0.000

POOLED ST. DEV. = 0.430

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male	Non-smoker	without dyspnoea
Female	Non-smoker	without dyspnoea
Male	Smoker	without dyspnoea
Female	Smoker	without dyspnoea
Male	Non-smoker	with dyspnoea grade 3
Female	Non-smoker	with dyspnoea grade 3
Male	Smoker	with dyspnoea grade 3
Female	Smoker	with dyspnoea grade 3
Male	Non-smoker	with dyspnoea grade 4+
Female	Non-smoker	with dyspnoea grade 4+
Male	Smoker	with dyspnoea grade 4+
Female	Smoker	with dyspnoea grade 4+

Male	Non-smoker	without dyspnoea
Female	Non-smoker	without dyspnoea
Male	Smoker	without dyspnoea
Female	Smoker	without dyspnoea
Male	Non-smoker	with dyspnoea grade 3
Female	Non-smoker	with dyspnoea grade 3
Male	Smoker	with dyspnoea grade 3
Female	Smoker	with dyspnoea grade 3
Male	Non-smoker	with dyspnoea grade 4+
Female	Non-smoker	with dyspnoea grade 4+
Male	Smoker	with dyspnoea grade 4+
Female	Smoker	with dyspnoea grade 4+

-- onew '110fib' c34

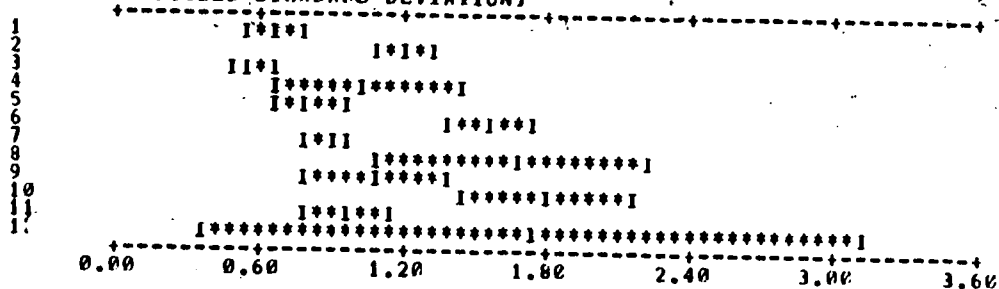
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	76.287	25.429	
DYSPNOEA	8	33.061	4.133	8.45
ERROR	1134	554.154	0.489	
TOTAL	1145	663.503		

DYSPNOEA * FIBRE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	218	0.660	0.764
2	148	1.199	0.692
3	329	2.558	0.707
4	12	1.034	0.945
5	77	0.795	0.674
6	65	1.556	0.668
7	187	0.883	0.686
8	6	1.660	0.432
9	23	1.086	0.352
10	17	1.798	0.826
11	63	0.970	0.539
12	1	1.743	0.000

POOLED ST. DEV. = 0.699

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male Non-smoker without dyspnoea
 Female Non-smoker without dyspnoea
 Male Smoker without dyspnoea
 Female Smoker without dyspnoea
 Male Non-smoker with dyspnoea grade 3
 Female Non-smoker with dyspnoea grade 3
 Male Smoker with dyspnoea grade 3
 Female Smoker with dyspnoea grade 3
 Male Non-smoker with dyspnoea grade 4+
 Female Non-smoker with dyspnoea grade 4+
 Male Smoker with dyspnoea grade 4+
 Female Smoker with dyspnoea grade 4+

Male Non-smoker without dyspnoea
 Female Non-smoker without dyspnoea
 Male Smoker without dyspnoea
 Female Smoker without dyspnoea
 Male Non-smoker with dyspnoea grade 3
 Female Non-smoker with dyspnoea grade 3
 Male Smoker with dyspnoea grade 3
 Female Smoker with dyspnoea grade 3
 Male Non-smoker with dyspnoea grade 4+
 Female Non-smoker with dyspnoea grade 4+
 Male Smoker with dyspnoea grade 4+
 Female Smoker with dyspnoea grade 4+

-- onew '110tot' c34

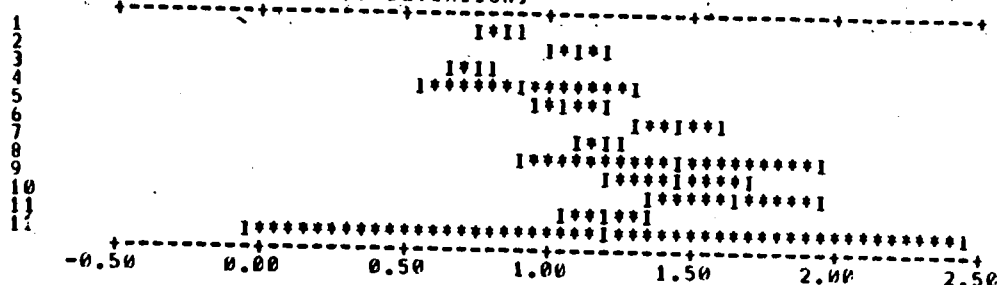
ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF	F-RATIO
SEX, SMOK	3	17.785	5.928	
DYSPNOEA	8	45.691	5.711	
ERROR	1134	463.857	0.409	13.96
TOTAL	1145	527.333		

DYSPNOEA * PARTICLE-YEARS
=====

LEVEL	N	MEAN	ST. DEV.
1	218	0.835	0.734
2	148	1.117	0.544
3	329	0.744	0.674
4	12	0.913	0.772
5	77	1.072	0.615
6	65	1.431	0.487
7	187	1.170	0.640
8	6	1.433	0.225
9	23	1.449	0.323
10	17	1.646	0.552
11	63	1.200	0.569
12	1	1.185	0.000

POOLED ST. DEV. = 0.640

INDIVIDUAL 95 PERCENT C. I. FOR LEVEL MEANS
(BASED ON POOLED STANDARD DEVIATION)

Male Non-smoker without dyspnoea
 Female Non-smoker without dyspnoea
 Male Smoker without dyspnoea
 Female Smoker without dyspnoea
 Male Non-smoker with dyspnoea grade 3
 Female Non-smoker with dyspnoea grade 3
 Male Smoker with dyspnoea grade 3
 Female Smoker with dyspnoea grade 3
 Male Non-smoker with dyspnoea grade 4+
 Female Non-smoker with dyspnoea grade 4+
 Male Smoker with dyspnoea grade 4+
 Female Smoker with dyspnoea grade 4+

Male Non-smoker without dyspnoea
 Female Non-smoker without dyspnoea
 Male Smoker without dyspnoea
 Female Smoker without dyspnoea
 Male Non-smoker with dyspnoea grade 3
 Female Non-smoker with dyspnoea grade 3
 Male Smoker with dyspnoea grade 3
 Female Smoker with dyspnoea grade 3
 Male Non-smoker with dyspnoea grade 4+
 Female Non-smoker with dyspnoea grade 4+
 Male Smoker with dyspnoea grade 4+
 Female Smoker with dyspnoea grade 4+

Annex IV

SNZ Asbestos Study
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"Controls" -- prediction of lung function
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SNZ Asbestos Study
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"Controls" -- prediction of lung function
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SNZ Asbestos Study

"Controls" -- prediction of lung function

The data for the controls consisted of lung function measurements on 1950 people, 801 males and 1149 females, unexposed to asbestos dust. The measurements were made in the same manner as for the people in the SNZ Asbestos Study group. These data have been used to develop laboratory specific prediction equations to be applied to the asbestos group.

1. Statistical Methods

People with symptoms, (cough, phlegm, bronchitis, dyspnoea) were excluded from the following analyses so that the resultant prediction equations could be related to "healthy" individuals permitting better detection of abnormal lung function in the asbestos-exposed workers. The analysis was also limited to people in the age-range 25 to 64. The upper limit was set because predictive equations were required for a working population and the lower limit because lung function is believed to increase up to about age 25 before the effects of age start to reduce it.

Thus in these analyses there were 518 men and 861 women.

The same basic set of regression analyses was done for each sex and for each lung function index - FVC, FEV1, Peakflow, MEF50 and MEF25. The following regression equations were calculated:

Lung function index on

- Age and Height
- Age, Height and Cigarettes smoked per day
- Age, Height, Cigarettes/day, and their 3 interactions
- Age and Height for non-smokers and smokers separately
- Age and Height (non-smokers) and Age, Height and Cigarettes/day (smokers)

In deciding which regression equation to use for the prediction of lung function for the asbestos-exposed workers, the extent to which the extra terms in the equations added to the precision of the prediction was taken into account. The results for each index for each sex are described in the next 14 sections of this report.

The statistical calculations (except the Shapiro and Wilks test for Normality) have been done using the MINITAB statistical package at the Clinical Research Centre, Harrow, UK. The histograms, analyses etc. have been presented as produced by MINITAB, with annotations added.

For each index a Normal plot of the distribution of residuals is shown. If the distribution is normal, then the Normal plot will be a straight line within the limits set by the printer. The probabilities given have been calculated from the Shapiro and Wilks test for Normality; the smaller the probability, the less the observed residual distribution is compatible with Normality.

Note that in the Normal plot * = 1 value, 2 = 2 values 9 = 9 values, + = 10 or more.

2. Forced Vital Capacity -- Males

Page 3

None of the possible regression lines fitted significantly better than that on age and height alone. The distribution of residuals is acceptably Normal.

-- regress 'fvc' 2 'age' 'height' 'residual'

THE REGRESSION EQUATION IS

$$Y = -4.63 - .0325 X_1 + 6.17 X_2$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	AGE	-4.6256	0.7087	-6.53
X2	HEIGHT	-0.032481	0.002841	-11.43
		6.1671	0.3951	15.61

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

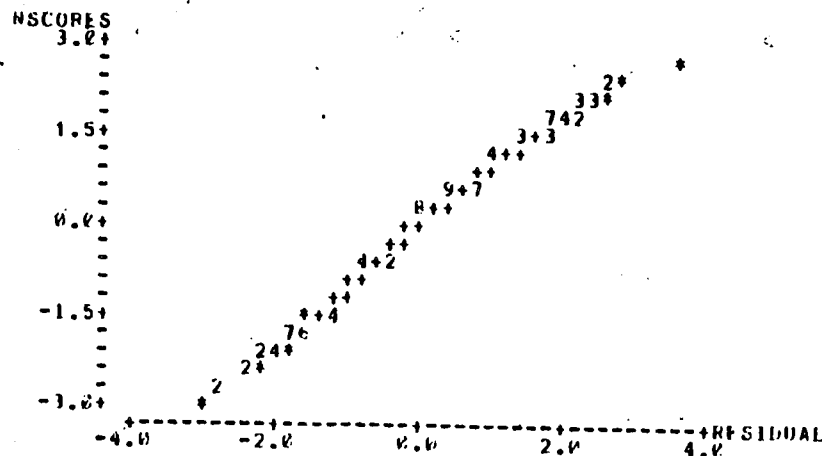
S/ 0.5824
W.L.D (518- 3) = 515 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		2	144.1427	72.0713
RESIDUAL		515	174.6799	0.3392
TOTAL		517	318.8226	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.73

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL FACH * REPRESENTS	5 OBSERVATIONS
MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	3
-2.5	2
-2.0	13
-1.5	33
-1.0	60
-0.5	104
0.0	106
0.5	80
1.0	62
1.5	31
2.0	14
2.5	8
3.0	1
3.5	1

3. Forcen Vital Capacity -- Females

Page 4

None of the possible regression lines fitted significantly better than that on age and height alone. The distribution of residuals is acceptably Normal.

-- regress 'fvc' 2 'age' 'height' 'residual'

852 CASES USED
9 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 2.83 - .0224 X1 + 4.50 X2

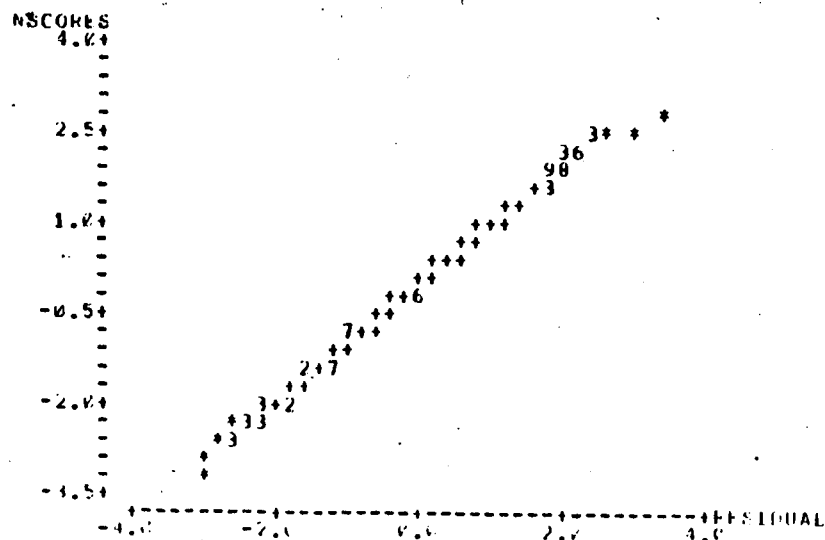
	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/ST.D.
X1	AGE	-0.022406	0.001561	-14.36
X2	HEIGHT	4.4989	0.2341	19.22

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.4043
WITH (852 - 3) = 849 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	2	107.2938	53.6469
RESIDUAL	849	130.7986	0.1635
TOTAL	851	246.0924	

-- plot 'nscores' 'residual'



Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.46

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	3
-2.5	9
-2.0	23
-1.5	57
-1.0	97
-0.5	167
0.0	152
0.5	140
1.0	109
1.5	63
2.0	24
2.5	6
3.0	1
3.5	1

4. Forced Expiratory volume in 1 second -- Males

Page 5

For FEV1 smoking was related to a significant reduction in function. However a single relation to age and height was adequate for smokers and non-smokers. The distribution of residuals is acceptably Normal.

-- regress 'fev1' 3 'age' 'height' 'smoking' 'residual'

517 CASES USED
1 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = -2.65 - .0351 X1 + 4.51 X2
- .0031 X3

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	AGE	-2.6472	0.5977	-4.43
X2	HEIGHT	-0.035102	0.002396	-14.65
X3	SMOKING	4.5090	0.3330	13.54
		-0.0031068	0.001537	-2.00

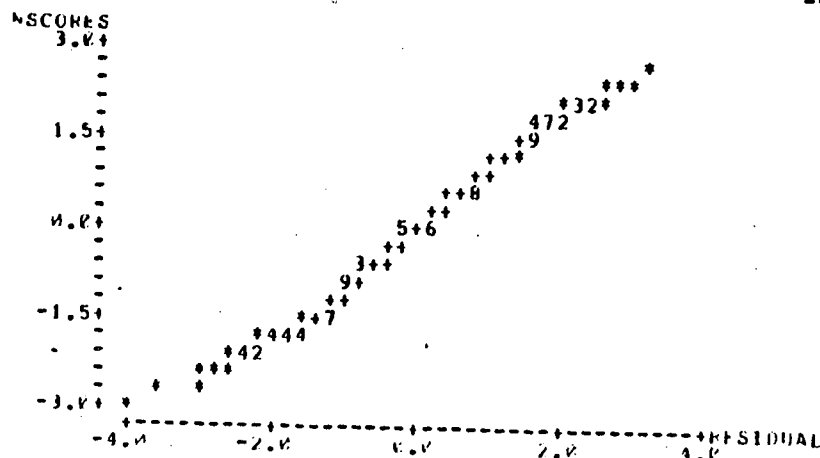
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.4900
WITH (517- 4) = 513 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	3	110.6509	36.8836
RESIDUAL	513	123.5876	0.2409
TOTAL	516	234.2385	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.53

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	1
-3.5	1
-3.0	3
-2.5	6
-2.0	10
-1.5	20
-1.0	71
-0.5	86
0.0	122
0.5	83
1.0	65
1.5	31
2.0	11
2.5	4
3.0	3

5. Forced Expiratory Volume in 1 second -- females
=====

Page 6

For FEV1 smoking was related to a significant reduction in function.
However a single relation to age and height was adequate for smokers and
non-smokers. The distribution of residuals is acceptably Normal.

-- regress 'fev1' 3 'age' 'height' 'smoking' 'residual'

852 CASES USED
9 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 1.52 - .0275 X1 + 3.40 X2
- .0024 X3

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	AGE	-1.5160	0.3314	-4.58
X2	HEIGHT	3.4000	0.001323	20.80
X3	SMOKING	-0.002436	0.001449	-1.68

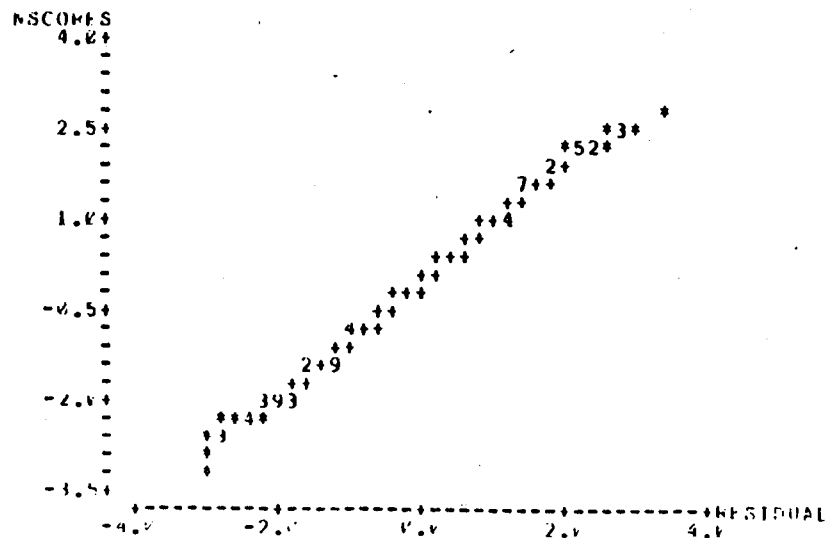
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.3427
WITH (852- 4) = 848 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		3	97.0462	32.3487
RESIDUAL		848	99.5807	0.1174
TOTAL		851	196.6269	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.66

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	5
-2.5	7
-2.0	27
-1.5	48
-1.0	99
-0.5	166
0.0	157
0.5	157
1.0	98
1.5	51
2.0	25
2.5	9
3.0	2
3.5	1

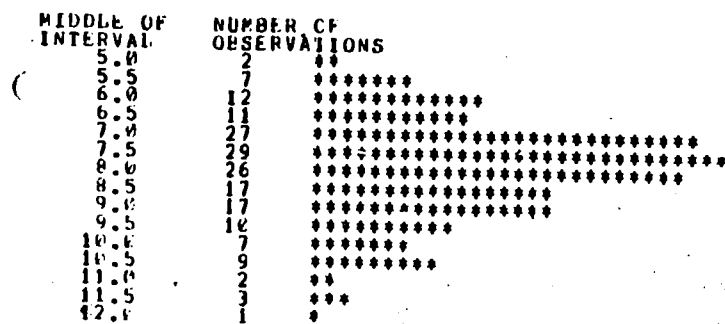
6. PEAKFLOW -- Males
=====

Page 7

For peakflow there were only 187 men with complete data. The distribution of peakflow is very skewed; the following two histograms show this for the peakflow data themselves and for the residuals after fitting the "best" regression line. This is confirmed by the Normal plot.

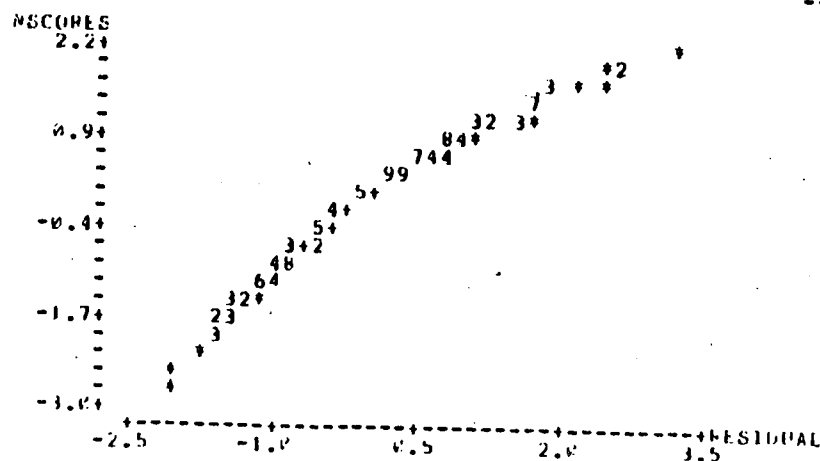
-- histogram 'peakflow'

PEAKFLOW
338 MISSING OBSERVATIONS

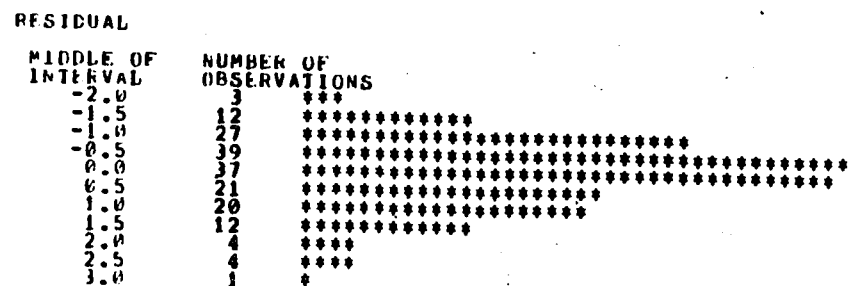


Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.006

-- plot 'nscores' 'residual'



-- hist 'residual'



7. PEAKFLOW -- females
=====

Page 8

For peakflow there were only 489 women with complete data. The distribution of peakflow is rather skewed; the following two histograms show this for the peakflow data themselves and for the residuals after fitting the "best" regression line. This is confirmed by the Normal plot.

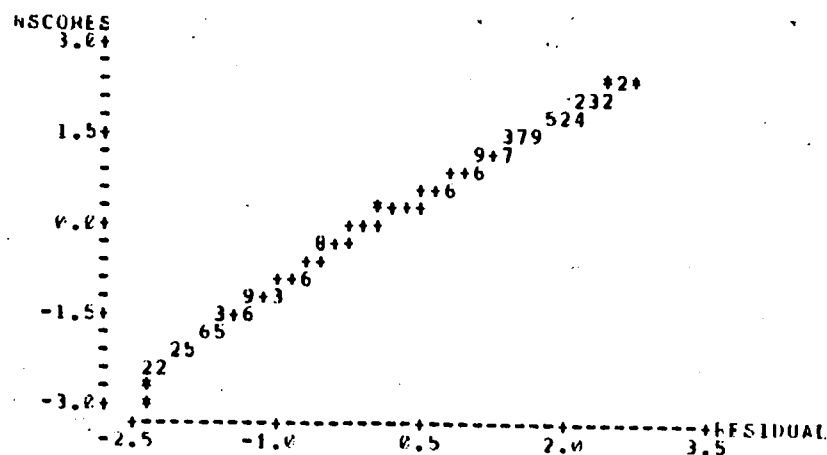
-- histogram 'peakflow'

PEAKFLOW
EACH * REPRESENTS 2 OBSERVATIONS
372 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
4.0	7
4.5	20
5.0	42
5.5	90
6.0	97
6.5	92
7.0	64
7.5	50
8.0	15
8.5	9
9.0	3

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.000

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	4
-2.0	12
-1.5	34
-1.0	58
-0.5	107
0.0	73
0.5	91
1.0	55
1.5	32
2.0	14
2.5	8
3.0	1

8. Log(e) PEAKFLOW -- Males =====

Page 9

The data for peakflow were reanalysed after taking logarithms.
untransformed values, as shown by the Normal plot.

A combined regression line for smokers and non-smokers did not
fit these data satisfactorily, so separate regressions were fitted.

-- regress 'lnpflw' 6 c31-c36 'residual'

180 CASES USED 338 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = + 0.321 X1 + 2.11 X2 - .0017 X3 \\ - .0031 X4 + 1.04 X5 + .0217 X6$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	INTSMOK	0.3209	0.4470	0.72
X2	INTNON	2.1078	0.5639	3.74
X3	AGESMOK	-0.001675	0.002018	-0.83
X4	AGENON	-0.003108	0.001977	-1.57
X5	HISMON	1.0385	0.2437	4.26
X6	HITNON	0.0217	0.3179	0.07

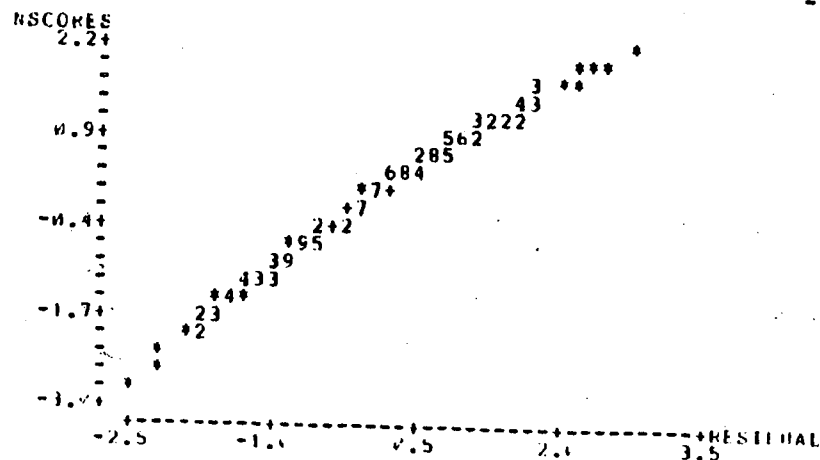
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.1682 WITH (180 - 6) = 174 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	6	763.7345	127.1724
RESIDUAL	174	4.9244	0.0283
TOTAL	180	767.9589	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.48

-- plot 'nscores' 'residual'



-- hist 'residual'

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	1
-2.0	4
-1.5	16
-1.0	19
-0.5	34
0.0	41
0.5	22
1.0	22
1.5	14
2.0	5
2.5	2

9. Log10 PEAKFLOW -- Females
=====

Page 10

The data for peakflow were reanalysed after taking logarithms. This transformation effectively removed much of the skewness existing in the untransformed values, as shown by the Normal plot.

A combined regression line for smokers and non-smokers did not fit these data satisfactorily, so separate regressions were fitted.

-- regress 'lnpfk' 6 c31-c36 'residual'

488 CASES USED 373 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = + 0.848 X1 + 0.935 X2 + .0004 X3
- .0041 X4 + 0.627 X5 + 0.631 X6

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	INTSMOK	0.8480	0.4781	1.77
X2	INTNON	0.9345	0.2125	4.40
X3	AGESMOK	0.000404	0.001732	0.23
X4	AGENCN	-0.0040933	0.0008734	-4.69
X5	HTSMOK	0.6267	0.2689	2.17
X6	HTNON	0.6307	0.1288	4.90

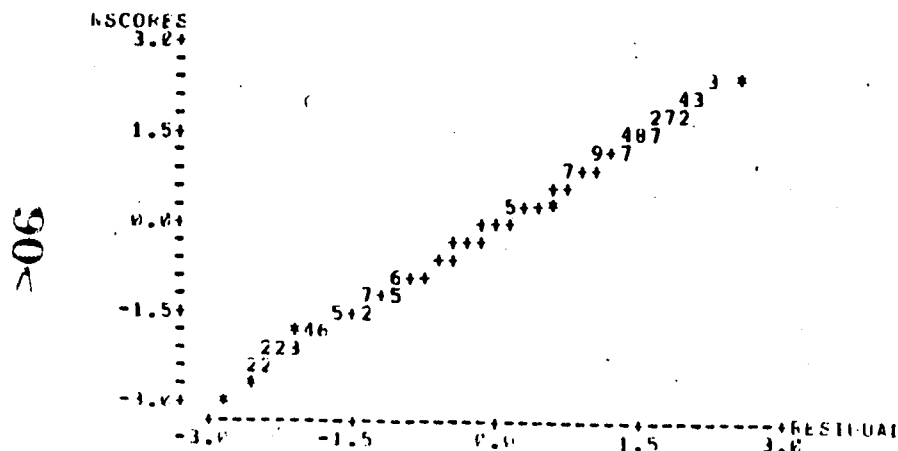
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.1455 WITH (466 - 6) = 482 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS	SS/DF
REGRESSION	6	1615.795	269.299	0.021	
RESIDUAL	482	10.198			
TOTAL	488	1625.992			

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.08

-- plot 'nscores' 'residual'



-- hist 'residual'

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	1
-2.5	9
-2.0	12
-1.5	32
-1.0	50
-0.5	95
0.0	83
0.5	91
1.0	66
1.5	30
2.0	17
2.5	2

=====

There proved to be no need to transform the values of Meif50, as the residuals after fitting the regression relations were adequately Normal.

A single relation for smokers and non-smokers was unsatisfactory for fitting these data, so separate relations for smokers and non-smokers were fitted. For smokers, it was necessary to include "cigarettes per day" as a predictor variable.

-- regress 'meif50' 7 'smoking' c31-c36 'residual'

517 CASES USED 1 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = -0.0307 X1 - 9.04 X2 + 2.61 X3 - 0.0508 X4 - 0.0307 X5 + 10.0 X6 + 2.65 X7$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	SMOKING	-0.030675	0.009140	-3.36
X2	INTSMOK	-9.045	2.707	-3.34
X3	INTNON	2.608	3.017	0.86
X4	AGESMOK	-0.05078	0.01123	-4.52
X5	AGENON	-0.03072	0.01161	-2.65
X6	HTSMOK	10.034	1.497	6.70
X7	HTNON	2.653	1.706	1.55

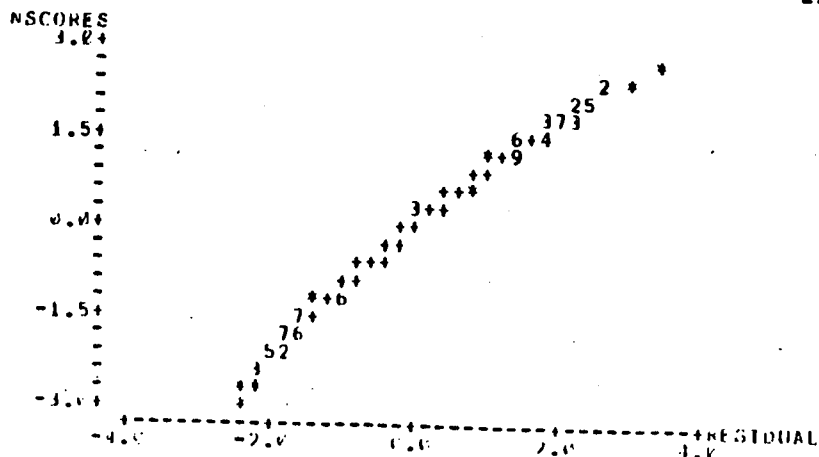
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 1.645 WITH (517 - 7) = 510 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	7	18318.12	2616.87
RESIDUAL	510	1379.97	2.71
TOTAL	517	19698.09	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.14

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL	EACH * REPRESENTS	5 OBSERVATIONS
MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.5	3	+
-2.0	12	***
-1.5	39	*****
-1.0	66	*****
-0.5	90	*****
0.0	115	*****
0.5	85	*****
1.0	45	*****
1.5	36	*****
2.0	15	***
2.5	9	**
3.0	1	+
3.5	1	+

There proved to be no need to transform the values of mef50 , as the residuals after fitting the regression relations were adequately Normal. A single relation for smokers and non-smokers was unsatisfactory for fitting these data, so separate relations for smokers and non-smokers were fitted. Unlike for the males, it did not prove necessary to include "cigarettes per day" as a predictor variable.

-- regress 'mef50' 6 c31-c36 'residual'

857 CASES USED 4 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 3.95 X1 + 5.30 X2 - .0542 X3 - .0282 X4 + 1.03 X5 + 2.92 X6$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/ST. D.
X1	INTSMOK	5.295	2.298	2.30
X2	INTNON	1.346	1.233	1.09
X3	AGESMOK	-0.054169	0.008983	-6.03
X4	AGENON	-0.028161	0.004996	-5.64
X5	HTSMOK	1.032	1.371	0.65
X6	HTNON	2.9170	0.7429	3.93

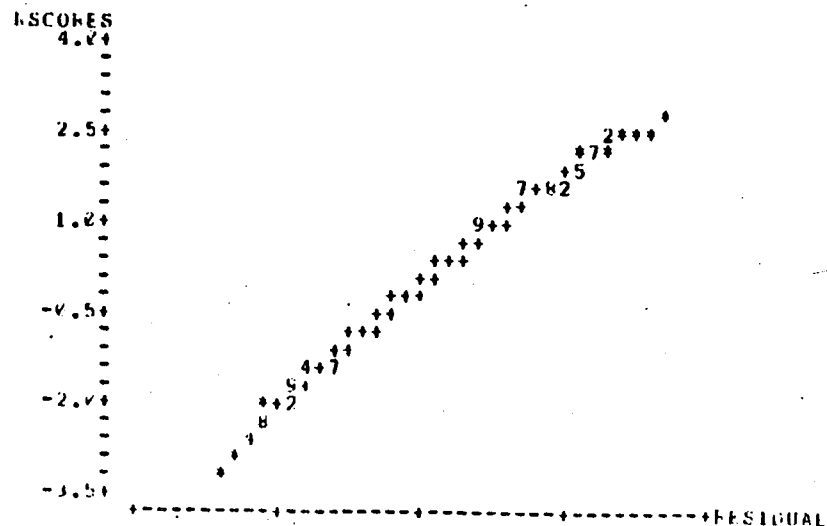
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 1.132 WITH (857 - 6) = 851 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	6	21652.40	3608.73
RESIDUAL	851	1090.48	1.28
TOTAL	857	22742.88	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.16

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	8
-2.0	28
-1.5	56
-1.0	104
-0.5	140
0.0	184
0.5	140
1.0	104
1.5	44
2.0	27
2.5	10
3.0	3
3.5	1

12. MEF25 -- Males
=====

Page 13

As for peakflow, the distribution of values for Mef25 and for the residuals after fitting the "best" regression relation were very skew. The following Normal score plot and histograms show this.

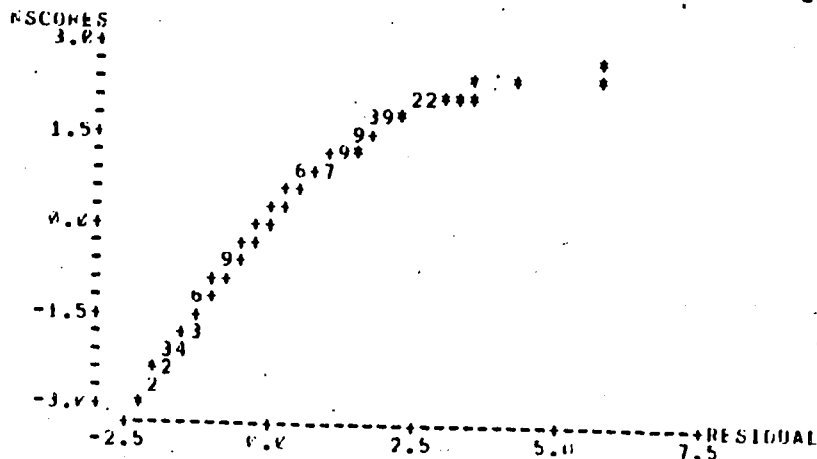
-- histogram 'mef25'

MEF25
EACH * REPRESENTS 5 OBSERVATIONS
1 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.5	7
1.0	52
1.5	110
2.0	110
2.5	107
3.0	70
3.5	31
4.0	18
4.5	3
5.0	5
5.5	1
6.0	0
6.5	2
7.0	1

Shapiro and Wilks test for Normality of distribution of residuals
Probability < 0.0001

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	1
-2.0	4
-1.5	29
-1.0	74
-0.5	125
0.0	117
0.5	74
1.0	42
1.5	22
2.0	17
2.5	4
3.0	3
3.5	2
4.0	0
4.5	1
5.0	0
5.5	2

13. MEF25 -- Ferales =====

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As for peakflow, the distribution of values for Mef25 and for the residuals after fitting the "best" regression relation were very skew. The following Normal score plot and histograms show this.

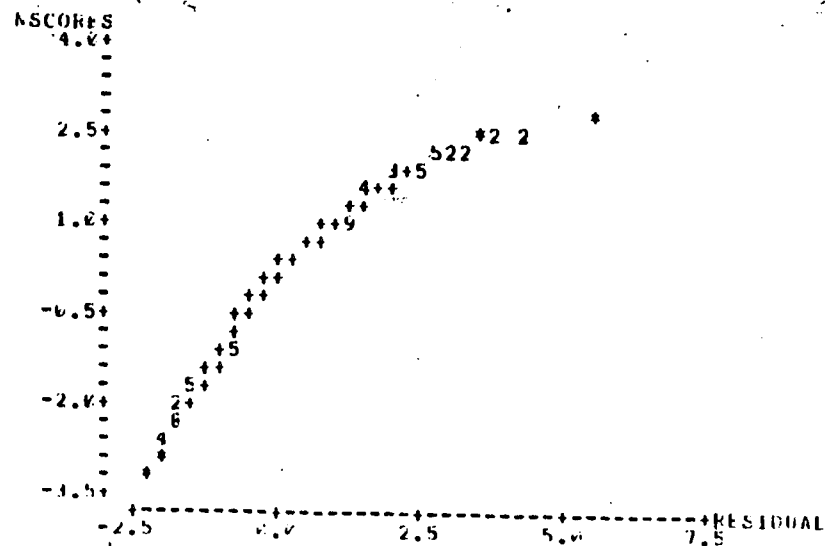
-- histogram 'mei25'

MEF25
EACH * REPRESENTS 5 OBSERVATIONS
2 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.5	11
1.0	74
1.5	198
2.0	234
2.5	153
3.0	85
3.5	55
4.0	30
4.5	6
5.0	6
5.5	4
6.0	1

Shapiro and Wilks test for Normality of distribution of residuals
Probability < 0.0001

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	10
-1.5	40
-1.0	139
-0.5	200
0.0	189
0.5	111
1.0	74
1.5	46
2.0	25
2.5	11
3.0	5
3.5	5
4.0	1
4.5	1
5.0	0
5.5	1

4. LOG(1) REF25 -- Fales
=====

Page 15

After transformation by taking logarithms, the residuals were adequately normally distributed.

A single relation for smokers and non-smokers was unsatisfactory for fitting these data, so separate relations for smokers and non-smokers were fitted. For smokers, it was necessary to include "cigarettes per day" as a predictor variable.

-- regress 'lnref25' 7 'smoking' c31-c36 'residual'

517 CASES USED 1 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = -0.0045 X_1 - 1.11 X_2 + 0.486 X_3 - 0.0256 X_4 - 0.0180 X_5 + 1.64 X_6 + 0.552 X_7$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	SMOKING	-0.004532	0.001937	-2.34
X2	INTSMOK	-1.1069	0.5736	-1.93
X3	INTNON	0.4863	0.6394	0.76
X4	AGESMOK	-0.025630	0.002380	-10.77
X5	AGENON	-0.017964	0.002461	-7.30
X6	HTSMOK	1.6420	0.3173	5.17
X7	HTNON	0.5519	0.3616	1.53

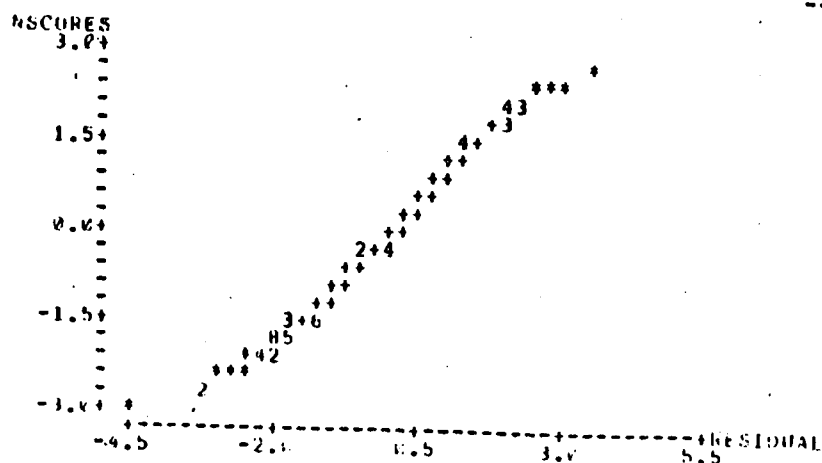
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.3486 WITH (517 - 7) = 510 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	7	299.7545	42.8221
RESIDUAL	510	61.9817	0.1215
TOTAL	517	361.7362	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.98

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	0
-3.5	1
-3.0	2
-2.5	5
-2.0	15
-1.5	26
-1.0	56
-0.5	93
0.0	104
0.5	106
1.0	57
1.5	32
2.0	13
2.5	3
3.0	2
3.5	1

After transformation by taking logarithms, the residuals were adequately normally distributed. A single relation for smokers and non-smokers was unsatisfactory for fitting these data, so separate relations for smokers and non-smokers were fitted. Unlike for the males, it did not prove necessary to include "cigarettes per day" as a predictor variable.

-- regress 'lnmf25' b c31-c36 'residual'

857 CASES USED. 4 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = -0.754 X1 + 0.354 X2 - .0265 X3 - .0227 X4 + 0.540 X5 + 0.720 X6$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	INTSMOK	0.7543	0.6601	1.14
X2	INTNOK	0.4007	0.3543	1.13
X3	AGESMOK	-0.026523	0.002573	-10.31
X4	AGENON	-0.022693	0.001435	-15.81
X5	WISMOK	0.5401	0.3937	1.37
X6	WINON	0.7196	0.2134	3.37

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

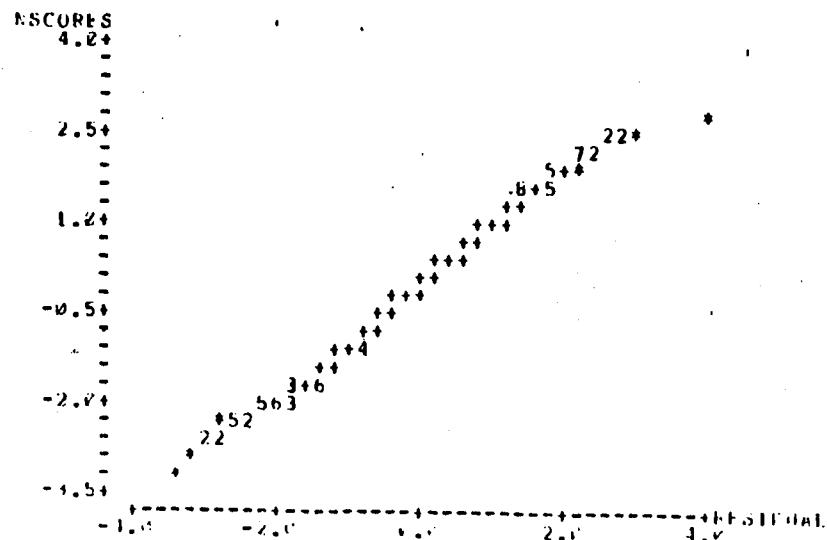
S = 0.3252 WITH (857 - 6) = 851 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	6	474.3996	79.0666
RESIDUAL	851	90.0071	0.1058
TOTAL	857	564.4067	

Shapiro and Wilks test for Normality of distribution of residuals
Probability = 0.84

-- plot 'nscores' 'residual'



-- hist 'residual'

RESIDUAL EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.5	1
-3.0	6
-2.5	8
-2.0	14
-1.5	44
-1.0	106
-0.5	180
0.0	165
0.5	142
1.0	94
1.5	64
2.0	24
2.5	5
3.0	3
3.5	0
4.0	1

Annex V

SNZ Asbestos Study
=====

Lung Function -- Initial analysis
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Lung Function -- Initial analysis
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23.	Regression analysis for MEF50.D	Difference between MEF50 and MEF50.P	49
24.	Regression analysis for LMEF25.D	Difference between Log(MEF25) and LMEF25.P	50
25.	Regression analysis for PFLW.D	Difference between PEAKFLOW and Exp(LFPLW.P)	52
26.	Regression analysis for MEF25.D	Difference between MEF25 and Exp(LMEF25.P)	53
27.	Regression analysis for FVC.R	Ratio of FVC to FVC.P (%)	55
28.	Regression analysis for FEV1.R	Ratio of FEV1 to FEV1.P (%)	57
29.	Regression analysis for PFLW.R	Ratio of PEAKFLOW to Exp(LFPLW.P) (%)	59
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Lung Function -- Initial analysis

=====

1. Introduction.

=====

There were 1126 people, 888 male and 238 female, out of the 1233 people in the SNZ asbestos study who underwent lung function testing. However the numbers of men and women with complete data were 873 & 236 for Forced Vital Capacity and Forced Expiratory Volume (one second) 663 & 194 for Peak Expiratory Flow Rate 832 & 224 for Maximum Expiratory Flow Rate at 50% and 834 & 225 for Maximum Expiratory Flow Rate at 25%

The statistical analyses have been done using the MINITAB statistical package at the Clinical Research Centre, Harrow, UK. The histograms, tables etc. have been presented as produced by MINITAB, with annotations added alongside.

2. Basic and exposure data

=====

This section provides information about the age, smoking and exposure to asbestos dust for the 1126 workers with lung function recorded. The exposure data have been calculated at SNZ from the detailed occupational histories.

AGE
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF
INTERVAL NUMBER OF
OBSERVATIONS

15. 8
20. 141
25. 143
30. 162
35. 202
40. 217
45. 137
50. 91
55. 23
60. 2

AGE DISTRIBUTION
=====

(C) OKER
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF
INTERVAL NUMBER OF
OBSERVATIONS

0. 535
1. 591

SMOKER
=====

SEX, SMOK
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF
INTERVAL NUMBER OF
OBSERVATIONS

1. 315
2. 226
3. 573
4. 18

SEX * SMOKING TABLE
=====

Codes:

- 1 - Male non-smokers
- 2 - Female non-smokers
- 3 - Male smokers
- 4 - Female smokers

PLANT
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
1.	305
2.	133
3.	260
4.	140
5.	200

ASBESTOS PLANT
=====

Codes:
1 - PLOCE
2 - VRANJIC
3 - ANHOVO
4 - KORLACE
5 - B.P.S.

EXPYRS
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	70
2.	229
4.	164
6.	84
8.	105
10.	101
12.	117
14.	89
16.	79
18.	45
20.	23
22.	20
24.	0
26.	3
28.	0
30.	1

YEARS OF EXPOSURE
=====

YRIEMP
EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
46.	2
48.	6
50.	6
52.	37
54.	25
56.	63
58.	72
60.	84
62.	115
64.	121
66.	90
68.	76
70.	205
72.	224

YEAR FIRST EMPLOYED IN PLANT
=====

100
A

FIBYRS
EACH * REPRESENTS 25 OBSERVATIONS

FIBRE-YEARS OF LUST EXPOSURE
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	1067	*****
200.	48	**
400.	4	*
600.	1	*
800.	0	
1000.	1	*
1200.	0	
1400.	1	*
1600.	0	
1800.	2	*
2000.	1	*
2200.	0	
2400.	0	
2600.	0	
2800.	0	
3000.	1	*

TOTYRS
EACH * REPRESENTS 20 OBSERVATIONS

PARTICLE YEARS OF DUST EXPOSURE/100
=====

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	823	*****
50.	234	*****
100.	52	**
150.	17	*
200.	7	*
250.	3	*
300.	2	*
350.	2	*
400.	2	*
450.	3	*
500.	0	
550.	0	
600.	0	
650.	1	*

101

3. Predicted values of lung function.

For each of the five lung function indices, predicted values were calculated using the equations derived from the analysis of the "control group" as described in a separate report -- these are called FVC.P, FEV1.P, LPFLW.P, MEF50.P and MEF25.P in this report. Note that the predicted values for Peakflow and Mef25 were for the logarithms of these indices.

In addition, predicted values for FVC and FEV1 were derived from nomograms based on the analyses by Morris, Koski & Johnson and by the C.E.C.A. For the other indices the relations used were those of Cherrick and Haber. These predicted values have been called FVC1PR, FVC2PR, FEV11PR, FEV12PR, PEAKFLPR, MEF50PR and MEF25PR in this report.

The following correlations and graphs show the relations between the various predictions for each of the five indices.

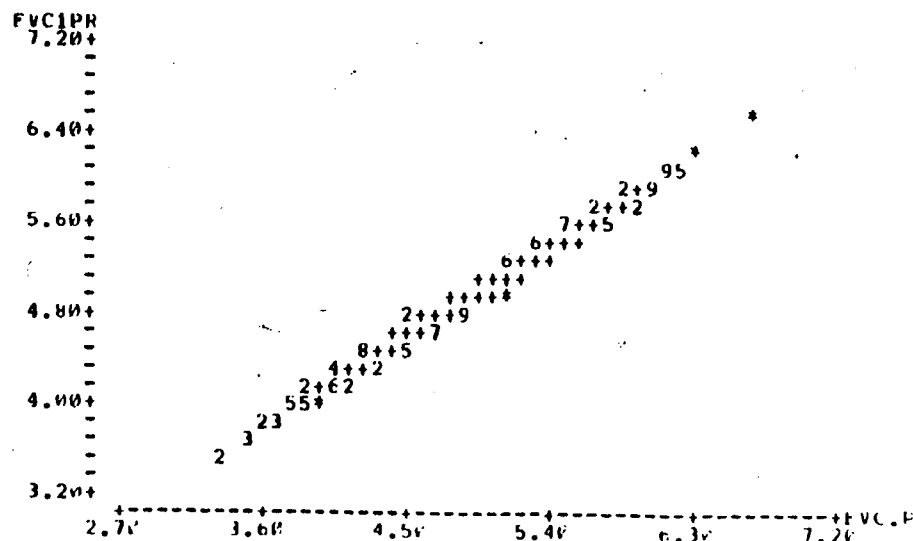
FORCED VITAL CAPACITY

MALES

-- corr c14 c15 c41

FVC1PR FVC2PR
FVC2PR 0.910
FVC.P 0.997 0.882

-- plot c14 c41

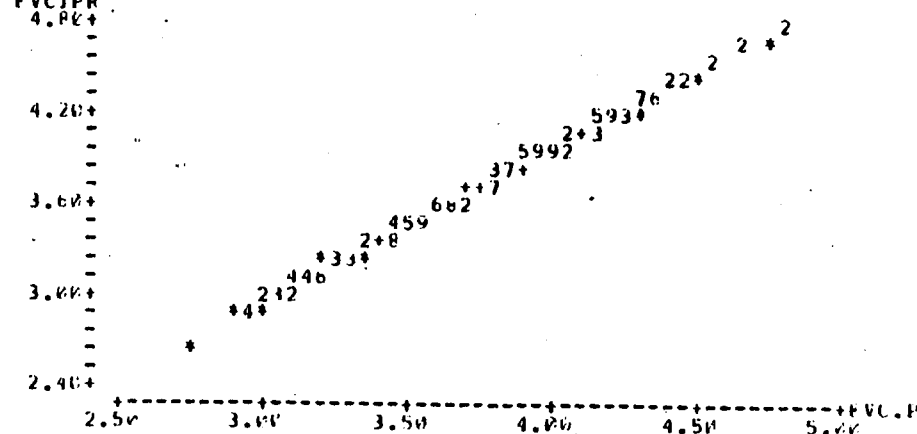


FEMALES

-- corr c14 c15 c41

FVC1PR FVC2PR
FVC2PR 0.786
FVC.P 1.000 0.796

-- plot c14 c41



FORCED VITAL CAPACITY
=====

MALES
=====

-- plot c15 c41

FVC2PR

8.0+

7.0+

6.0+

5.0+

4.0+

3.0+

2.70

3.60

4.50

5.40

6.30

7.20

FVC.P

FEMALES
=====

-- plot c15 c41

FVC2PR

6.40+

5.60+

4.80+

4.00+

3.20+

2.40+

2.50

3.00

3.50

4.00

4.50

5.00

FVC.P

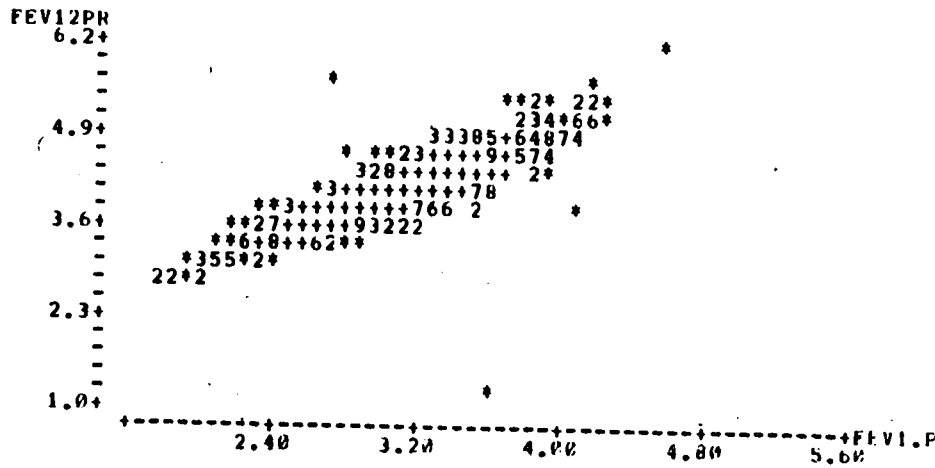
FORCED EXPIRATORY VOLUME

Page 8

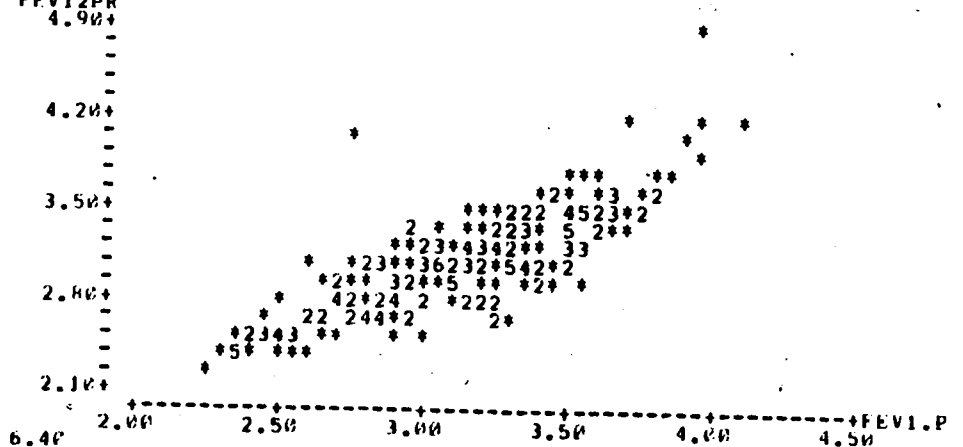
MALES
=====

FEMALES
=====

-- plot c18 c42



-- plot c18 c42



105

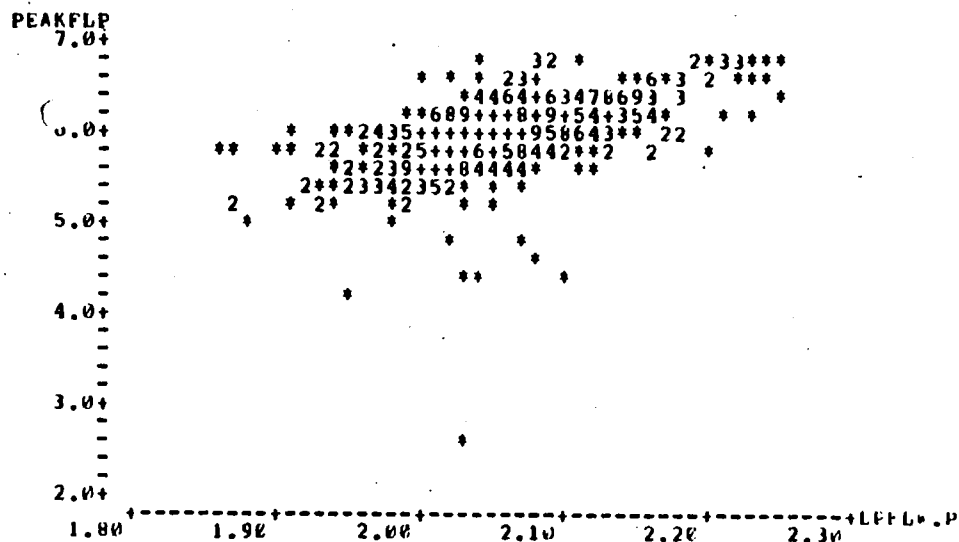
MALES
=====

PEAKFLOW
=====

-- CORR c20 c43

CORRELATION OF PEAKFLP AND LPFLW.P= 0.585

-- plot c20 c43

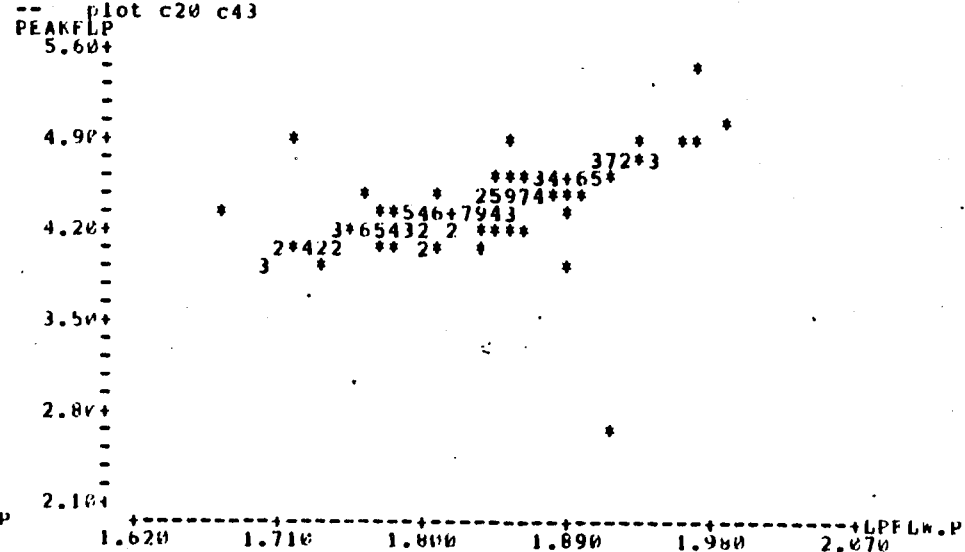


FEMALES
=====

-- CORR c20 c43

CORRELATION OF PEAKFLP AND LPFLW.P= 0.694

-- plot c20 c43



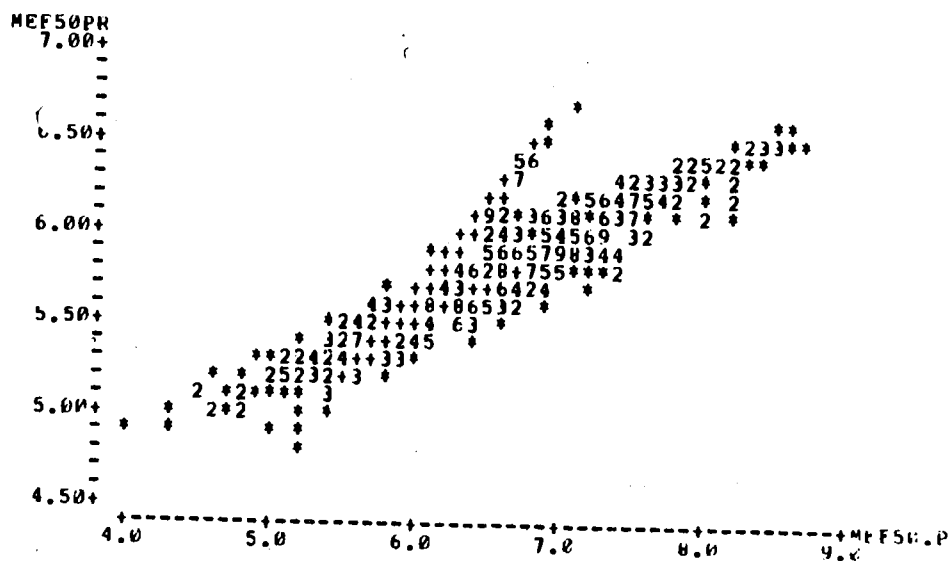
MAXIMUM EXPIRATORY FLOW - 50%
=====

MALES
=====

-- corr c22 c44

CORRELATION OF MEF50PR AND MEF50.P = 0.845

-- plot c22 c44

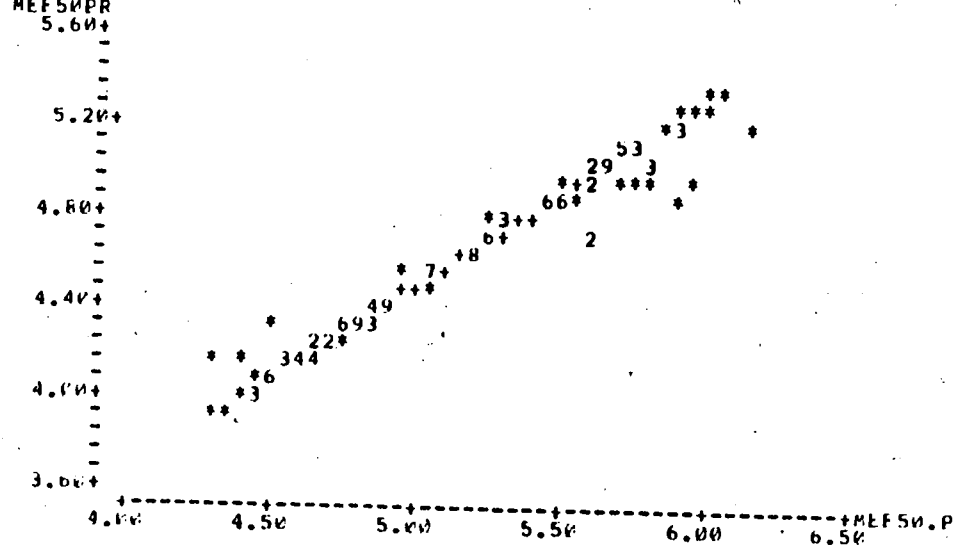


FEMALES
=====

-- corr c22 c44

CORRELATION OF MEF50PR AND MEF50.P = 0.987

-- plot c22 c44



107

MAXIMUM EXPIRATORY FLOW - 25%

=====

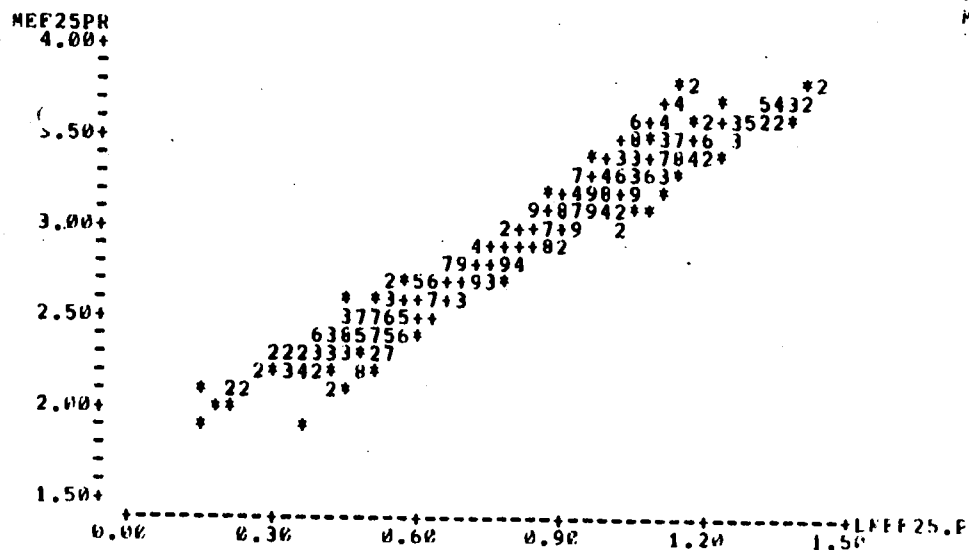
MALES

=====

-- CORR c24 c45

CORRELATION OF MEF25PR AND LMEF25.P= 0.967

-- plot c24 c45



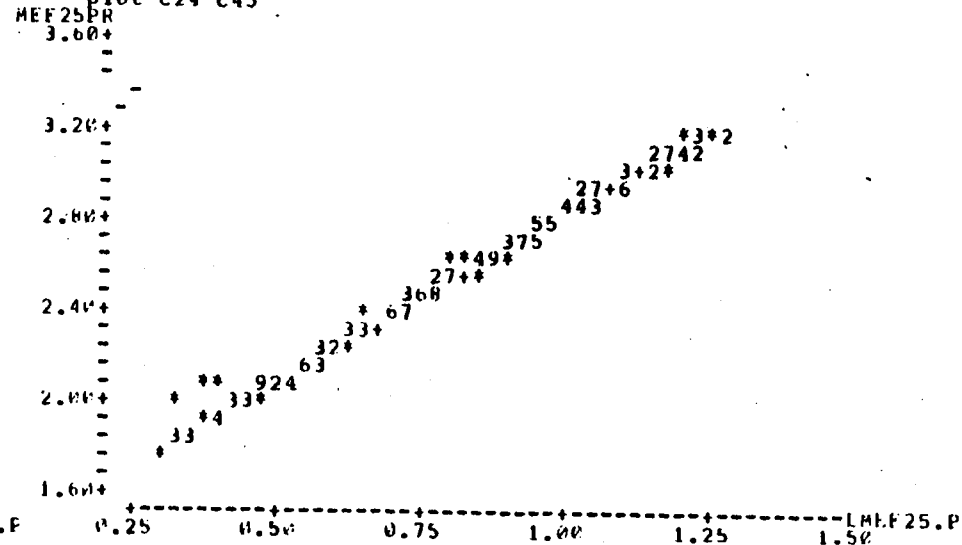
FEMALES

=====

-- CORR c24 c45

CORRELATION OF MEF25PR AND LMEF25.P= 0.998

-- plot c24 c45



4. Lung function indices analysed.

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The lung function indices analysed were:

FVC.D	Difference between FVC and FVC.P	
FVC.D	Difference between FVC and FVC.P	
LPFLW.D	Difference between Log(PEAKFLOW) and LPFLW.P	
MEF50.D	Difference between MEF50 and MEF50.P	
MEF25.D	Difference between Log(MEF25) and LMEF25.P	
PFLW.D	Difference between PEAKFLOW and Exp(LPFLW.P)	
MEF25.D	Difference between MEF25 and Exp(LMEF25.P)	
FVC.R	Ratio of FVC to FVC.P	(3)
FEV1.R	Ratio of FEV1 to FEV1.P	(4)
PFLW.R	Ratio of PEAKFLOW to Exp(LPFLW.P)	(4)
MEF50.R	Ratio of MEF50 to MEF50.P	(4)
MEF25.R	Ratio of MEF25 to Exp(MEF25.P)	(4)

5. Correlations between lung function and independent variables.

The following two tables give the correlations between the lung function indices and age, height, smoking (number of cigarettes daily) and the exposure indices.

	AGE	HEIGHT	EXPYRS	FIHYRS	TOTYRS	SMOKING
FVC.D	-0.071	-0.052	-0.131	-0.026	-0.079	-0.058
FEV1.D	-0.164	-0.066	-0.186	-0.028	-0.102	-0.103
LPFLW.D	-0.223	-0.011	-0.166	0.021	-0.037	-0.174
MEF50.D	-0.145	-0.187	-0.152	0.009	-0.034	-0.297
LMEF25.D	-0.191	-0.034	-0.176	-0.039	-0.062	-0.235
PFLW.D	-0.126	-0.182	-0.100	0.037	-0.002	-0.211
MEF25.D	-0.010	-0.118	-0.060	-0.028	-0.025	-0.219
FVC.R	-0.100	-0.006	-0.154	-0.031	-0.093	-0.063
FEV1.R	-0.192	-0.025	-0.209	-0.032	-0.116	-0.115
PFLW.R	-0.214	-0.020	-0.156	0.026	-0.032	-0.181
MEF50.R	-0.217	-0.091	-0.199	0.003	-0.053	-0.281
MEF25.R	-0.158	-0.032	-0.162	-0.041	-0.064	-0.233

CORRELATIONS FOR *** MALES ***

	AGE	HEIGHT	EXPYRS	FIHYRS	TOTYRS	SMOKING
FVC.D	0.042	-0.075	-0.159	0.023	-0.036	0.119
FEV1.D	0.061	-0.094	-0.115	0.017	-0.074	0.123
LPFLW.D	0.246	-0.082	0.143	-0.002	0.066	-0.201
MEF50.D	0.108	-0.107	0.082	-0.003	-0.008	0.007
LMEF25.D	-0.127	0.006	-0.130	-0.114	-0.101	0.074
PFLW.D	0.388	-0.230	0.234	0.053	0.135	-0.190
MEF25.D	0.210	-0.133	0.090	-0.010	0.032	0.021
FVC.R	-0.010	-0.011	-0.206	-0.012	-0.056	0.114
FEV1.R	-0.033	-0.019	-0.180	-0.042	-0.114	0.122
PFLW.R	0.263	-0.094	0.146	0.006	0.000	-0.187
MEF50.R	0.015	-0.035	0.027	-0.115	-0.043	0.024
MEF25.R	-0.046	-0.013	-0.073	-0.101	-0.060	0.051

CORRELATIONS FOR *** FEMALES ***

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6. Distributions of values for the lung function indices.
=====

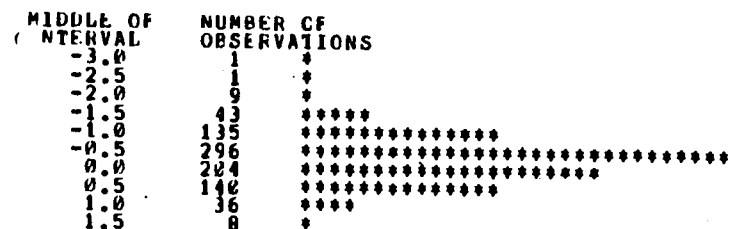
Page 13

The following histograms show the distributions for the 12 lung function indices analysed. For the difference indices (which end in .D) the expected value is zero and poorer lung function has negative values. For the ratio indices (which end in .R) the expected value is 100% and poorer lung function has lower values.

-- hist c70-c76 c80-c84

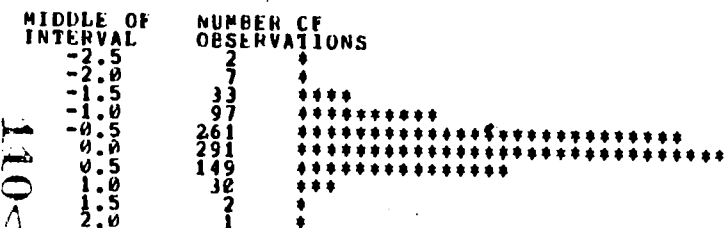
FVC.D
EACH * REPRESENTS 10 OBSERVATIONS
15 MISSING OBSERVATIONS

*** MALES ***



FEV1.D
EACH * REPRESENTS 10 OBSERVATIONS
15 MISSING OBSERVATIONS

*** MALES ***



110

LPFLW.D
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

*** MALES ***

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-1.6	1
-1.5	0
-1.4	1
-1.3	2
-1.2	0
-1.1	3
-1.0	2
-0.9	6
-0.8	14
-0.7	23
-0.6	57
-0.5	112
-0.4	181
-0.3	155
-0.2	83
-0.1	22
0.0	1

MEF50.D
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-7.	2
-6.	5
-5.	38
-4.	80
-3.	158
-2.	176
-1.	174
0.	117
1.	55
2.	27
3.	7
4.	2
5.	1

MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.0	1	*
-1.8	2	*
-1.6	10	**
-1.4	21	*****
-1.2	23	*****
-1.0	46	*****
-0.8	74	*****
-0.6	111	*****
-0.4	155	*****
-0.2	179	*****
0.0	184	*****
0.2	61	*****
0.4	28	*****
0.6	13	***
0.8	6	**

PFLW.D
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-6.5	1	*
-6.0	2	*
-5.5	3	*
-5.0	3	*
-4.5	17	*****
-4.0	32	*****
-3.5	69	*****
-3.0	132	*****
-2.5	161	*****
-2.0	135	*****
-1.5	73	*****
-1.0	24	*****
-0.5	11	***

CF25.D
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.5	5	*
-2.0	27	*****
-1.5	101	*****
-1.0	230	*****
-0.5	248	*****
0.0	117	*****
0.5	51	*****
1.0	27	*****
1.5	14	***
2.0	9	**
2.5	2	*
3.0	1	*
3.5	1	*

FVC.R
EACH * REPRESENTS 10 OBSERVATIONS
15 MISSING OBSERVATIONS

*** MALES ***

1000 10

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
40.	3
50.	1
60.	11
70.	37
80.	141
90.	294
100.	286
110.	131
120.	41
130.	8

FEV1.R
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
30.	1
40.	3
50.	8
60.	27
70.	52
80.	119
90.	231
100.	230
110.	141
120.	47
130.	13
140.	2
150.	1

PFLW.R
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
20.	1
25.	3
30.	1
35.	3
40.	6
45.	16
50.	24
55.	52
60.	83
65.	126
70.	135
75.	104
80.	63
85.	28
90.	11
95.	7

MEF56.R
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS

*** MALES ***

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
10.	9	***
20.	15	*****
30.	34	*****
40.	57	*****
50.	101	*****
60.	102	*****
70.	105	*****
80.	121	*****
90.	115	*****
100.	68	*****
110.	43	*****
120.	26	*****
130.	20	*****
140.	13	*****
150.	8	*****
160.	1	*
170.	1	*
180.	1	*

MEF25.R
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

*** MALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
20.	42	*****
40.	136	*****
60.	226	*****
80.	212	*****
100.	168	*****
120.	52	*****
140.	31	*****
160.	11	*****
180.	8	*****
200.	5	*****
220.	2	*****
240.	1	*****

111
A

-- hist c70-c76 c80-c84

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FVC.D
EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	2
-1.5	14
-1.0	41
-0.5	99
0.0	56
0.5	21
1.0	2
1.5	0
2.0	1

FEV1.D
2 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	1
-1.8	1
-1.6	5
-1.4	2
-1.2	9
-1.0	18
-0.8	35
-0.6	31
-0.4	42
-0.2	43
0.0	18
0.2	13
0.4	13
0.6	5

LPFLW.D
4 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-1.3	1
-1.2	1
-1.1	3
-1.0	4
-0.9	6
-0.8	22
-0.7	18
-0.6	21
-0.5	43
-0.4	43
-0.3	22
-0.2	4
-0.1	6

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MEF50.D
EACH * REPRESENTS 2 OBSERVATIONS
13 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	2
-3.5	3
-3.0	15
-2.5	25
-2.0	31
-1.5	54
-1.0	41
-0.5	28
0.0	15
0.5	10
1.0	0
1.5	0
2.0	0
2.5	1

LMEF25.D
12 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	2
-1.8	4
-1.6	2
-1.4	10
-1.2	12
-1.0	26
-0.8	40
-0.6	35
-0.4	40
-0.2	21
0.0	24
0.2	5
0.4	3
0.6	2

PFLW.D
EACH * REPRESENTS 2 OBSERVATIONS
44 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	3
-4.0	14
-3.5	25
-3.0	31
-2.5	52
-2.0	41
-1.5	20
-1.0	6
-0.5	7

MEF25.D
EACH * REPRESENTS 2 OBSERVATIONS
12 MISSING OBSERVATIONS

*** FEMALES ***

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	4
-2.0	19
-1.5	52
-1.0	77
-0.5	40
0.0	23
0.5	4
1.0	6
1.5	0
2.0	1

FVC.R
EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
40.	1
50.	2
60.	9
70.	26
80.	58
90.	68
100.	42
110.	22
120.	5
130.	2
140.	0
150.	0
160.	1

FEV1.R
EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
40.	1
50.	6
60.	12
70.	29
80.	66
90.	60
100.	39
110.	15
120.	7
130.	1

PFLW.R
44 MISSING OBSERVATIONS

*** FEMALES ***

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
30.	2
35.	7
40.	6
45.	25
50.	18
55.	17
60.	37
65.	35
70.	24
75.	12
80.	3
85.	7
90.	1

MEF50.R
EACH * REPRESENTS 2 OBSERVATIONS
13 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
20.	1
30.	2
40.	16
50.	17
60.	35
70.	54
80.	45
90.	27
100.	17
110.	10
120.	0
130.	0
140.	0
150.	1

LF25.R
EACH * REPRESENTS 2 OBSERVATIONS
12 MISSING OBSERVATIONS

*** FEMALES ***

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
20.	22
40.	75
60.	61
80.	34
100.	23
120.	4
140.	5
160.	0
180.	2

7. Regression analysis -- general description.
=====

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In the following analyses for each lung function index the first regression presented is that on EXPYRS (years of exposure) only. The second analysis, if present, is that on EXPYRS plus any other dependent variable for which the regression coefficient was significantly different from zero.

NOTE that in no case whatsoever were the regressions on Fibre-years or Total particle-years of exposure significant.

The histograms show the residual variation about the fitted regression lines. A requirement for a satisfactory fit is that these residual distributions should be symmetric and Normal. This requirement certainly does not hold for the indices of deficit of PEAKFLOW nor adequately for the ratio indices.

8. Regression analysis for FVC.L Difference between FVC and FVC.F *** PALPS ***

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-- regr c70 1 'expyrs' 'residual'

873 CASES USED

15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -0.169 - .0135 X1$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.013463	0.003460	-3.89

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 0.6326$

$df = (873 - 2) = 871$ DEGREES OF FREEDOM

R-SQUARED = 1.7 PERCENT

R-SQUARED = 1.6 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	6.0601	6.0601	
RESIDUAL	871	348.6137	0.4002	
TOTAL	872	354.6739		

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	1
-3.5	0
-3.0	2
-2.5	9
-2.0	18
-1.5	63
-1.0	99
-0.5	148
0.0	197
0.5	129
1.0	109
1.5	64
2.0	23
2.5	6
3.0	4

120

-- regr c70 2 'expyrs' 'height' 'residual'

873 CASES USED
15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 1.13 - .0145 X1 - 0.743 X2

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	1.1324	0.6105	1.85
X2	HEIGHT	-0.014519	0.003488	-4.16
		-0.7430	0.3478	-2.14

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.6314

WITH (873- 3) = 870 DEGREES OF FREEDOM

R-SQUARED = 2.2 PERCENT
R-SQUARED = 2.0 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	2	7.8793	3.9396
RESIDUAL	870	346.7946	0.3986
TOTAL	872	354.6739	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	1
-3.5	2
-3.0	2
-2.5	9
-2.0	18
-1.5	61
-1.0	94
-0.5	163
0.0	185
0.5	131
1.0	114
1.5	64
2.0	20
2.5	7
3.0	3

9. Regression analysis for FEVI.D Difference between FEVI and FEVI.P *** MALES ***

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-- regr c71 1 'expyrs' 'residual'

873 CASES USED
15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = -.0664 - .0175 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-.06642	0.03326	-2.00
		-.017537	0.003141	-5.58

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.5744
WI(873- 2) = 871 DEGREES OF FREEDOM

R-SQUARED = 3.5 PERCENT
R-SQUARED = 3.3 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		1	10.2029	10.2029
RESIDUAL		871	287.4115	0.3300
TOTAL		872	297.6144	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	2
-3.5	1
-3.0	4
-2.5	8
-2.0	26
-1.5	51
-1.0	89
-0.5	146
0.0	189
0.5	163
1.0	112
1.5	55
2.0	21
2.5	4
3.0	1
3.5	0
4.0	1

-- regr c71 4 'expyrs' 'age' 'height' 'smoking' 'residual'

873 CASES USED
15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 1.88 - .0124 X_1 - .0061 X_2 - 0.991 X_3 - .0039 X_4$$

	COLUMN	COEFFICIENT	S1. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.012431	0.5779	-3.26
X2	AGE	-0.006084	0.004058	-3.06
X3	HEIGHT	-0.9915	0.002801	-2.17
X4	SMOKING	-0.003861	0.3188	-3.11
			0.001652	-2.34

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S (N, 5693)
WILL (873- 5) = 868 DEGREES OF FREEDOM

R-SQUARED = 5.5 PERCENT
R-SQUARED = 5.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		4	16.3873	4.0968
RESIDUAL		868	281.3071	0.3241
TOTAL		872	297.6944	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	2
-3.5	0
-3.0	5
-2.5	11
-2.0	25
-1.5	60
-1.0	78
-0.5	146
0.0	184
0.5	165
1.0	112
1.5	60
2.0	19
2.5	4
3.0	1
3.5	0
4.0	1

10. Regression analysis for LFFLA.D Difference between Log(LFANFLOW) and LFFLA.P *** FALLS ***

-- reqr c72 1 'expyrs' 'residual'

663 CASES USED
225 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.367 - .00246 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.36734	0.01185	-31.00
		-0.0024641	0.001069	-4.34

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.1794
N (663 - 2) = 661 DEGREES OF FREEDOM

R-SQUARED = 2.8 PERCENT
R-SQUARED = 2.6 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	0.60577	0.60577
RESIDUAL	661	21.26281	0.03217
TOTAL	662	21.86858	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-6.0	1
-5.5	1
-5.0	2
-4.5	0
-4.0	2
-3.5	1
-3.0	4
-2.5	9
-2.0	12
-1.5	23
-1.0	50
-0.5	112
0.0	150
0.5	152
1.0	94
1.5	33
2.0	9

-- regr c72 3 'expyrs' 'age' 'smoking' 'residual'

663 CASES USED
225 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = -0.234 - .0024 X1 - .0039 X2
- .0023 X3

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.23390	0.03047	-7.68
X2	AGE	-0.000416	0.001442	-0.29
X3	SMOKING	-0.0022089	0.001020	-3.81
			0.0005675	-4.03

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.1754

(ITH (663- 4) = 659 DEGREES OF FREEDOM

R-SQUARED = 7.3 PERCENT

R-SQUARED = 6.9 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		3	1.59626	0.53209
RESIDUAL		659	20.27232	0.03076
TOTAL		662	21.86858	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 10 OBSERVATIONS
225 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-6.	1
-5.	3
-4.	2
-3.	7
-2.	32
-1.	115
0.	291
1.	191
2.	21

125

11. Regression analysis for MEF50.D Difference between MEF50 and MEF50.P *** PALES ***

-- regr c73 1 'expyrs' 'residual'

832 CASES USED
56 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -1.30 - .0423 X1$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.042299	0.009562	-4.42

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 1.723$

WITH (832 - 2) = 830 DEGREES OF FREEDOM

R-SQUARED = 2.3 PERCENT

R-SQUARED = 2.2 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		1	58.121	58.121
RESIDUAL		830	2465.419	2.970
TOTAL		831	2523.540	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	2
-2.5	8
-2.0	14
-1.5	61
-1.0	116
-0.5	146
0.0	149
0.5	153
1.0	101
1.5	41
2.0	28
2.5	10
3.0	2
3.5	0
4.0	1

-- regr c73 4 'expyrs' 'age' 'height' 'smoking' 'residual'

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832 CASES USED
56 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 10.6 - .0223 X1 - .0204 X2 - 6.22 X3 - .0406 X4$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/ST. D.
X1	EXPYRS	-0.02230	0.01177	-1.89
X2	AGE	-0.020400	0.008188	-2.49
X3	HEIGHT	-6.2158	0.9193	-6.76
X4	SMOKING	-0.040619	0.004787	-8.48

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 1.610
WITH (832- 5) = 827 DEGREES OF FREEDOM

R-SQUARED = .15.1 PERCENT

R-SQUARED = 14.7 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		4	382.596	95.149
RESIDUAL		827	2142.945	2.591
TOTAL		831	2523.540	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	2
-2.5	6
-2.0	10
-1.5	70
-1.0	128
-0.5	128
0.0	141
0.5	156
1.0	99
1.5	57
2.0	21
2.5	9
3.0	2
3.5	1

12. Regression analysis for LMEF25.D Difference between Log(MEF25) and LMEF25.P *** MALES ***

-- regr c74 1 'expyrs' 'residual'

834 CASES USED
54 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.266 - .0127 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.26632	0.02626	-10.14
		-0.012740	0.002468	-5.16

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.4453
WITH (834 - 2) = 832 DEGREES OF FREEDOM

R-SQUARED = 3.1 PERCENT
R-SQUARED = 3.0 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	5.2836	5.2836
RESIDUAL	832	164.9847	0.1983
TOTAL	833	170.2683	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.5	1
-3.0	3
-2.5	19
-2.0	23
-1.5	43
-1.0	82
-0.5	126
0.0	193
0.5	173
1.0	87
1.5	56
2.0	21
2.5	6
3.0	1

-- regr c74 4 'expyrs' 'age' 'height' 'smoking' 'residual'

834 CASES USED
54 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 0.939 - .0056 X1 - .0065 X2 \\ - 0.534 X3 - .0081 X4$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.005565	0.003148	-1.77
X2	AGE	-0.006479	0.002189	-2.96
X3	HEIGHT	-0.5342	0.2465	-2.17
X4	SMOKING	-0.008057	0.001283	-6.28

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.4322
WITH (834 - 5) = 829 DEGREES OF FREEDOM

R-SQUARED = 9.0 PERCENT

R-SQUARED = 0.6 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	4	15.3967	3.8492
RESIDUAL	829	154.6716	0.1866
TOTAL	833	170.2683	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.5	1
-3.0	1
-2.5	19
-2.0	27
-1.5	53
-1.0	65
-0.5	143
0.0	172
0.5	177
1.0	98
1.5	55
2.0	13
2.5	8
3.0	2

129

13. Regression analysis for PFLW.D Difference between FLAKFLOW and Exp(LPFLW.P) *** MALES ***

-- regr c75 1 'expyrs' 'residual'

663 CASES USED

225 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -2.44 - .0135 X1$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-2.43558 -0.013532	0.05812 0.005245	-41.91 -2.58

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 0.8798$

WITH (663- 2) = 661 DEGREES OF FREEDOM

R-SQUARED = 1.0 PERCENT

R-SQUARED = 0.8 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		1	5.1511	5.1511
RESIDUAL		661	511.5886	0.7740
TOTAL		662	516.7397	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL

EACH * REPRESENTS 5 OBSERVATIONS

225 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	1
-3.5	4
-3.0	2
-2.5	7
-2.0	16
-1.5	37
-1.0	66
-0.5	118
0.0	148
0.5	123
1.0	84
1.5	39
2.0	12
2.5	7

```
-- regr c75 4 'expyrs' 'age' 'height' 'smoking' 'residual'
```

663 CASES USED
225 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 3.44 - .0017 X1 - .0138 X2 \\ - 3.03 X3 - .0145 X4$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.001720	0.006909	-0.25
X2	AGE	-0.013833	0.004950	-2.79
X3	HEIGHT	-3.0316	0.5257	-5.77
X4	SMOKING	-0.014465	0.002719	-5.32

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.8403
WITH (663 - 5) = 658 DEGREES OF FREEDOM

R-SQUARED = 10.1 PERCENT

R-SQUARED = 9.5 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	4	52.1130	13.0282
RESIDUAL	658	464.6268	0.7061
TOTAL	662	516.7397	

```
-- hist 'residual'
```

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	2
-3.5	4
-3.0	1
-2.5	8
-2.0	20
-1.5	33
-1.0	67
-0.5	106
0.0	151
0.5	132
1.0	78
1.5	42
2.0	15
2.5	5

14. Regression analysis for MEF25.0 Difference between MEF25 and Exp(LMEF25.F) *** *ALLS ***

-- regr c76 1 'expyrs' 'residual'

834 CASES USED
54 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.488 - .0077 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.48827 -0.007698	0.04703 0.004421	-10.38 -1.74

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.977
WITH (834 - 2) = 832 DEGREES OF FREEDOM

R-SQUARED = 0.4 PERCENT
R-SQUARED = 0.2 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	1	1.9291	1.9291
RESIDUAL	832	832	529.3689	0.6363
TOTAL	833	833	531.2981	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	1
-2.0	14
-1.5	45
-1.0	107
-0.5	187
0.0	202
0.5	136
1.0	62
1.5	33
2.0	21
2.5	10
3.0	8
3.5	5
4.0	2
4.5	1
5.0	1
5.5	1

132

X1	EXPIRS	-0.006101	0.4342	
X2	HEIGHT	-1.6022	0.002292	-6.32
X3	SMOKING	-0.014478		

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
 $S = 0.7737$
 WITH (834 - 4) = 830 DEGREES OF FREEDOM

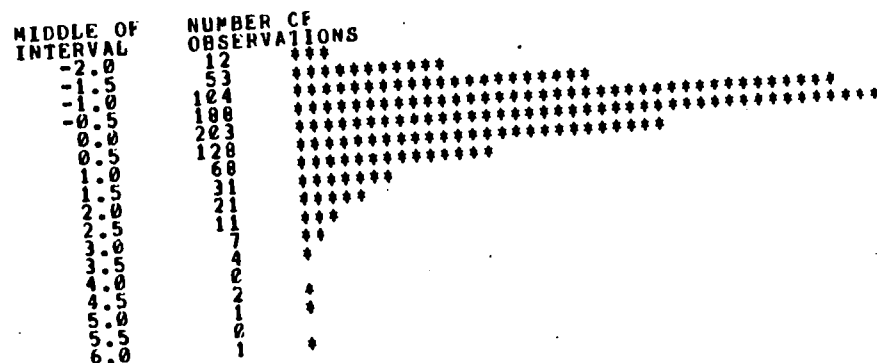
R-SQUARED = 6.5 PERCENT
 R-SQUARED = 6.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	3	34.3910	11.4637
RESIDUAL	830	496.9071	0.5987
TOTAL	833	531.2981	

-- hist 'residual'

RESIDUAL
 EACH * REPRESENTS 5 OBSERVATIONS
 54 MISSING OBSERVATIONS



DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

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15. Regression analysis for FVC.R Ratio of FVC to FVC.L (%) *** MALES ***

-- regr c80 1 'expyrs' 'residual'

873 CASES USED

15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

Y = 97.0 - 0.326 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.32648	0.7510	-4.60

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 12.97

WITH (873 - 2) = 871 DEGREES OF FREEDOM

R-SQUARED = 2.4 PERCENT

R-SQUARED = 2.3 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		1	3563.9	3563.9
RESIDUAL		871	146549.0	168.3
TOTAL		872	150113.0	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	3
-3.5	1
-3.0	0
-2.5	7
-2.0	17
-1.5	60
-1.0	91
-0.5	163
0.0	197
0.5	136
1.0	122
1.5	61
2.0	21
2.5	9
3.0	3

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16. Regression analysis for FEVI.R Ratio of FEVI to FEVI.F (%) *** MALES ***

-- regr c81 1 'expyrs' 'residual'

873 CASES USED

15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = 98.7 - 0.520 X1$

COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.51981	0.08738
		0.00254	112.94
			-6.30

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 15.09$

WITH (873 - 2) = 871 DEGREES OF FREEDOM

R-SQUARED = 4.4 PERCENT

R-SQUARED = 4.2 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	9034.5	9034.5
RESIDUAL	871	198188.2	227.8
TOTAL	872	207422.7	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	2
-3.5	1
-3.0	3
-2.5	7
-2.0	34
-1.5	42
-1.0	85
-0.5	149
0.0	195
0.5	162
1.0	117
1.5	46
2.0	20
2.5	7
3.0	1
3.5	1

135

```
-- regr c01 4 'expyrs' 'age' 'height' 'smoking' 'residual'
```

873 CASES USED
15 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 135.135 - 0.349 X1 - 0.182 X2
- 16.9 X3 - 0.115 X4

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.3493	0.1068	-3.27
X2	AGE	-0.18178	0.07369	-2.47
X3	HEIGHT	-16.926	8.387	-2.02
X4	SMOKING	-0.11506	0.04345	-2.65

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 14.97
WITH (873- 5) = 868 DEGREES OF FREEDOM

R-SQUARED = 6.2 PERCENT
R-SQUARED = 5.7 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	4	12790.9	3197.7
RESIDUAL	868	194631.7	224.2
TOTAL	872	207422.6	

```
-- hist 'residual'
```

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
15 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.5	1
-4.0	1
-3.5	2
-3.0	4
-2.5	7
-2.0	30
-1.5	46
-1.0	86
-0.5	149
0.0	190
0.5	166
1.0	111
1.5	53
2.0	18
2.5	7
3.0	1
3.5	1

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

17. Regression analysis for PFLW.R Ratio of PEAKFLOW to Exp(LPFLW.P) (%) *** MALES ***

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-- regr c82 1 'expyrs' 'residual'

663 CASES USED
225 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 69.8 - 0.266 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.26609	0.06475	-4.11

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 10.86
WITH (663- 2) = 661 DEGREES OF FREEDOM

R-SQUARED = 2.5 PERCENT
R-SQUARED = 2.3 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	1	1991.6	1991.6
RESIDUAL	661	661	77958.1	117.9
TOTAL	662	662	79949.7	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	2
-3.5	2
-3.0	3
-2.5	9
-2.0	17
-1.5	32
-1.0	63
-0.5	122
0.0	144
0.5	126
1.0	83
1.5	40
2.0	13
2.5	6
3.0	1

137

```
-- regr c02 3 'expyrs' 'age' 'smoking' 'residual'
```

```
663 CASES USED
225 CASES CONTAINED MISSING VALUES
```

```
THE REGRESSION EQUATION IS
Y = 77.8 - .0160 X1 - 0.220 X2
  - 0.146 X3
```

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
	--	77.801	1.844	42.20
X1	EXPYRS	-0.01604	0.00726	-0.18
X2	AGE	-0.22792	0.06171	-3.69
X3	SMOKING	-0.14565	0.03434	-4.24

```
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 10.61
WITH ( 663- 4) = 659 DEGREES OF FREEDOM
```

```
R-SQUARED = 7.2 PERCENT
R-SQUARED = 6.7 PERCENT, ADJUSTED FOR D.F.
```

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	3	5716.7	1905.6
RESIDUAL	659	74233.0	112.6
TOTAL	662	79949.7	

```
-- hist 'residual'
```

```
RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
225 MISSING OBSERVATIONS
```

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-4.0	2
-3.5	2
-3.0	2
-2.5	8
-2.0	20
-1.5	31
-1.0	69
-0.5	100
0.0	152
0.5	130
1.0	70
1.5	30
2.0	16
2.5	6
3.0	1

18. Regression analysis for MEF50.k Ratio of MEF50 to MEF50.F (%) *** MALES ***

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-- regr c83 1 'expyrs' 'residual'

832 CASES USED
56 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 81.7 - 0.873 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.8726	0.1488	-5.86

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 26.83

WITH (832 - 2) = 830 DEGREES OF FREEDOM

R-SQUARED = 4.0 PERCENT

R-SQUARED = 3.9 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	24735.7	24735.7	
RESIDUAL	830	597388.9	719.7	
TOTAL	831	622124.6		

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	5
-2.0	19
-1.5	66
-1.0	111
-0.5	146
0.0	150
0.5	156
1.0	96
1.5	40
2.0	27
2.5	12
3.0	3
3.5	0
4.0	1

139

```
-- regr c83 4 'expyrs' 'age' 'height' 'smoking' 'residual'
```

```
832 CASES USED
56 CASES CONTAINED MISSING VALUES
```

```
THE REGRESSION EQUATION IS
Y = 208.7 - 0.370 X1 - 0.479 X2
    - 60.7 X3 - 2.584 X4
```

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
	--	207.80	26.41	7.87
X1	EXPYRS	-0.3701	0.1865	-1.98
X2	AGE	-0.4793	0.1298	-3.69
X3	HEIGHT	-60.69	14.57	-4.17
X4	SMOKING	-2.58377	0.07588	-7.69

```
THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 25.51
WITH (832- 5) = 827 DEGREES OF FREEDOM
```

```
R-SQUARED = 13.5 PERCENT
R-SQUARED = 13.1 PERCENT, ADJUSTED FOR D.F.
```

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		4	83854.8	20963.7
RESIDUAL		827	538269.8	650.9
TOTAL		831	622124.6	

```
-- hist 'residual'
```

```
RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
56 MISSING OBSERVATIONS
```

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	1
-2.5	7
-2.0	16
-1.5	33
-1.0	112
-0.5	139
0.0	144
0.5	163
1.0	95
1.5	52
2.0	22
2.5	13
3.0	1
3.5	1
4.0	1

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

19. Regression analysis for MEF25.W Ratio of MEF25 to EXP (MEF25.F) (%) *** MALES ***

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-- regr C84 1 'expyrs' 'residual'

834 CASES USED
54 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 83.2 - 0.871 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.8706	0.1835	-4.75

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 33.10

WITH (834 - 2) = 832 DEGREES OF FREEDOM

R-SQUARED = 2.6 PERCENT

R-SQUARED = 2.5 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		1	24673	24673
RESIDUAL		832	911606	1096
TOTAL		833	936279	

-- hist 'residual'

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	2
-1.5	55
-1.0	128
-0.5	182
0.0	194
0.5	125
1.0	57
1.5	42
2.0	26
2.5	7
3.0	7
3.5	4
4.0	2
4.5	3

-- regr c04.2 'expyrs' 'smoking' 'residual'

834 CASES USED
54 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 90.3 - 0.736 X1 - 0.619 X2

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.7361	0.1803	-4.08
X2	SMOKING	-0.61916	0.09572	-6.47

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 32.32
WITH (834 - 3) = 831 DEGREES OF FREEDOM

R-SQUARED = 7.3 PERCENT
R-SQUARED = 7.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	2	68373	34187
RESIDUAL	831	867906	1044
TOTAL	833	936279	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

RESIDUAL
EACH * REPRESENTS 5 OBSERVATIONS
54 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	3
-1.5	59
-1.0	126
-0.5	186
0.0	181
0.5	133
1.0	57
1.5	43
2.0	21
2.5	11
3.0	3
3.5	5
4.0	5
4.5	1

20. Regression analysis for FVC.D Difference between FVC and FVC.D *** F-ALTS ***

-- regr c70 1 'expyrs' 'residual'

236 CASES USED
2 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.323 - .0161 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.32255 -0.016136	0.05968 0.006537	-5.41 -2.47

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.5505
WITH (236- 2) = 234 DEGREES OF FREEDOM

R-SQUARED = 2.5 PERCENT
R-SQUARED = 2.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	1.8465	1.8465
RESIDUAL	234	70.9086	0.3030
TOTAL	235	72.7551	

-- hist 'residual'

'residual'
2 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	2
-2.5	2
-2.0	4
-1.5	18
-1.0	24
-0.5	43
0.0	50
0.5	42
1.0	28
1.5	16
2.0	4
2.5	2
3.0	0
3.5	0
4.0	0
4.5	1

```
-- regr c70 2 'expyrs' 'age' 'residual'
```

236 CASES USED
2 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.606 - .0292 X1 + .0116 X2

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.6056	0.1201	-5.04
X2	AGE	0.011638	0.004304	2.70

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.5432
WITH (236 - 3) = 233 DEGREES OF FREEDOM

R-SQUARED = 5.5 PERCENT
R-SQUARED = 4.7 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	2	4.0039	2.0020
RESIDUAL	233	68.7512	0.2951
TOTAL	235	72.7551	

```
-- hist 'residual'
```

'residual'
EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-3.0	1	*
-2.5	4	**
-2.0	4	**
-1.5	14	*****
-1.0	26	*****
-0.5	44	*****
0.0	51	*****
0.5	41	*****
1.0	29	*****
1.5	14	*****
2.0	5	***
2.5	2	*
3.0	2	
3.5	0	
4.0	0	
4.5	1	*

21. Regression analysis for FEVL.D

Difference between FEVL and FEVL.P

*** FEMALES ***

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-- regr c71 1 'expyrs' 'residual'

236 CASES USED

2 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -0.373 - .0099 X1$

COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	-0.37271	0.05142	-7.25
EXPYRS	-0.009945	0.005632	-1.77

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 0.4743$

WITH (236 - 2) = 234 DEGREES OF FREEDOM

R-SQUARED = 1.3 PERCENT

R-SQUARED = 0.9 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	0.7014	0.7014
RESIDUAL	234	52.6384	0.2250
TOTAL	235	53.3399	

-- hist 'residual'

'residual'

EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	2
-2.5	5
-2.0	3
-1.5	12
-1.0	33
-0.5	31
0.0	54
0.5	50
1.0	24
1.5	12
2.0	8
2.5	2

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22. Regression analysis for LFPLW.D Difference between Log(PHANTOM) and LFPLW.P *** FEMALES ***

-- regr c72 1 'expyrs' 'residual'

194 CASES USED

44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -0.582 + .0059 X1$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.58228 0.005901	0.02524 0.002945	-23.07 2.00

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 0.2162$

WITH (194 - 2) = 192 DEGREES OF FREEDOM

R-SQUARED = 2.0 PERCENT

R-SQUARED = 1.5 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	0.18761	0.18761
RESIDUAL	192	8.97312	0.04673
TOTAL	193	9.16072	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

'residual'
44 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.5	1
-3.0	2
-2.5	2
-2.0	5
-1.5	10
-1.0	28
-0.5	22
0.0	32
0.5	49
1.0	24
1.5	15
2.0	4

-- regr c72 j 'expyrs' 'age' 'smoking' 'residual'

194 CASES USED
44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = -0.695 - .0003 X1 + .0053 X2
- .0087 X3

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.69482	0.04962	-14.00
X2	AGE	-0.000262	0.003559	-0.07
X3	SMOKING	-0.008706	0.003010	-2.89

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.2083
WITH (194 - 4) = 190 DEGREES OF FREEDOM

R-SQUARED = 10.0 PERCENT
R-SQUARED = 8.6 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	3	0.91824	0.30608
RESIDUAL	190	8.24248	0.04338
TOTAL	193	9.16072	

-- hist 'residual'

'residual'
44 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-3.5	1	*
-3.0	2	**
-2.5	2	**
-2.0	6	*****
-1.5	10	*****
-1.0	29	*****
-0.5	14	*****
0.0	36	*****
0.5	49	*****
1.0	28	*****
1.5	12	*****
2.0	3	***

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23. Regression analysis for MEF50.D

Difference between MEF50 and MEF50.P

*** FEMALES ***

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-- regr c73 1 'expyrs' 'residual'

225 CASES USED

13 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$Y = -1.50 + .0148 X1$

COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	0.01482	0.1093
			-13.76
			1.23

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$S = 0.9876$

WITH (225 - 2) = 223 DEGREES OF FREEDOM

R-SQUARED = 0.7 PERCENT

R-SQUARED = 0.2 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	1.4654	1.4654
RESIDUAL	223	217.5145	0.9754
TOTAL	224	218.9799	

-- hist 'residual'

'residual'

13 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	1
-2.5	1
-2.0	7
-1.5	16
-1.0	24
-0.5	37
0.0	49
0.5	42
1.0	24
1.5	17
2.0	6
2.5	0
3.0	0
3.5	0
4.0	1

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24. Regression analysis for LMEF25.D Difference between Log(FEF25) and LMEF25.P *** FEMALES ***

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-- regr c74 1 'expyrs' 'residual'

226 CASES USED
12 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 0.535 - .0113 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.53451 -0.011269	0.05163 0.005723	-10.35 -1.97

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.4680
WITH (226 - 2) = 224 DEGREES OF FREEDOM

R-SQUARED = 1.7 PERCENT
R-SQUARED = 1.3 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	0.8493	0.8493
RESIDUAL	224	49.0629	0.2190
TOTAL	225	49.9123	

-- hist 'residual'

'residual'
12 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	1
-2.5	5
-2.0	2
-1.5	13
-1.0	27
-0.5	47
0.0	38
0.5	37
1.0	36
1.5	11
2.0	6
2.5	3

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25. Regression analysis for PFLW.D Difference between PEAKFLOW and EXP(LFPFLW.P) *** FEMALS ***

-- regr c75 1 'expyrs' 'residual'

194 CASES USED
44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 2.81 + .0362 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXYRS	0.03623	0.01086	3.34

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.7971
WITH (194- 2) = 192 DEGREES OF FREEDOM

R-SQUARED = 5.5 PERCENT
R-SQUARED = 5.0 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	7.0715	7.0715	
RESIDUAL	192	121.9850	0.6353	
TOTAL	193	129.0566		

-- hist 'residual'

'residual'
44 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.5	3	***
-2.0	4	****
-1.5	16	*****
-1.0	25	*****
-0.5	30	*****
0.0	32	*****
0.5	41	*****
1.0	22	*****
1.5	13	*****
2.0	6	*****
2.5	2	**

1502

-- regr c75 4 'expyrs' 'age' 'height' 'smoking' 'residual'

194 CASES USED
44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = -.0077 - .0024 X1 + .0290 X2 \\ - 2.09 X3 - .0310 X4$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
	--	-0.008	1.476	-0.01
X1	EXPYRS	-0.00242	0.01261	-0.19
X2	AGE	0.029003	0.006536	4.44
X3	HEIGHT	-2.0852	0.8780	-2.38
X4	SMOKING	-0.03102	0.01062	-2.92

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.7348
WITH (194 - 5) = 189 DEGREES OF FREEDOM

R-SQUARED = 20.9 PERCENT

R-SQUARED = 19.3 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		4	27.0149	6.7537
RESIDUAL		189	102.0417	0.5399
TOTAL		193	129.0566	

-- hist 'residual'

RESIDUAL
44 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.5	2	**
-2.0	6	*****
-1.5	14	*****
-1.0	32	*****
-0.5	16	*****
0.0	42	*****
0.5	38	*****
1.0	25	*****
1.5	13	*****
2.0	4	****
2.5	1	*
3.0	1	*

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

26. Regression analysis for WEF25.D Difference between WEF25 and EXP(LMEF25.P) *** FEMALE ***

-- regr c76 1 'expyrs' 'residual'

226 CASES USED
12 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = - 1.02 + .0123 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	0.012284	0.008357	1.47

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.6834
WITH (226 - 2) = 224 DEGREES OF FREEDOM

R-SQUARED = 1.0 PERCENT
R-SQUARED = 0.5 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	1	1.0092	1.0092
RESIDUAL	224	224	104.6193	0.4671
TOTAL	225	225	105.6285	

-- hist 'residual'

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

'residual'
12 MISSING OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	1
-2.0	3
-1.5	6
-1.0	38
-0.5	47
0.0	50
0.5	34
1.0	18
1.5	14
2.0	6
2.5	3
3.0	3
3.5	0
4.0	1

```
-- regr c76 2 'expyrs' 'age' 'residual'
```

226 CASES USED

12 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = -1.41 - .0061 X1 + .0160 X2$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-PA110 = COEF/S.D.
X1	EXPYRS	-1.4092	0.1520	-9.27
X2	AGE	-0.00606	0.01038	-0.58
		0.016031	0.005536	2.90

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

$$S = 0.6124$$

WITH (226- 3) = 223 DEGREES OF FREEDOM

R-SQUARED = 4.5 PERCENT

R-SQUARED = 3.7 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	2	4.8008	2.4004
RESIDUAL	223	100.8277	0.4521
TOTAL	225	105.6285	

```
-- hist 'residual'
```

'residual'

EACH * REPRESENTS 2 OBSERVATIONS
12 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.0	4
-1.5	8
-1.0	34
-0.5	63
0.0	42
0.5	33
1.0	13
1.5	17
2.0	5
2.5	2
3.0	4
3.5	0
4.0	1

27. Regression analysis for FVC.R Ratio of FVC to FVC.F (%) *** FEMALES ***
 =====

-- regr c80 1 'expyrs' 'residual'

236 CASES USED

2 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

Y = 92.4 - 0.560 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.5595	0.1741	-3.21

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 14.67

WITH (236 - 2) = 234 DEGREES OF FREEDOM

R-SQUARED = 4.2 PERCENT

R-SQUARED = 3.8 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	2220.1	2220.1
RESIDUAL	234	50327.2	215.1
TOTAL	235	52547.4	

-- list 'residual'

'residual'

EACH * REPRESENTS 5 OBSERVATIONS
 2 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.	2
-2.	9
-1.	54
0.	104
1.	53
2.	11
3.	2
4.	0
5.	1

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-- reqr c80 2 'expyrs' 'age' 'residual'

236 CASES USED
2 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 86.6 - 0.827 X1 + 0.239 X2

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.8274	0.2159	-3.83
X2	AGE	0.2390	0.1154	2.07

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 14.56
WITH (236 - 3) = 233 DEGREES OF FREEDOM

R-SQUARED = 6.0 PERCENT
R-SQUARED = 5.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION		2	3129.9	1565.0
RESIDUAL		233	4947.4	212.1
TOTAL		235	52547.4	

-- hist 'residual'

'residual'
EACH * REPRESENTS 2 OBSERVATIONS
2 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.	1
-2.	11
-1.	56
0.	102
1.	56
2.	12
3.	1
4.	0
5.	1

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X1

TABLE

THE ST. DEV. OF Y ABOUT REGRESSION LINE
 $S = 15.03$
 WITH $(236 - 2) = 234$ DEGREES OF FREEDOM

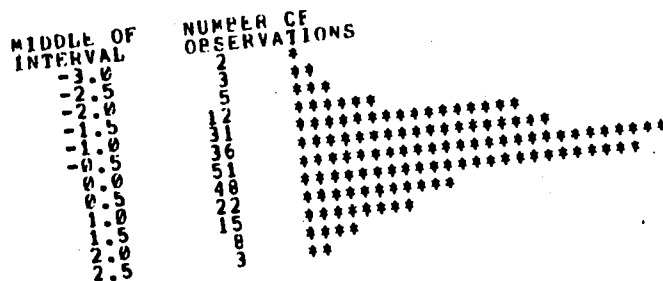
R-SQUARED = 3.3 PERCENT
 R-SQUARED = 2.8 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DF	SS	MS=SS/DF
DUE TO REGRESSION	1	1779.0	1779.0
RESIDUAL	234	52888.3	226.0
TOTAL	235	54667.3	

-- hist 'residual'

'residual'
 EACH * REPRESENTS 2 OBSERVATIONS
 2 MISSING OBSERVATIONS



DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

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29. Regression analysis for PFLW.R Ratio of PEAKFLOW to EXP(LPFLW.P) (%) *** FEMALES ***
 =====

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-- regr c02 1 'expyrs' 'residual'

194 CASES USED
 44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
 $Y = 57.2 + 0.338 X1$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	0.3378	0.1652	2.04

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
 $S = 12.13$

WITH (194 - 2) = 192 DEGREES OF FREEDOM

R-SQUARED = 2.1 PERCENT
 R-SQUARED = 1.6 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	614.8	614.8
RESIDUAL	192	28239.8	147.1
TOTAL	193	28854.6	

-- hist 'residual'

'residual'
 44 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-3.0	1
-2.5	2
-2.0	5
-1.5	12
-1.0	31
-0.5	22
0.0	37
0.5	44
1.0	19
1.5	12
2.0	7
2.5	2

-- reqr c82 3 'expyrs' 'age' 'smoking' 'residual'

194 CASES USED

44 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

$$Y = 50.1 - .042X_1 + 0.327X_2 - 0.454X_3$$

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-0.0428	0.1994	-0.21
X2	AGE	0.3268	0.1030	3.17
X3	SMOKING	-0.4536	0.1686	-2.69

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 11.67

WITH (194 - 4) = 190 DEGREES OF FREEDOM

R-SQUARED = 10.4 PERCENT

R-SQUARED = 9.0 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	3	2595.9	998.6
RESIDUAL	190	25658.7	136.1
TOTAL	193	28654.6	

-- hist 'residual'

'residual'

44 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
-2.5	3	***
-2.0	4	****
-1.5	13	*****
-1.0	34	*****
-0.5	15	*****
0.0	44	*****
0.5	40	*****
1.0	23	*****
1.5	10	*****
2.0	6	*****
2.5	2	**

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30. Regression analysis for MEF5W.R Ratio of MEF5W to MEF5W.F (%) *** FEMALES ***

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-- regr c03 1 'expyrs' 'residual'

225 CASES USED
13 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS
Y = 72.5 + .0963 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	0.0963	0.2352	0.41

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 19.21
WITH (225 - 2) = 223 DEGREES OF FREEDOM

R-SQUARED = 0.1 PERCENT
R-SQUARED = -0.4 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

	DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	61.8	61.8	
RESIDUAL	223	82319.6	369.1	
TOTAL	224	82381.4		

-- hist 'residual'

'residual'
13 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-2.5	2
-2.0	9
-1.5	16
-1.0	17
-0.5	44
0.0	50
0.5	42
1.0	22
1.5	18
2.0	6
2.5	0
3.0	0
3.5	0
4.0	1

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31. Regression analysis for MEF25.N Ratio of MEF25 to Exp(MEF25.P) (8) *** FEMALES ***

-- regr c84 1 'expyrs' 'residual'

226 CASES USED
12 CASES CONTAINED MISSING VALUES

THE REGRESSION EQUATION IS

Y = 62.8 - 0.377 X1

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	EXPYRS	-2.3772	0.3455	-1.09

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 28.25

WITH (226- 2) = 224 DEGREES OF FREEDOM

R-SQUARED = 0.5 PERCENT

R-SQUARED = 0.1 PERCENT, ADJUSTED FOR D.F.

ANALYSIS OF VARIANCE

DUE TO	DF	SS	MS=SS/DF
REGRESSION	1	951.7	951.7
RESIDUAL	224	178790.6	798.2
TOTAL	225	179742.3	

-- hist 'residual'

'residual'

EACH * REPRESENTS 2 OBSERVATIONS
12 MISSING OBSERVATIONS

DISTRIBUTION OF RESIDUALS ABOUT REGRESSION LINE

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-1.5	10
-1.0	42
-0.5	58
0.0	40
0.5	33
1.0	18
1.5	12
2.0	5
2.5	5
3.0	1
3.5	1
4.0	1
4.5	1

Annex VI

SNZ Asbestos Study
=====

X-ray readings -- Initial analysis
=====

SN/ Asbestos Study
=====

X-ray readings -- initial analysis
=====

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=====

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best available copy.



SNZ Asbestos Study
=====

x-ray readings -- initial analysis
=====

2

There were 765 people, 551 male and 214 female, for whom there were x-ray readings by three readers (coded GS JG and ZC in the following tabulations) and for whom there were measures of dust exposure.

The statistical analyses have been done using the MINITAB statistical package at the Clinical Research Centre, Harrow, UK. The histograms, tables etc. have been presented as produced by MINITAB, with annotations added alongside.

1. Comparison of Readers
=={=====

The layout of the tables in this section is as follows:

- a. Histograms for each reader of the x-ray variables in the order
GS JG ZC
- b. Tables for score of the x-ray variables inter-relating readings by
GS and JG
GS and ZC
JG and ZC.

163

-- DIST C7 C52 C102

FILM QUALITY

Page 3

GS.QUAL
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	77	*****
2.	551	*****
3.	134	*****
4.	3	*

Although there were 4 readings of quality 4 (unreadable)
no film was recorded as unreadable by more than one
reader.

JG.QUAL
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	271	*****
2.	425	*****
3.	69	*****

ZC.QUAL
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	716	*****
2.	42	***
3.	6	*
4.	1	*

161

-- table c2 c52

ROWS: GS.GUAL		COLUMNS: JG.GUAL			
	1	2	3	ALL	
1	71	6	0	77	
2	194	335	22	551	
3	6	83	45	134	
4	0	1	2	3	
ALL	271	425	69	765	

-- table c2 c142

ROWS: GS.GUAL		COLUMNS: ZC.GUAL			
	1	2	3	4	ALL
1	75	2	0	0	77
2	522	25	3	1	551
3	116	15	3	0	134
4	3	0	0	0	3
ALL	716	42	6	1	765

-- table c52 c142

ROWS: JG.GUAL		COLUMNS: ZC.GUAL			
	1	2	3	4	ALL
1	267	3	1	0	271
2	396	24	4	1	425
3	53	15	1	0	69
ALL	716	42	6	1	765

FILE QUALITY - CROSS-TABULATIONS

Page 4

There are major differences in the readings of film quality with ZC recording 94% of films as quality 1 whereas GS only so recorded 10%.

-- hist c3 c53 c103

VISIBILITY OF PARENCHYMA

Page 5

PAR.VIS
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	419	*****
2.	346	*****

C53
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	527	*****
2.	238	*****

C103
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	715	*****
1.	37	**
2.	20	**

Note: ZC did not usually record visibility of parenchyma or pleura, if quality was 1.

-- hist c4 c54 c104

VISIBILITY OF PLEURA

PLP.VIS
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	533	*****
2.	232	*****

C54
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	593	*****
2.	172	*****

C104
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	715	*****
1.	7	1
2.	46	***

166

-- hist c5 c55 c145

SMALL OPACITIES - PROFUSION

Page 6

GS, PROF: EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	1	*
2.	653	*****
3.	46	****
4.	42	***
5.	15	*
6.	5	*
7.	2	*
8.	1	*
9.	0	

Codes:
 1 - 0/-
 2 - 0/0
 3 - 0/1
 4 - 1/0
 5 - 1/1
 6 - 1/2
 7 - 2/1
 8 - 2/2
 9 - 2/3

JG, PROF: EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	14	*
2.	618	*****
3.	43	***
4.	38	***
5.	43	***
6.	5	*
7.	1	*
8.	3	*

ZC read more abnormality than the other two readers. Taking agreement within two sub-categories, GS and JG agreed on 91% of the radiographs. ZC agreed with the others on 81% of the films, but the agreement was rather better if allowance was made for a relative bias of one sub-category in ZC's readings.

ZC, PROF: EACH * REPRESENTS 5 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	155	*****
2.	213	*****
3.	228	*****
4.	84	*****
5.	76	*****
6.	11	***
7.	2	*
8.	0	
9.	2	*

-- table c5 c55

SMALL OPACITIES - PROFUSION - CROSS-TABULATIONS

ROWS: GS.PROFM

COLUMNS: JG.PROFM

	1	2	3	4	5	6	7	8	ALL
1	0	1	0	0	0	0	0	0	1
2	14	57	30	24	13	1	0	0	653
3	0	27	7	4	7	1	0	0	46
4	0	15	6	8	13	0	0	0	42
5	0	4	0	0	2	2	0	1	15
6	0	0	0	1	2	0	1	1	5
7	0	0	0	1	0	0	1	1	2
8	0	0	0	0	0	0	0	0	1
ALL	14	618	43	38	43	5	1	3	765

-- table c5 c105

ROWS: GS.PROFM

COLUMNS: ZC.PROFM

	1	2	3	4	5	6	7	9	ALL
1	1	0	0	0	0	0	0	0	1
2	145	269	201	58	37	0	0	0	653
3	5	4	14	11	11	1	0	0	46
4	0	0	0	12	13	5	0	0	42
5	0	0	4	1	7	1	1	1	15
6	0	0	1	1	2	1	0	0	5
7	0	0	0	1	0	1	0	1	2
8	0	0	0	0	0	0	1	0	1
ALL	155	213	228	64	70	11	2	2	765

-- table c55 c105

ROWS: JG.PROFM

COLUMNS: ZC.PROFM

	1	2	3	4	5	6	7	9	ALL
1	0	2	6	0	0	0	0	0	14
2	132	200	170	64	33	1	0	0	618
3	5	7	16	5	7	2	0	0	43
4	2	2	17	9	7	5	0	0	38
5	0	2	11	1	17	2	1	1	43
6	0	0	0	0	4	0	1	0	5
7	0	0	0	0	1	0	0	0	1
8	0	0	0	0	1	1	0	0	3
ALL	155	213	228	64	70	11	2	2	765

168

-- hist c6 c56 c146

PREDOMINANT SIZE OF SMALL OPACITIES

Page 8

GS.SIZE1
EACH * REPRESENTS 15 OBSERVATIONS

Codes:
0 - 0
1 - p
2 - q
3 - r
4 - s
5 - t
6 - u

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	654	*****
1.	0	
2.	93	*****
3.	0	
4.	0	
5.	16	**
6.	0	

JG.SIZE1
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	632	*****
1.	1	*
2.	92	*****
3.	1	*
4.	0	
5.	36	***
6.	2	**

ZC.SIZE1
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	366	*****
1.	150	*****
2.	145	*****
3.	4	*
4.	60	*****
5.	38	****

Unlike GS and JG, ZC read many films as predominantly of sizes p & s.

1697

-- table c6 c56

ROWS: GS.SIZE1		COLUMNS: JG.SIZE1				
	0	1	2	5	6	ALL
0	586	1	46	19	2	654
2	42	0	39	12	6	93
5	4	0	7	7	0	18
ALL	632	1	92	38	2	765

-- table c6 c106

ROWS: GS.SIZE1		COLUMNS: ZC.SIZE1					
	0	1	2	3	4	5	ALL
0	355	122	101	4	49	23	654
2	12	25	38	0	6	12	93
5	1	3	6	0	5	3	18
ALL	368	150	145	4	60	38	765

-- table c56 c106

ROWS: JG.SIZE1		COLUMNS: ZC.SIZE1					
	0	1	2	3	4	5	ALL
0	352	123	94	2	42	21	632
1	0	1	0	0	0	0	1
2	10	24	37	2	10	9	92
5	7	1	14	0	6	0	38
ALL	368	150	145	4	60	30	765

-- DIST C7 C57 CIV7

GS.SIZE2
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	654	*****
1.	0	
2.	48	****
3.	2	*
4.	0	
5.	61	*****

SECOND SIZE OF SMALL OPACITIES

Page 10

('G.SIZE2
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	632	*****
1.	0	
2.	17	*****
3.	0	
4.	2	*
5.	52	****
6.	7	*

ZC.SIZE2
EACH * REPRESENTS 12 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	308	*****
1.	97	*****
2.	122	*****
3.	5	*
4.	59	*****
5.	125	*****
6.	9	*

121

-- table c7 c57

ROWS: GS.SIZE2		COLUMNS: JG.SIZE2					
	N	2	4	5	6	ALL	
0	586	37	0	29	2	654	
2	21	15	1	11	0	48	
3	2	0	0	0	0	2	
5	23	25	1	12	0	61	
ALL	632	77	2	52	2	765	

-- table c7 c107

ROWS: GS.SIZE2		COLUMNS: ZC.SIZE2							
	N	1	2	3	4	5	6	ALL	
0	355	84	93	3	47	68	4	654	
2	3	7	10	1	7	19	1	48	
3	0	0	0	0	0	1	1	2	
5	14	6	19	1	5	17	3	61	
ALL	368	97	122	5	59	105	9	765	

-- table c57 c107

ROWS: JG.SIZE2		COLUMNS: ZC.SIZE2							
	N	1	2	3	4	5	6	ALL	
0	354	83	88	3	44	62	2	632	
2	14	8	26	1	7	22	3	77	
4	0	1	0	0	0	1	0	2	
5	7	4	0	1	6	20	4	52	
6	1	1	0	0	0	0	0	2	
ALL	368	97	122	5	59	105	9	765	

(

1728

-- DIST CH CSE CIGH

GS.LARGE
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	763
1.	2

JG.LARGE
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765

ZC.LARGE
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	761
1.	4

-- table CH CIGH

ROWS: GS.LARGE COLUMNS: ZC.LARGE

	1	1	ALL
J	764	3	763
1	1	3	2
ALL	761	4	765

LARGE OPACITIES

Page 12

Codes:
0 - 0
1 - A

Note: There were no readings of large opacities of size B or C.

LARGE OPACITIES - CROSS-TABULATIONS

173

-- hist c9 c59 c109

PLEURAL THICKENING - DIFFUSE - RIGHT

Page 13

PTDIFF.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	738	*****
1.	27	**

C59
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	721	*****
1.	64	*****

C109
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	754	*****
1.	11	*

-- hist c14 c64 c114

PLEURAL THICKENING - DIFFUSE - LEFT

PTDIFF.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	748	*****
1.	17	**

C64
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	693	*****
1.	72	*****

JG recorded many more cases of diffuse type thickening
and many less of plaque type.

C114
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	754	*****
1.	15	*

-- Dist C11 C61 C111

PLEURAL THICKENING - PLAQUES - RIGHT

Page 14

PTPLAQ.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	725 ****
1.	42 ***

C61
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	757 ****
1.	8 *

C111
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	720 ****
1.	45 ***

-- Dist C12 C62 C112

PLEURAL THICKENING - PLAQUES - LEFT

PTPLAQ.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	725 ****
1.	40 ***

C62
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	759 ****
1.	6 *

C112
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	727 ****
1.	30 ***

123

-- hist c13 c63 c113

PTWID1.F
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	698
1.	57
2.	6
3.	4

Codes:
0 - 0
1 - a
2 - b
3 - c

C63
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	693
1.	57
2.	5
3.	10

C113
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	709
1.	50
2.	5
3.	1

-- hist c14 c64 c114

PTWID1.F
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	709
1.	47
2.	5
3.	4

PLEURAL THICKENING - WIDTH - LEFT

C64
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	687
1.	67
2.	2
3.	9

Very close agreement on prevalence.

C114
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	717
1.	11
2.	7

176

PLEURAL THICKENING - WIDTH - RIGHT

Page 15

-- hist c15 c65 c115

PLEURAL THICKENING - FACE ON - RIGHT

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PTFACE:R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764
1.	1

C65
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	761
1.	4

C115
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	769
1.	56

-- hist c16 c66 c116

PLEURAL THICKENING - FACE ON - LEFT

PTFACE:L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	763
1.	2

C66
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	762
1.	3

C116
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	713
1.	52

ZC recorded pleural thickening face on much more frequently than did GS and JG.

-- hist c17 c67 c117

GS.PTH.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	698
1.	36
2.	29

JG.PTH.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	693
1.	47
2.	15
3.	6

ZC.PTH.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	729
1.	36
2.	12
3.	8

-- hist c18 c68 c118

GS.PTH.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	706
1.	46
2.	17

JG.PTH.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	687
1.	52
2.	17
3.	9

ZC.PTH.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	712
1.	32
2.	13
3.	7

PLEURAL THICKENING - EXTENT - RIGHT

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PLEURAL THICKENING - EXTENT - LEFT

178

-- table c17 c67
ROWS: GS.FTH.R

COLUMNS: JG.PTH.R

		1	2	3	ALL
0	669	22	5	2	698
1	16	18	4	0	38
2	6	7	10	4	29
ALL	693	47	19	6	765

-- table c17 c117
ROWS: GS.PTH.R

COLUMNS: ZC.PTH.R

		1	2	3	ALL
0	667	22	8	1	698
1	27	7	3	1	38
2	15	7	1	6	29
ALL	709	36	12	8	765

-- table c67 c117
ROWS: JG.FTH.R

COLUMNS: ZC.FTH.R

		1	2	3	ALL
0	662	23	7	1	693
1	33	16	2	2	47
2	13	2	1	3	19
3	1	1	2	2	6
ALL	709	36	12	8	765

-- table c18 c66
ROWS: GS.FTH.L

COLUMNS: JG.PTH.L

		1	2	3	ALL
0	673	27	6	2	708
1	12	22	5	1	40
2	2	3	6	6	17
ALL	687	52	17	9	765

-- table c18 c118
ROWS: GS.FTH.L

COLUMNS: ZC.PTH.L

		1	2	3	ALL
0	677	23	5	3	708
1	28	6	5	1	40
2	7	3	3	4	17
ALL	712	32	13	8	765

-- table c68 c118
ROWS: JG.PTH.L

COLUMNS: ZC.PTH.L

		1	2	3	ALL
0	658	24	6	3	687
1	12	6	3	1	52
2	13	1	1	2	17
3	3	1	3	2	6
ALL	712	32	13	8	765

PLEURAL THICKENING - EXTENT - RIGHT - CROSS-TABULATIONS Page 18

PLEURAL THICKENING - EXTENT - LEFT - CROSS-TABULATIONS

-- hist c19 c69 c119

GS.DIA.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

JG.DIA.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764 *****
1.	1 *

LS.DIA.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	754 *****
1.	11 *

-- hist c20 c70 c120

GS.DIA.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764 *****
1.	1 *

JG.DIA.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

LS.DIA.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	746 *****
1.	17 **

DIAPHRAGM THICKENING - RIGHT

DIAPHRAGM THICKENING - LEFT

There were few readings of diaphragm thickening.

-- hist c21 c71 c121

COSTOPHRENIC ANGLE -RIGHT

Page 20

GS.CPA.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	743
1.	22

JG.CPA.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	743
1.	22

ZC.CPA.R
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	733
1.	32

-- hist c22 c72 c122

COSTOPHRENIC ANGLE -LEFT

GS.CPA.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	739
1.	26

JG.CPA.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	741
1.	24

ZC.CPA.L
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	728
1.	45

1872

```
-- table c21 c71
ROWS: GS.CPA.R      COLUMNS: JG.CPA.R
      0      1      ALL
0      737      6      743
1      6      16      22
ALL     743      22      765
```

```
-- table c21 c121
ROWS: GS.CPA.R      COLUMNS: ZC.CPA.R
      0      1      ALL
0      729      14      743
1      4      18      22
ALL     733      32      765
```

```
-- table c71 c121
ROWS: JG.CPA.R      COLUMNS: ZC.CPA.R
      0      1      ALL
0      720      15      743
1      5      17      22
ALL     733      32      765
```

```
-- table c22 c72
ROWS: GS.CPA.L      COLUMNS: JG.CPA.L
      0      1      ALL
0      735      4      739
1      6      20      26
ALL     741      24      765
```

```
-- table c22 c122
ROWS: GS.CPA.L      COLUMNS: ZC.CPA.L
      0      1      ALL
0      719      20      739
1      1      25      26
ALL     720      45      765
```

```
-- table c72 c122
ROWS: JG.CPA.L      COLUMNS: ZC.CPA.L
      0      1      ALL
0      718      23      741
1      2      22      24
ALL     720      45      765
```

COSTOPHRENIC ANGLE -LEFT - CROSS-TABULATIONS

Good agreement allowing for a higher prevalence reported by ZC.

-- hist c23 c73 c123

PCDIA.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	762
1.	3

C73
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	763
1.	2

C123
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765
1.	

-- hist c24 c74 c124

PCDIA.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764
1.	1

PLEURAL CALCIFICATION - DIAPHRAGM -LEFT

C74
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	762
1.	3

C124
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765
1.	

183

-- hist c25 c75 c125

PLEURAL CALCIFICATION - WALL -RIGHT

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PCWALL.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	762	*****
1.	3	*

C75
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	760	*****
1.	5	*

C125
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	762	*****
1.	3	*

-- hist c26 c76 c126

PLEURAL CALCIFICATION - WALL -LEFT

PCWALL.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	761	*****
1.	4	*

C76
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	761	*****
1.	4	*

C126
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	762	*****
1.	3	*

-- hist c27 c77 c127

PLEURAL CALCIFICATION - OTHER -RIGHT

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PCOTH.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

C77
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

C127
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

-- hist c28 c78 c128

PLEURAL CALCIFICATION - OTHER -LEFT

PCOTH.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764 *****
1.	1 *

C78
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764 *****
1.	1 *

C128
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	765 *****

-- hist c29 c79 c129

GS.CLC.F
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	761	*****
1.	1	*
2.	1	*
3.	2	*

JG.CLC.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	760	*****
1.	2	*
2.	1	*
3.	2	*

ZC.CLC.R
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	762	*****
1.	2	*
2.	3	*

-- hist c34 c84 c134

GS.CLC.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	760	*****
1.	3	*
2.	1	*
3.	1	*

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^

GS.CLC.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	761	*****
1.	1	*
2.	2	*
3.	1	*

ZC.CLC.L
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	762	*****
1.	2	*
2.	3	*

-- table c29 c79
ROWS: GS.CLC.R

		1	2	3	ALL
0	759	2	0	0	761
1	1	0	0	1	1
2	0	0	1	1	2
3	0	0	1	1	2
ALL	760	2	1	2	765

-- table c29 c129
ROWS: GS.CLC.R

		2	ALL
0	760	1	761
1	1	0	1
2	0	1	1
3	1	1	2
ALL	762	3	765

-- table c79 c129
ROWS: JG.CLC.R

		2	ALL
0	759	1	760
1	2	0	2
2	0	1	1
3	1	1	2
ALL	762	3	765

-- table c30 c30
ROWS: GS.CLC.L

		1	2	3	ALL
0	759	0	1	0	760
1	2	1	0	0	3
2	0	0	1	0	1
3	0	0	0	1	1
ALL	761	1	2	1	765

-- table c30 c130
ROWS: GS.CLC.L

		2	ALL
0	759	1	760
1	3	0	3
2	0	1	1
3	0	1	1
ALL	762	3	765

-- table c30 c130
ROWS: JG.CLC.L

		2	ALL
0	760	1	761
1	1	0	1
2	1	1	2
3	0	1	1
ALL	762	3	765

PLEURAL CALCIFICATION - EXTENT -RIGHT - CROSS-TABULATIONS

PLEURAL CALCIFICATION - EXTENT -LEFT - CROSS-TABULATIONS

There were few films showing pleural calcification.

-- HIST C180 C181 C182

SYMBOLS

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GS.SYMH
EACH * REPRESENTS 2 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	0	
2.	1	*
3.	0	
4.	0	
5.	2	*
6.	0	
7.	0	
8.	0	
9.	0	
10.	0	
11.	0	
12.	14	*****
13.	0	
14.	0	
15.	3	**
16.	0	
17.	0	
18.	0	****
19.	39	*****
20.	0	
21.	0	
22.	30	*****

Codes:

1	-	AX
2	-	BU
3	-	CA
4	-	CN
5	-	CO
6	-	CP
7	-	CV
8	-	DI
9	-	EF
10	-	EM
11	-	ES
12	-	FR
13	-	HI
14	-	HO
15	-	ID
16	-	IH
17	-	KL
18	-	OD
19	-	PI
20	-	PX
21	-	RP
22	-	TR

JG.SYMH
EACH * REPRESENTS 2 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
5.	12	*****
6.	4	**
7.	2	*
8.	1	*
9.	0	
10.	0	
11.	0	
12.	14	*****
13.	5	***
14.	0	
15.	0	
16.	4	**
17.	4	**
18.	16	*****
19.	141	*****
20.	0	
21.	0	
22.	33	*****

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2C. SYMC	REPRESENTS	2 OBSERVATIONS
EACH	NUMBER OF	MIDDLE OF
INTERVAL	INTERVAL	INTERVAL
2:	1	1
3:	2	2
4:	41	41
5:	2	2
6:	2	2
7:	2	2
8:	2	2
9:	2	2
10:	2	2
11:	2	2
12:	14	14
13:	2	2
14:	2	2
15:	9	9
16:	7	7
17:	2	2
18:	4	4
19:	11	11
20:	2	2
21:	2	2
22:	54	54

2. Basic and exposure data
=====

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This section presents information about the age, smoking and exposure to asbestos dust for the 745 workers with x-ray readings. The exposure data have been calculated at SNZ from the detailed occupational histories.

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A
C
E
EACH * REPRESENTS 5 OBSERVATIONS

AGE DISTRIBUTION

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
15.	7	*****
20.	72	*****
25.	96	*****
30.	98	*****
35.	149	*****
40.	157	*****
45.	97	*****
50.	67	*****
55.	23	*****
60.	1	*****

SMOKER

SMOKER
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	427	*****
1.	318	*****

ASBESTOS PLANT

P
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	281	*****
2.	37	*****
3.	219	*****
4.	46	*****
5.	162	*****

Codes:
1 - PLOCE
2 - VRANJIC
3 - ANHOVO
4 - KORLACE
5 - R.P.S.

EXPKRS
EACH * REPRESENTS 5 OBSERVATIONS

YEARS OF EXPOSURE

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	21	*****
2.	141	*****
4.	130	*****
6.	53	*****
8.	58	*****
10.	85	*****
12.	64	*****
14.	71	*****
16.	53	*****
18.	39	*****
20.	15	*****
22.	28	*****
24.	4	*
26.	2	*
28.	0	
30.	1	*

YRIEFP
EACH * REPRESENTS 5 OBSERVATIONS

YEAR FIRST EMPLOYED IN PLANT

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
46.	1	*
48.	3	*
50.	2	*
52.	36	*****
54.	16	*****
56.	50	*****
58.	52	*****
60.	57	*****
62.	79	*****
64.	94	*****
66.	58	*****
68.	51	*****
70.	133	*****
72.	143	*****
74.	2	*

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FIBYRS
EACH * REPRESENTS 15 OBSERVATIONS

FIBRE-YEARS OF DUST EXPOSURE

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MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	707	*****
200.	44	***
400.	4	*
600.	3	*
800.	1	*
1000.	1	*
1200.	0	
1400.	1	*
1600.	0	
1800.	2	*
2000.	1	*
2200.	0	
2400.	0	
2600.	0	
2800.	0	
3000.	1	*

TOTYRS
EACH * REPRESENTS 15 OBSERVATIONS

PARTICLE YEARS OF DUST EXPOSURE/100

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.	522	*****
50.	100	*****
100.	39	***
150.	12	**
200.	5	*
250.	3	*
300.	2	*
350.	3	*
400.	3	*
450.	3	*
500.	0	
550.	0	
600.	0	
650.	1	*
700.	0	
750.	0	
800.	0	
850.	2	*

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3. X-ray scores analysed

For each of the primary indices of radiographic appearance, the median of the three readings by GS, JG and ZC has been taken, and the median has been included in the subsequent statistical analyses. The following histograms present the distributions of these median readings. The codes are the same as those in Section 1 of this report.

SOPROF.
EACH * REPRESENTS 15 OBSERVATIONS

SMALL OPACITIES - PROFUSION

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	7	*
2.	626	*****
3.	72	*****
4.	44	***
5.	32	***
6.	2	*
7.	1	*
8.	1	*

SOS-SI.
EACH * REPRESENTS 15 OBSERVATIONS

PREDOMINANT SIZE OF SMALL OPACITIES

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	613	*****
2.	27	**
3.	172	*****
4.	5	*
5.	16	**

LARGO.
EACH * REPRESENTS 20 OBSERVATIONS

LARGE OPACITIES - SIZE

Note: Only one positive case

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	764	*****
2.	1	*

EXTIR.
EACH * REPRESENTS 15 OBSERVATIONS

PLEURAL THICKENING - EXTENT - RIGHT

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	712	*****
2.	36	***
3.	15	*
4.	2	*

PTXTL.
EACH * REPRESENTS 15 OBSERVATIONS

PLEURAL THICKENING - EXTENT - LEFT

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.	714	*****
2.	36	***
3.	13	*
4.	2	*

DIAR.M
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764
1.	1

DIAL.M
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	764
1.	1

CPAR.M
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	742
1.	23

CPAL.M
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	738
1.	27

PCEXIP.M
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	762
1.	0
2.	2
3.	1

PCEXIL.M
EACH * REPRESENTS 20 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
0.	762
1.	1
2.	1
3.	1

DIAPHRAGM THICKENING - RIGHT

Note: only one positive case

DIAPHRAGM THICKENING - LEFT

Note: only one positive case

COSTOPHRENIC ANGLE - RIGHT

COSTOPHRENIC ANGLE - LEFT

PLEURAL CALCIFICATION - EXTENT - RIGHT

Note: only three positive cases

PLEURAL CALCIFICATION - EXTENT - LEFT

Note: only three positive cases

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4. Regression of X-ray indices on dust indices

=====

Stepwise regression techniques have been used to examine the relations between the radiographic indices and measures of dust exposure. The independent variables included in the regressions were:

```

male
  n.age -- age
  n.expyrs -- years of exposure
  n.fibys -- fibre-years of exposure
  n.totyrs -- particle-years of exposure/100
                                     } if male

```

and 5 similar indices of females.

These 10 indices permitted the fitting of separate regressions for the two sexes, if the data warranted it.

For each radiographic index, the best fitting regression has been calculated and the distribution of the standardised residuals about the regression is shown so that the assumption of normality of the residuals may be checked.

For each index analysed, the distribution of residuals about the fitted regression line is very skew, suggesting that this method of analysis is not appropriate.

REGRESSIONS FOR SMALL OPACITIES - PROFUSION

-- step c151 c50-c55

STEPWISE REGRESSION OF SOPROF. ON 10 PREDICTORS, WITH N = 765

STEP	1	2	3	4	5
NO CONSTANT					
MALE	2.434	2.434	1.704	1.704	1.723
T-RATIO	40.71	68.65	11.29	11.33	11.46
FEMALE		1.068	1.068	0.980	0.980
T-RATIO		37.54	36.12	21.38	21.43
M.AGE			0.0198	0.0198	0.0184
T-RATIO			4.97	4.99	4.58
F.EXPYRS				0.024	0.024
T-RATIO				2.42	2.42
M.TOTYRS					0.00100
T-RATIO					2.04
S	1.40	0.832	0.820	0.817	0.815

-- regress c151 5 'male' 'female' 'm.age' 'f.expyrs' 'm.totyr' c180

THE REGRESSION EQUATION IS

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
NOCONSTANT				
X1	MALE	1.7229	0.1504	11.46
X2	FEMALE	0.97990	0.04573	21.43
X3	M.AGE	0.018411	0.004020	4.58
X4	F.EXPYRS	0.02426	0.01001	2.42
X5	M.TOTYRS	0.0010041	0.0004922	2.04

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.8153

WITH (765 - 5) = 760 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

DUE TO	OF	SS	MS=SS/DF
REGRESSION	5	4262.859	852.572
RESIDUAL	760	505.142	0.665
TOTAL	765	4768.001	

-- hist c180

C180

EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF
INTERVAL NUMBER OF
OBSERVATIONS

-2.	4	*
-1.	222	*****
0.	403	*****
1.	58	*****
2.	42	*****
3.	32	*****
4.	2	*
5.	1	*
6.	0	*
7.	1	*

REGRESSIONS FOR PLEURAL THICKENING - EXTENT - RIGHT

-- step c154 c50-c59

STEPWISE REGRESSION OF EXTENT.M ON 10 PREDICTORS, WITH N = 765

STEP 1
NO CONSTANT
M.AGE 0.00342
T-RATIO 0.23
S 0.372

-- regress c154 j 'male' 'female' 'm.age' c180

THE REGRESSION EQUATION IS

NO.	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	MALE	-0.12022	0.06806	-1.77
X2	FEMALE	0.01402	0.01263	1.11
X3	M.AGE	0.006512	0.001797	3.62

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.3697

WITH (765 - 3) = 762 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

DUE TO	OF	SS	MS=SS/DF
REGRESSION	3	9.8693	3.2898
RESIDUAL	762	104.1307	0.1367
TOTAL	765	114.0000	

-- DIST C180

C180

EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-1.	65
0.	047
1.	6
2.	33
3.	3
4.	2
5.	15
6.	6
7.	2
8.	2

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-- step c155 c50-c59

STEPWISE REGRESSION OF FTEXTL.F ON 10 PREDICTORS, WITH N = 765

STEP 1
NO CONSTANT
M,EXPYRS 0.0104
T-RATIO 7.74

S 0.359

-- regress c155 3 'male' 'female' 'm.expyrs' c180

THE REGRESSION EQUATION IS

	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
NO CONSTANT				
X1	MALE	0.24476	0.22002	1.60
X2	FEMALE	0.21402	0.01224	1.14
X3	M,EXPYRS	0.027112	0.002467	2.88

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.3582

WITH (765- 3) = 762 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

SOURCE	DF	SS	MS=SS/DF
REGRESSION	3	8.2116	2.7372
RESIDUAL	762	97.7894	0.1283
TOTAL	765	106.0010	

-- dist c180

C180
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-1.	44
0.	67
1.	6
2.	25
3.	11
4.	0
5.	11
6.	2
7.	0
8.	2

-- step c158 c50-c59

STEPWISE REGRESSION OF CPAR.M ON 10 PREDICTORS, WITH N = 765

STEP 1
NO CONSTANT
M.AGE 0.00106
T-RATIO 5.53
S 0.170

-- regress c158 3 'male' 'female' 'm.age' c180

THE REGRESSION EQUATION IS

NO.	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	MALE	-0.05070	0.03128	-1.62
X2	FEMALE	0.007009	0.005807	1.21
X3	M.AGE	0.0023607	0.0008257	2.86

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS
S = 0.1699
WITH (765 - 3) = 762 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE.

DUE TO	DF	SS	MS=SS/DF
REGRESSION	3	1.02394	0.33465
RESIDUAL	762	21.99606	0.02867
TOTAL	765	23.02000	

-- hist c180

C180
EACH * REPRESENTS 15 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-0.5	205
0.0	537
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
3.5	0
4.0	0
4.5	0
5.0	16
5.5	5

REGRESSIONS FOR COSTOPHRENIC ANGLE - RIGHT Page 38

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-- STEP C159 C50-C59

STEPWISE REGRESSION OF CPAL.M ON 10 PREDICTORS, WITH N = 765

STEP 1
NO CONSTANT
M.AGE 0.00125
T-RATIO 6.03

S 0.184

-- regress C159 3 'male' 'female' 'm.age' C180

THE REGRESSION EQUATION IS

NO	COLUMN	COEFFICIENT	ST. DEV. OF COEF.	T-RATIO = COEF/S.D.
X1	MALE	-0.024395	0.03379	-1.30
X2	FEMALE	0.027009	0.006274	1.12
X3	M.AGE	0.0223746	0.008921	2.66

THE ST. DEV. OF Y ABOUT REGRESSION LINE IS

S = 0.1836
WITH (765 - 3) = 762 DEGREES OF FREEDOM

ANALYSIS OF VARIANCE

SOURCE	DF	SS	MS=SS/DF
REGRESSION	3	1.32614	0.44205
RESIDUAL	762	25.67386	0.03369
TOTAL	765	27.00000	

-- HIST C180

C180
EACH * REPRESENTS 10 OBSERVATIONS

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS
-0.5	259
0.0	479
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
3.5	0
4.0	0
4.5	0
5.0	10
5.5	5

5. Average exposure indices for levels of x-ray indices. =====

The tables in this section show how the mean values for the exposure indices relate to increasing values of the radiographic variables. In each table the number of subjects, the number of smokers and the mean values for age, years of exposure, fibre-years of exposure and total particle-years of exposure (7100) are shown for each level of the radiographic index and for each sex separately and combined.

The codes for the levels of the radiographic indices are the same as those in section 1 of this report.

--table 'sex' c151;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.

PROFUSION OF SMALL OPACITIES

ROWS: SEX COLUMNS: SOPROF.M

	1	2	3	4	5	6	7	8	ALL	
1	7 4 29.571 5.298 6.32 17.06	412 225 36.412 9.121 25.57 27.20	57 39 40.853 11.231 31.47 46.14	43 34 39.209 9.876 43.56 61.23	28 18 39.643 11.506 20.89 37.54	2 2 44.500 18.167 15.12 17.69	1 1 52.000 17.333 61.42 90.78	1 0 42.000 14.417 8.50 16.91	551 323 36.853 9.528 27.09 32.27	Number Smokers Age Exposure-years Fibre-years Particle-years
2	194 14 32.314 6.676 75.32 36.32	15 1 41.333 12.511 272.71 79.62	1 1 53.000 18.083 81.42 34.77	4 0 36.000 12.250 100.00 43.19	0 0 -- -- -- --	0 0 -- -- -- --	0 0 -- -- -- --	0 0 -- -- -- --	214 15 33.112 7.243 89.63 39.47	
ALL	7 4 29.571 5.298 6.32 17.06	646 239 34.628 8.336 41.49 30.12	72 40 40.319 11.494 31.73 53.11	44 34 39.523 12.062 44.42 60.63	32 18 39.188 11.599 30.70 38.24	2 2 44.500 18.167 15.12 17.69	1 1 52.000 17.333 61.42 90.78	1 0 42.000 14.417 8.50 16.91	765 338 35.867 8.889 44.59 34.29	

201

```
-- table 'sex' c152;
--count;
--sums ; smoker';
--means c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: SOS-SI.M

	0	1	2	4	5	ALL	
1	419 229 35.905 9.057 25.24 27.03	23 17 37.739 9.254 19.49 27.15	87 63 40.517 11.989 40.82 60.69	4 2 37.750 9.229 43.15 20.06	18 12 39.889 9.269 9.99 26.22	551 323 36.853 9.528 27.09 32.27	Number Smokers Age Exposure-years Fibre-years Particle-years
2	194 14 32.314 6.676 75.30 36.32	4 1 37.000 10.479 50.54 33.00	15 0 41.133 12.961 286.42 83.01	1 0 52.000 18.417 73.67 24.31	0 -- -- -- -- --	214 15 33.112 7.243 89.63 39.47	
ALL	613 243 34.768 8.303 41.09 29.97	27 16 37.630 9.265 24.09 28.02	102 63 40.608 12.132 76.94 63.90	5 2 40.600 11.067 49.25 20.91	18 12 39.889 9.269 9.99 26.22	765 338 35.807 8.809 44.59 34.29	

```
-- table 'sex' c153;
--count;
--sums ; smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: LARGE.O.M

	0	1	ALL	
1	550 322 36.844 9.522 27.08 32.25	1 1 42.000 12.667 32.67 46.84	551 323 36.853 9.528 27.09 32.27	Number Smokers Age Exposure-years Fibre-years Particle-years
2	214 15 33.112 7.243 89.63 39.47	6 -- -- -- -- --	214 15 33.112 7.243 89.63 39.47	
ALL	764 337 35.798 8.809 44.59 34.27	1 1 42.000 12.667 42.67 46.84	765 338 35.807 8.809 44.59 34.29	

PREDOMINANT SIZE OF SMALL OPACITIES Page 41

LARGE OPACITIES

```
-- table 'sex' c154;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: FIEX1P.M

	0	1	2	3	ALL
1	502 287 36.434 9.370 28.25 32.77	34 25 41.412 11.681 15.53 32.18	13 11 40.328 10.654 15.20 14.58	2 0 42.000 5.375 11.67 23.17	551 323 36.853 9.528 27.09 32.27
2	210 15 32.916 7.122 90.54 39.88	2 0 35.000 14.000 42.21 12.72	2 0 52.500 13.125 41.42 23.84	0 -- -- -- -- --	214 15 33.112 7.243 89.63 39.47
ALL	712 302 35.395 8.707 46.62 34.67	36 25 41.056 11.810 17.01 31.10	15 11 41.933 10.983 18.69 15.82	2 0 42.000 5.375 11.67 23.17	765 338 35.807 8.889 44.59 34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

```
-- table 'sex' c155;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: FIEXTL.M

	0	1	2	3	ALL
1	504 291 36.573 9.300 28.14 32.58	34 22 40.118 11.868 15.86 32.93	11 9 38.545 12.795 17.92 19.18	2 1 42.500 9.292 4.46 14.83	551 323 36.853 9.528 27.09 32.27
2	210 15 33.048 7.232 90.84 39.82	2 0 37.500 9.375 40.83 24.06	2 0 35.500 6.208 11.33 18.29	0 -- -- -- -- --	214 15 33.112 7.243 89.63 39.47
ALL	714 306 35.536 8.652 46.58 34.71	36 22 39.972 11.729 17.25 32.44	13 9 38.077 11.782 16.91 19.05	2 1 42.500 9.292 4.46 14.83	765 338 35.807 8.889 44.59 34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

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PLEURAL THICKENING - EXTENT - RIGHT

PLEURAL THICKENING - EXTENT - LEFT

203

```
-- table 'sex' c156;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: DIAP.M

	0	1	ALL
1	551	0	551
	323	--	323
	36.853	--	36.853
	9.528	--	9.528
	27.09	--	27.09
	32.27	--	32.27
2	213	1	214
	15	0	15
	33.061	44.000	33.112
	7.191	18.333	7.243
	89.88	36.08	89.63
	39.59	15.53	39.47
ALL	764	1	765
	338	0	338
	35.796	44.000	35.807
	8.876	18.333	8.889
	44.64	36.08	44.59
	34.31	15.53	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

```
-- table 'sex' c157;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: LIAL.M

	0	1	ALL
1	551	1	551
	322	1	323
	36.853	37.000	36.853
	9.546	3.000	9.528
	27.14	0.03	27.09
	32.33	2.94	32.27
2	214	0	214
	15	--	15
	33.112	--	33.112
	7.243	--	7.243
	89.63	--	89.63
	39.47	--	39.47
ALL	764	1	765
	337	1	338
	35.805	37.000	35.807
	8.890	3.000	8.889
	44.64	0.03	44.59
	34.33	2.94	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

DIAPHRAGM THICKENING - RIGHT

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DIAPHRAGM THICKENING - LEFT

201

```
-- table 'sex' c158;
--count;
--sums 'smoker';
--mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: CPAR.M

	0	1	ALL
1	531	20	551
	310	13	323
	36.665	41.850	36.853
	9.486	10.642	9.528
	27.64	12.55	27.09
	32.65	22.27	32.27
2	211	3	214
	15	0	15
	33.043	36.000	33.112
	7.215	9.167	7.243
	89.17	121.03	89.63
	38.96	75.87	39.47
ALL	742	23	765
	325	13	338
	35.635	41.348	35.807
	8.840	10.449	8.889
	45.14	26.80	44.59
	34.44	29.26	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

```
-- table 'sex' c159;
--count;
--sums 'smoker';
--means c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: CPAL.M

	0	1	ALL
1	527	24	551
	311	12	323
	36.662	41.842	36.853
	9.529	9.507	9.528
	27.48	18.63	27.09
	32.28	32.15	32.27
2	211	3	214
	15	0	15
	33.128	32.000	33.112
	7.297	9.117	7.243
	89.51	27.58	89.63
	34.83	14.47	39.47
ALL	738	27	765
	326	12	338
	35.652	40.237	35.807
	8.891	8.836	8.889
	45.50	19.62	44.59
	34.44	30.10	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

COSTOPHRENIC ANGLE - RIGHT

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COSTOPHRENIC ANGLE - LEFT

```
-- table 'sex' c16;
-- count;
-- sums 'smoker';
-- mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: FCEX1R.M

	1	2	3	ALL
1	548	2	1	551
	321	1	1	323
	36.834	41.500	38.000	36.853
	9.550	5.042	6.333	9.528
	27.26	11.63	0.75	27.09
	32.36	24.18	2.79	32.27
2	214	0	0	214
	15	--	--	15
	33.112	--	--	33.112
	7.243	--	--	7.243
	89.63	--	--	89.63
	39.47	--	--	39.47
ALL	762	2	1	765
	336	1	1	338
	35.789	41.500	38.000	35.807
	8.902	5.042	6.333	8.889
	44.73	11.63	0.75	44.59
	31.35	24.18	2.79	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

```
-- table 'sex' c16;
-- count;
-- sums 'smoker';
-- mean c3 c7 c11 c12.
```

ROWS: SEX COLUMNS: FCEX1L.M

	1	2	3	ALL
1	546	1	1	551
	320	1	1	323
	36.859	36.000	40.000	36.853
	9.520	14.500	15.417	9.528
	27.18	30.17	4.67	27.09
	32.46	5.97	15.65	32.27
2	214	0	0	214
	15	--	--	15
	33.112	--	--	33.112
	7.243	--	--	7.243
	89.63	--	--	89.63
	39.47	--	--	39.47
ALL	762	1	1	765
	335	1	1	338
	35.607	36.000	40.000	35.607
	8.889	14.500	15.417	8.889
	44.72	30.17	4.67	44.59
	31.35	5.97	15.65	34.29

Number
Smokers
Age
Exposure-years
Fibre-years
Particle-years

b. Grouping of age and exposure indices. =====

The indices age, years of exposure, fibre-years of exposure and total particle-years of exposure have been grouped as shown below for the analysis described in section 7.

-- hist c100-c103

AGE.GP
EACH * REPRESENTS 10 OBSERVATIONS

AGE-GROUP

INTERVAL	NUMBER OF OBSERVATIONS
15 - 24.	130
25 - 34.	188
35 - 44.	302
45 - 54.	137
55 - 64.	8

EXPY.GP
EACH * REPRESENTS 10 OBSERVATIONS

YEARS OF EXPOSURE GROUP

INTERVAL	NUMBER OF OBSERVATIONS
0 - 1.	29
1 - 2.	57
2 - 5.	209
5 - 10.	172
10 - 20.	256
20 -	42

FIBY.GP
EACH * REPRESENTS 10 OBSERVATIONS

FIBRE-YEARS OF EXPOSURE GROUP

INTERVAL	NUMBER OF OBSERVATIONS
0 - 5.	266
5 - 10.	122
10 - 20.	121
20 - 40.	124
40 - 80.	81
80 - 160.	41
160 -	32

TOTY.GP
EACH * REPRESENTS 5 OBSERVATIONS

PARTICLE-YEARS OF EXPOSURE GROUP

INTERVAL	NUMBER OF OBSERVATIONS
0 - 5.	201
5 - 10.	129
10 - 20.	164
20 - 40.	124
40 - 80.	56
80 - 160.	39
160 -	30

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7. Prevalence of radiographic abnormality by age and exposure groups.
 =====

The four tables show for the groups described in section 6. the prevalence of radiographic abnormality.

```
-- table 'sex' 'age.gp';
-- count;
-- sums 'smoker';
-- proportion between 3 and 10 for 'soprof.m';
-- proportion between 4 and 10 for 'soprof.m';
-- proportion between 5 and 10 for 'soprof.m';
-- proportion between 1 and 4 for the other indices c153-c161;
-- end.
```

PREVALENCE BY AGE GROUP

ROWS: SEX COLUMNS: AGE.GP

	1	2	3	4	5	ALL
1	64	140	239	102	6	551
	31	81	149	59	3	323
0.0469	0.1714	0.3013	0.3039	0.3333	0.2396	
0.0313	0.0857	0.1799	0.1667	0.1667	0.1361	
0.0000	0.0206	0.0795	0.0882	0.0000	0.0501	
0.0000	0.0000	0.0042	0.0000	0.0000	0.0018	
0.0156	0.0357	0.1172	0.1373	0.1667	0.0809	
0.0156	0.0571	0.1130	0.0900	0.1667	0.0853	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0.0000	0.0000	0.0042	0.0000	0.0000	0.0018	
0.0156	0.0214	0.0293	0.0882	0.0000	0.0363	
0.0156	0.0357	0.0293	0.1078	0.0000	0.0436	
0.0000	0.0000	0.0084	0.0098	0.0000	0.0054	
0.0000	0.0071	0.0084	0.0000	0.0000	0.0054	
2	66	48	63	35	2	214
	7	3	2	3	0	15
0.0455	0.0625	0.0794	0.2286	0.5000	0.0935	
0.0152	0.0208	0.0000	0.0857	0.0000	0.0234	
0.0152	0.0208	0.0000	0.0571	0.0000	0.0107	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0.0000	0.0208	0.0159	0.0571	0.0000	0.0187	
0.0152	0.0208	0.0000	0.0571	0.0000	0.0187	
0.0000	0.0000	0.0159	0.0000	0.0000	0.0047	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0.0000	0.0208	0.0317	0.0000	0.0000	0.0140	
0.0152	0.0000	0.0317	0.0000	0.0000	0.0140	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ALL	130	188	302	137	8	765
	38	64	151	62	3	330
0.0462	0.1436	0.2550	0.2047	0.3750	0.1907	
0.0231	0.0691	0.1424	0.1460	0.1250	0.1046	
0.0077	0.0266	0.0629	0.0803	0.0000	0.0471	
0.0000	0.0000	0.0033	0.0000	0.0000	0.0013	
0.0077	0.0319	0.0960	0.1160	0.1250	0.0693	
0.0154	0.0479	0.0894	0.0876	0.1250	0.0667	
0.0000	0.0000	0.0033	0.0000	0.0000	0.0013	
0.0000	0.0000	0.0033	0.0000	0.0000	0.0013	
0.0077	0.0213	0.0298	0.0657	0.0000	0.0301	
0.0154	0.0266	0.0298	0.0000	0.0000	0.0353	
0.0000	0.0000	0.0066	0.0071	0.0000	0.0019	
0.0000	0.0053	0.0066	0.0000	0.0000	0.0019	

Number
 Smokers
 Small opacities - 0/1 plus
 Small opacities - 1/0 plus
 Small opacities - 1/1 plus
 Large opacities - A plus
 Pleural thickening - extent right - 1 plus
 Pleural thickening - extent left - 1 plus
 Diaphragm thickening - right
 Diaphragm thickening - left
 Costophrenic angle - right
 Costophrenic angle - left
 Pleural calcification - extent right - 1 plus
 Pleural calcification - extent left - 1 plus

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```
-- table 'sex' 'expy.up';
-- count;
-- sums;
-- proportion between 3 and 10 for 'soprof.m';
-- proportion between 4 and 10 for 'soprof.m';
-- proportion between 5 and 10 for 'soprof.m';
-- proportion between 1 and 4 for the other indices c153-c161;
-- end.
```

ROWS: SEX COLUMNS: EXPY.GP

	1	2	3	4	5	6	ALL
1	12	33	141	127	197	41	551
5	5	17	83	74	123	21	323
0.1667	0.1515	0.1489	0.2441	0.3147	0.2683	0.2396	0.2396
0.0833	0.1515	0.0851	0.0866	0.2132	0.0976	0.1361	0.1361
0.0000	0.2606	0.0426	0.0157	0.0964	0.0732	0.0581	0.0581
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
0.0833	0.0000	0.0567	0.0866	0.1371	0.0488	0.0889	0.0889
0.0833	0.0303	0.0426	0.0787	0.1269	0.0976	0.0853	0.0853
0.0600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0071	0.0000	0.0000	0.0000	0.0018	0.0018
0.0000	0.0000	0.0284	0.0630	0.0254	0.0732	0.0363	0.0363
0.0833	0.0303	0.0496	0.0472	0.0305	0.0732	0.0436	0.0436
0.0000	0.0000	0.0071	0.0157	0.0000	0.0000	0.0054	0.0054
0.0000	0.0000	0.0071	0.0000	0.0102	0.0000	0.0054	0.0054
2	17	24	68	45	59	1	214
5	1	10	1	1	3	0	15
0.0000	0.0000	0.0441	0.1111	0.2034	0.0000	0.0935	0.0935
0.0000	0.0000	0.0000	0.0444	0.0508	0.0000	0.0234	0.0234
0.0000	0.0000	0.0000	0.0444	0.0339	0.0000	0.0187	0.0187
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0444	0.0339	0.0000	0.0187	0.0187
0.0000	0.0000	0.0147	0.0667	0.0000	0.0000	0.0187	0.0187
0.0000	0.0000	0.0000	0.0000	0.0169	0.0000	0.0047	0.0047
0.0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0339	0.0000	0.0140	0.0140
0.0000	0.0417	0.0294	0.0000	0.0000	0.0000	0.0140	0.0140
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	29	57	209	172	256	42	765
5	5	18	93	75	126	21	339
0.0690	0.0877	0.1148	0.2093	0.2891	0.2619	0.1987	0.1987
0.0345	0.0877	0.0574	0.0756	0.1758	0.0952	0.1046	0.1046
0.0000	0.0351	0.0207	0.0233	0.0820	0.0714	0.0471	0.0471
0.0345	0.0000	0.0000	0.0000	0.0039	0.0000	0.0013	0.0013
0.0345	0.0175	0.0383	0.0756	0.1133	0.0476	0.0693	0.0693
0.0000	0.0335	0.0335	0.0756	0.0977	0.0952	0.0667	0.0667
0.0000	0.0000	0.0000	0.0000	0.0039	0.0000	0.0013	0.0013
0.0345	0.0000	0.0048	0.0000	0.0000	0.0000	0.0013	0.0013
0.0345	0.0000	0.0191	0.0405	0.0273	0.0714	0.0301	0.0301
0.0000	0.0351	0.0431	0.0339	0.0234	0.0714	0.0353	0.0353
0.0000	0.0000	0.0048	0.0116	0.0000	0.0000	0.0039	0.0039
0.0000	0.0000	0.0048	0.0000	0.0078	0.0000	0.0039	0.0039

Number
Smokers
Small opacities - 0/1 plus
Small opacities - 1/0 plus
Small opacities - 1/1 plus
Large opacities - A plus
Pleural thickening - extent right - 1 plus
Pleural thickening - extent left - 1 plus
Diaphragm thickening - right
Diaphragm thickening - left
Costophrenic angle - right
Costophrenic angle - left
Pleural calcification - extent right - 1 plus
Pleural calcification - extent left - 1 plus

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```
-- table 'sex' 'fby.qp';
-- count;
-- sums 'smoker';
-- proportion between 3 and 10 for 'soprof.m';
-- proportion between 4 and 10 for 'soprof.m';
-- proportion between 5 and 10 for 'soprof.m';
-- proportion between 1 and 4 for the other indices c153-c161;
-- end.
```

ROWS: SEX COLUMNS: FIBY.GP

	1	2	3	4	5	6	7	ALL
1	229 140 0.2096 0.1048 0.0480 0.0000 0.0742 0.0524 0.0000 0.0044 0.0349 0.0326 0.0087 0.0087	101 62 0.2376 0.1386 0.0594 0.0000 0.1386 0.1683 0.0000 0.0000 0.0495 0.0495 0.0000 0.0000	91 53 0.2527 0.1648 0.0769 0.0000 0.0769 0.0769 0.0000 0.0000 0.0330 0.0549 0.0000 0.0000	64 34 0.1563 0.1094 0.0313 0.0156 0.0937 0.1094 0.0000 0.0000 0.0469 0.0469 0.0156 0.0156	33 21 0.4242 0.1818 0.0909 0.0000 0.1212 0.0909 0.0000 0.0000 0.0303 0.0909 0.0000 0.0000	23 10 0.3913 0.2609 0.1304 0.0000 0.0435 0.0435 0.0000 0.0000 0.0000 0.0435 0.0000 0.0000	10 3 0.4000 0.3000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	551 323 0.2396 0.1361 0.0581 0.0018 0.0889 0.0853 0.0000 0.0018 0.0363 0.0436 0.0054 0.0054
2	37 3 0.0270 0.0000 0.0000 0.0000 0.0270 0.0270 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	21 0 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	30 2 0.0667 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	40 4 0.0500 0.0250 0.0250 0.0000 0.0250 0.0500 0.0250 0.0000 0.0250 0.0000 0.0000 0.0000	48 4 0.1042 0.0208 0.0208 0.0000 0.0208 0.0500 0.0208 0.0000 0.0208 0.0000 0.0000 0.0000	18 0 0.3333 0.0500 0.0556 0.0000 0.0556 0.0000 0.0000 0.0000 0.0000 0.0556 0.0000 0.0000	20 2 0.2000 0.0500 0.0500 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	214 15 0.0935 0.0234 0.0187 0.0000 0.0187 0.0187 0.0047 0.0000 0.0140 0.0140 0.0000 0.0000
ALL	266 143 0.1842 0.0902 0.0414 0.0000 0.0677 0.0489 0.0000 0.0038 0.0301 0.0263 0.0075 0.0075	122 62 0.1967 0.1148 0.0492 0.0000 0.1148 0.1393 0.0000 0.0000 0.0410 0.0492 0.0000 0.0000	121 55 0.2066 0.1240 0.0579 0.0000 0.0579 0.0579 0.0000 0.0000 0.0248 0.0413 0.0000 0.0000	104 38 0.1154 0.0769 0.0288 0.0096 0.0673 0.0865 0.0096 0.0000 0.0288 0.0385 0.0096 0.0096	81 25 0.2346 0.0064 0.0494 0.0000 0.0617 0.0494 0.0000 0.0000 0.0247 0.0494 0.0000 0.0000	41 10 0.3659 0.1951 0.0976 0.0000 0.0488 0.0244 0.0000 0.0000 0.0244 0.0244 0.0000 0.0000	30 5 0.2667 0.1333 0.0333 0.0000 0.0000 0.0000 0.0000 0.0000 0.0333 0.0000 0.0000 0.0000	765 338 0.1987 0.1046 0.0471 0.0013 0.0693 0.0667 0.0013 0.0013 0.0301 0.0353 0.0039 0.0039

Number
Smokers
Small opacities - 0/1 plus
Small opacities - 1/0 plus
Small opacities - 1/1 plus
Large opacities - A plus
Pleural thickening - extent right - 1 plus
Pleural thickening - extent left - 1 plus
Diaphragm thickening - right
Diaphragm thickening - left
Costophrenic angle - right
Costophrenic angle - left
Pleural calcification - extent right - 1 plus
Pleural calcification - extent left - 1 plus

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```
-- table 'sex' 'toty.gp';
-- count;
-- sums 'smoker';
-- proportion between 3 and 10 for 'soprof.m';
-- proportion between 4 and 10 for 'soprof.m';
-- proportion between 5 and 10 for 'soprof.m';
-- proportion between 1 and 4 for the other indices c153-c161;
-- end.
```

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PREVALENCE BY PARTICLE-YEARS OF EXPOSURE

ROWS: SEX COLUMNS: TOTY.GP

	1	2	3	4	5	6	7	ALL
1	160 101 0.1938 0.1250 0.0625 0.0000 0.0500 0.0250 0.0000 0.0062 0.0187 0.0313 0.0125 0.0062	90 53 0.2222 0.0667 0.0111 0.0000 0.1000 0.0667 0.0000 0.0000 0.0778 0.0111 0.0000 0.0111	111 64 0.2342 0.1622 0.0721 0.0000 0.1351 0.1712 0.0000 0.0000 0.0450 0.0450 0.0000 0.0090	81 43 0.2346 0.0908 0.0494 0.0000 0.1111 0.1235 0.0000 0.0000 0.0123 0.0741 0.0000 0.0000	58 33 0.3103 0.1897 0.0690 0.0172 0.0517 0.0690 0.0000 0.0000 0.0345 0.0862 0.0172 0.0000	30 20 0.3000 0.2000 0.1000 0.0000 0.1333 0.1000 0.0000 0.0000 0.0667 0.0667 0.0000 0.0000	21 9 0.4286 0.2857 0.0952 0.0000 0.0476 0.0476 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	551 323 0.2396 0.1361 0.0501 0.0018 0.0089 0.0853 0.0000 0.0018 0.0363 0.0436 0.0054 0.0054
2	41 4 0.0244 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0244 0.0000 0.0000	19 1 0.1253 0.0526 0.0526 0.0000 0.0526 0.0526 0.0189 0.0189 0.0000 0.0000 0.0000 0.0000	53 3 0.0566 0.0000 0.0000 0.0000 0.0377 0.0222 0.0189 0.0189 0.0000 0.0000 0.0189 0.0000	45 4 0.1556 0.0444 0.0222 0.0000 0.0222 0.0444 0.0000 0.0000 0.0000 0.0222 0.0000 0.0000	38 2 0.1053 0.0526 0.0526 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0263 0.0000 0.0000	9 0 0.2222 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	9 1 0.1111 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1111 0.0000 0.0000	214 15 0.0935 0.0234 0.0187 0.0000 0.0187 0.0187 0.0047 0.0000 0.0140 0.0140 0.0000
ALL	201 105 0.1592 0.0995 0.0498 0.0000 0.0398 0.0199 0.0000 0.0050 0.0149 0.0299 0.0100 0.0050	109 54 0.2018 0.0642 0.0153 0.0000 0.0917 0.0642 0.0000 0.0000 0.0642 0.0097 0.0000 0.0092	164 67 0.1768 0.1098 0.0488 0.0000 0.1037 0.1220 0.0061 0.0000 0.0366 0.0366 0.0000 0.0061	126 47 0.2063 0.0794 0.0397 0.0000 0.0794 0.0952 0.0000 0.0000 0.0079 0.0556 0.0000 0.0000	96 35 0.2292 0.1354 0.0625 0.0104 0.0313 0.0417 0.0000 0.0000 0.0313 0.0513 0.0513 0.0104 0.0000	39 20 0.2821 0.1530 0.0769 0.0000 0.1026 0.0769 0.0000 0.0000 0.0000 0.0513 0.0513 0.0000 0.0000	30 10 0.3333 0.2000 0.0667 0.0000 0.0333 0.0333 0.0333 0.0000 0.0333 0.0333 0.0000 0.0000	765 338 0.1987 0.1046 0.0471 0.0013 0.0693 0.0667 0.0013 0.0013 0.0301 0.0353 0.0030 0.0039

Number
Smokers
Small opacities - 0/1 plus
Small opacities - 1/0 plus
Small opacities - 1/1 plus
Large opacities - A plus
Pleural thickening - extent right - 1 plus
Pleural thickening - extent left - 1 plus
Diaphragm thickening - right
Diaphragm thickening - left
Costophrenic angle - right
Costophrenic angle - left
Pleural calcification - extent right - 1 plus
Pleural calcification - extent left - 1 plus

