

RHEUMATISM IN INDUSTRY

A study of the prevalence and some social effects of
the rheumatic group diseases in industrial workers
in Scotland.

by

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CHAPTER I

INTRODUCTION AND GENERAL BACKGROUND

HISTORY.

There is evidence that rheumatic diseases as we know them today have been part of the morbidity pattern of man and his primitive ancestors for millions of years. Some rheumatic diseases cause permanent damage to joints and these changes persist in fossilised skeletons and in those of mummified bodies.

(1)
Ruffer in his book entitled 'Studies in Palaeopathology in Egypt' published in 1921 describes heavy deposits of new bone round the heads of both femora in a mummified female corpse of the twenty first dynasty (circa 1000 B.C.). The same author questions the opinion of earlier writers who differentiated between two types of arthritis. In one there was bony outgrowth roughening of the articular surface, while in the other there was eburnation of the opposed ends of bones. Ruffer stated that he personally regarded these two pathological processes as two stages of one disease, but he distinguished spondylitis and described a case (circa 2000 B.C.) in which the spinal column from the fourth cervical vertebra to the coccyx had been converted by disease into a rigid block.

(2)
Boule writing about Fossilmen two years after Ruffer describes an exostosis occurring in a tibia unearthed in Java. The discussion which follows is mainly concerned with the exact period to which the bone belonged and also whether the tibia was from the same skeleton as a nearby skull. From the point of view of the rheumatologist however, the picture

of the specimen gives a fair indication that osteoarthritis secondary to trauma is of reasonable antiquity. Physicians appear to have been involved in considerable controversy over nomenclature throughout the ages.

Hippocrates recognised *ἄρθριτις* and divided it into *χειρῶν* affecting the hands and *ποδαγρῶν* affecting the feet; the latter probably included gout.

The early concept of rheumatism was that it was associated with a discharge and probably it was confused with 'catarrh' of modern terminology. It is customary to attribute the modern concept of rheumatism to Baillou. (3)

In the section devoted to rheumatism in his 'Omnia Opera Medica' he distinguished between rheumatic diseases and catarrh. He claimed that the old concept of rheumatism being caused by an imbalance of the four humours was responsible for some of the existing confusion. He suggested linking rheumatism with arthritis though he distinguished between diseases of joints and those affecting soft tissues. (4) Haygarth divided his clinical history of diseases into two sections. The first was entitled 'Acute Rheumatism' and was concerned mainly with rheumatic fever. In the early part of this section however he discusses the diseases coming under the heading of rheumatism and states: "After separating from it the Sciatica, Lumbago, Tic Douloureux, Nodosity of the Joints and other diseases which some nosologists have placed under this denomination there still remain 470 cases of rheumatism of which 170 had fever". These febrile cases he called acute rheumatism while the 300 afebrile cases were graded under the heading of chronic rheumatism.

MEANING AND SCOPE OF RHEUMATIC DISEASES.

Hirsh writing in 1883 about medical authorities of the middle ages says: "Neuralgia as a specific affection of one or other of the sensory nerves was unknown to them; it was rather with diseased states of joints, bones, or muscles that they associated the painful feelings of neuralgia".

Some modern rheumatologists would agree with their medieval predecessors mentioned by Hirsh that many of the pains ascribed to rheumatism of the soft tissues are referred from the spinal joints. Unfortunately this has not prevented others from confusing the issue still further by adding repeatedly to the list of rheumatic diseases. This tendency to increase the number of names has continued and while it must be admitted that some clear cut syndromes have emerged there are others which merely indicate the site of a pain. Examples such as brachial neuritis, trigeminal neuralgia, pleurodynia, lumbago and sciatica are typical of these; other labels like fibrositis, or polymyalgia do not even indicate the site of the pain. Nevertheless some observers give detailed descriptions of these syndromes and are obviously convinced that they exist as separate entities. Heald⁽⁶⁾ defined 'fibrositis' in 1952 as a localised and clearly defined area of pain with muscular spasm; the symptoms eased following mild exercise only to return after resting. Gordon⁽⁷⁾ described the syndrome of 'polymyalgia rheumatica' in 1960. He maintains that this condition occurs in adults, usually middle aged or elderly, with severe but transient muscular pains, which are relieved by steroids. The 21 cases reported had hypochromic anaemia, an increased erythrocyte sedimentation rate and a raised plasma globulin with a

negative sheep cell test; spontaneous remission is said to occur in 2-4 years. Unfortunately terms such as 'fibrositis' and 'polymyalgis' are used very loosely to indicate vague pain in different parts of the body and the criteria described above are not always observed before such labels are used. The concensus of opinions expressed at the meeting of the British Medical Association in Cardiff in 1953⁽⁸⁾ appear to suggest that fibrositis is a diagnostic scrap heap.

The nomenclature of rheumatic diseases at the present time is not well systemised; a patient with any one of the diseases, syndromes and labels of convenience given in Appendix I could attend a clinic for rheumatic diseases without being out of place. Even this list which has been compiled from the International Classification of Diseases⁽⁹⁾ is not exhaustive, rheumatic fever could also be added together with its cardiac complications; these conditions, however, are commonly accepted as being the responsibility of the cardiologist rather than the rheumatologist.

IMPORTANCE OF RHEUMATIC DISEASES TODAY.

The confusion arising from the nomenclature of the rheumatic diseases was relatively unimportant until the present century since the group as a whole did not command very great attention until recently. The control of the spread of infectious diseases in civilised countries by improved methods of controlling water supplies and disposal of waste matter led to the virtual disappearance of cholera and typhoid. The outbreaks of the latter associated with Zermatt (1963) and Aberdeen (1964) serve as sharp reminders of the price of negligence, but in spite of these salutary experiences enteric diseases are no longer serious problems at least in the countries of Western Europe or North America.

The reduction of mortality and morbidity from the above causes has altered the pattern of disease and focussed attention on what is often termed the non-communicable group of diseases. Improved health has led to an increased expectation of life especially among children and young adults and this in turn has also led to a greater interest in those diseases which increase in prevalence with advancing age. Rheumatic diseases are essentially non-communicable and they constitute an important proportion of the diseases of old age. They are therefore becoming increasingly prominent in the modern medical scene.

During the present century some of the trends which started with the industrial revolution have become more pronounced. Industry has been concentrated to a greater extent into large units where the workers carry out repetitive tasks and where the productivity of one worker can be compared directly with that of his fellows at the same bench. The effect of these changes has been to accentuate the importance of disabilities which may reduce the speed at which work can be carried out.

The days in which the cost of sickness to industry need only be measured in terms of financial payment as compensation have passed. Stern (10) suggests some factors which may result in financial loss through illness or accident. These include losses from:

- 1) other workers attending to the injured person.
- 2) reorganisation of staff.
- 3) reduced productivity from a team on losing one member
- 4) falling production of one part leading to falling production of the whole.

Another factor tending to underline the importance of rheumatic diseases is related to the social revolution which has occurred during the same period. The National Health Insurance Act of 1911⁽¹¹⁾ and the National Insurance Act of 1946⁽¹²⁾ have enabled workers who have paid sufficient contributions to draw insurance benefits as a right rather than having to suffer the indignity of seeking charity when they are absent through illness. The development of state sponsored insurance has been associated with the growth of private insurance schemes and friendly societies. Sickness absence or premature retirement are two factors which result in the payment of benefit to insured workers. It follows therefore that those who are concerned with such methods of insurance, whether statutory or voluntary, keep detailed records of the diseases which lead to such payments. They are also very interested in the causes and the effects of such diseases.

PREVIOUS EPIDEMIOLOGICAL STUDIES OF RHEUMATIC DISEASES.

One of the first workers to make a systematic study of insurance certificates was Kahlmeter⁽¹³⁾ who observed that in Sweden in 1918 nine percent of those who had retired prematurely suffered from articular rheumatism. The numbers were lower for men than for women: 398 out of 4,538 (8.8 percent) and 933 out of 9,069 (10.3 percent). He subsequently reported⁽¹⁴⁾ that the overall rate had increased to 12 percent by 1933 suggesting that the role of these diseases in the morbidity pattern of the future was likely to be one of increasing importance.

In this later work he also observed that the prevalence rates of those with rheumatism were higher in some occupations than in others. Among the figures quoted are: factory workers, 19.2; agricultural workers, 15.6; and

professional and clerical workers 6.1 per hundred of those employed in each occupation.

In Britain the Ministry of Health ⁽¹⁵⁾ stated in 1924 that rheumatic diseases accounted for 15 percent of industrial disability in England and Wales, an annual loss of 3.14 million working weeks and an expenditure of over 1.8 million pounds on sickness benefit; rheumatic fever was included in this total. A further official enquiry carried out by the Department of Health for Scotland and published in 1945 ⁽¹⁶⁾ stressed the relative importance of rheumatism in causing disability. Table I taken from this report shows the number of days of incapacity and the new cases occurring in the year 1937 - 38.

T A B L E I

DAYS OF INCAPACITY AND NEW CASES OF INCAPACITY IN SCOTLAND FOR YEAR
1937 - 1938

<u>Disease Group</u>	<u>Days of incapacity</u>	<u>New cases of incapacity</u>
Rheumatic Group	3,000,000	45,300
Digestive diseases (all forms)	2,400,000	48,500
Tuberculosis	1,700,000	1,900
Heart Disease	1,500,000	4,000
Influenza (non Epidemic Year)	660,000	44,000
Pneumonia	160,000	2,000

Source Report of Medical Advisory Committee Scotland on
(16)
"Chronic Rheumatic Diseases"

T A B L E I

The geographical distribution of new cases of the rheumatic group of diseases showed a higher incidence in the towns and industrial areas and the occupational distribution indicated that the number of men incapacitated each year from these causes showed considerable variation with occupation. Whereas 4.7 percent of miners were incapacitated at some time during the year being studied, the rate for metal workers was 2.6 percent.

The publications mentioned so far based their observations either on insurance certificates, or on the records of hospitals or general practitioners; it follows that the figures only refer to those with fairly severe complaints. The first survey to assess the prevalence of rheumatic diseases by interview which was conducted on a large scale in this country was carried out in Leigh Lancashire, by Kellgren,⁽¹⁷⁾ Lawrence and Aitken-Swan. In this particular study a one in ten sample of the population over the age of 15 years was interviewed giving a total of 1619 males and 1896 females. A screening interview was carried out first by a medico-social worker and it was observed that 16 percent of males and 21 percent of females had symptoms at the time of questioning and that 31 percent of males and 34 percent of females had had symptoms during the previous five years. Those with symptoms were examined by a physician who made the diagnoses shown in Table 11. The high prevalence of pains of undetermined origin particularly in those without current symptoms is striking (11.2 percent of all those interviewed).

T A B L E II

RHEUMATIC COMPLAINTS IN AN URBAN POPULATION

(During the previous 5 years)

DIAGNOSIS	<u>MALES</u>		<u>FEMALES</u>	
	No.	%	No.	%
Osteoarthrosis	99	6.1	178	9.4
Rheumatoid arthritis	28	1.7	81	4.3
Rheumatic fever	4	0.2	18	0.9
Gout	5	0.3	1	
Other arthritides	2		3	
Ankylosing spondylitis	1		1	
Disk prolapse	20)	7.2	7)	3.0
Disk degeneration	97)		50)	
Bursitis and synovitis	22	1.4	19	1.0
Other diagnosable disorders	8		13	
Undetermined	176	10.8	219	11.6
Entirely psychogenic	3		4	
Not seen by physician	43		59	
Total complaints	508	31	653	34
Total questioned (100%)	1,619		1,896	

(17)

Source Kellgren, Lawrence and Aitken-Swan.

T A B L E II

The figures given by Kellgren and his colleagues suggest that the complaint rate is higher in females than in males. This is certainly so as far as rheumatoid arthritis and osteoarthritis are concerned. When however the attendance rates at an industrial surgery for rheumatic complaints were studied in America by Brown and Ling (18) they could find little difference between the sexes.

During the last ten years or so numerous surveys have been made in other parts of the world than Britain and the United States. Kablak (19) found that the prevalence of rheumatic complaints in Denmark was 15 percent at the time of interview and that 32 percent had had symptoms at one time or other. In Holland de Blecourt (20) recorded an overall prevalence of 18 percent having rheumatic complaints (including rheumatic fever) during the previous twelve months. This was based on 3,378 interviews. He observed that the prevalence rates rose to 84 percent for males and 79 percent for females over the age of forty years.

In a follow up examination of the original population after ten years de Blecourt and Boerma (21) found that the disease pattern had changed. Rheumatic fever had disappeared and the prevalence of non articular rheumatism (fibrositis) had fallen while that of articular rheumatism (rheumatoid arthritis and osteoarthritis) had risen. This suggests that some of the cases of so called fibrositis had developed into one of the definitive arthritides during the interval (See Table III) .

T A B L E I I I

CHANGES IN DISEASE PATTERN IN A POPULATION OVER A TEN YEAR PERIOD

D I A G N O S I S	Y E A R O F S U R V E Y	
	1951 %	1961 %
Rheumatic Fever	2.5	-
Rheumatoid Arthritis	4.0	6.6
Osteoarthrosis	47.4	55.4
Fibrositis	46.1	33.0
Those with rheumatic complaints (= 100%)	126	121

(21)

Source de Blecourt and Boerma

T A B L E III
(22)

Nelson and Lancaster obtained 87 percent co-operation in interviewing a one in five hundred sample of dwellings in Sydney. A sample of 3264 people was obtained; 279 males (17.4 percent) out of 1608 and 363 females (21.9 percent) out of 1656 had rheumatic complaints.

Out of 1281 people who were gainfully employed 45 (3.5 percent) had been incapacitated by one of the rheumatic diseases and the average duration of these periods of incapacity was 3.3 weeks. They suggest that rheumatic complaints might affect different occupations in different ways but do not make allowances for age differences in their occupational groups.

A comparison of the diagnostic findings of the Australian study with that of Kellgren and others (17) is given in Table IV.

T A B L E IV

The generally lower prevalences in Sydney may be accounted for to some extent by the fact that Kellgren only interviewed those over 15 years of age. Furthermore the criteria of postivity differed in that the observations by Nelson were only made on those who had been incapacitated. None the less the importance of osteoarthrosis and disk disease stand out in each series as does the number of non articular cases though Kellgren breaks these down in a different way to Nelson. The different sex ratios for disk disease in the two groups is striking. This may be due to differences in criteria or possibly it may be accounted for by the large number of coalminers in the group studied by Kellgren. Another interesting difference between the two studies is that Kellgren made no mention of there being more than one diagnosis per complainant while Nelson had an average of 1.44 diagnoses for every positive responder, a ratio which is

T A B L E I V

COMPARISON OF THE RESULTS OF RHEUMATIC SURVEY.

D I A G N O S I S	M A L E S		F E M A L E S	
	Kellgren %	Nelson %	Kellgren %	Nelson %
Osteoarthrosis	21.4	19.6	30.3	24.1
Rheumatoid Arthritis	6.1	9.1	13.7	17.9
Rheumatic Fever	0.9	5.4	3.1	3.1
Gout	0.4	2.2	0.2	0.7
Ankylosing Spondylitis	1.1	0.9	0.2	0.2
Disc Disease	25.3	10.7	9.7	10.6
Other rheumatic diseases	45.0	52.1	43.1	43.2
Total number with rheumatic disease on which percentages are based	462*	317	590*	414

* 43 males and 59 females who were not examined have been omitted
from these totals

Source Kellgren et Al (17) and Nelson and Lancaster (22)

constant for both sexes. It seems unlikely, particularly in older patients that there would be only one cause for musculo-skeletal pain in every case.

(23)
More recently Rose and Prior reported on 97 patients with rheumatic complaints (49 males and 48 females). Sixtysix of these patients (68 percent) were diagnosed as having non articular rheumatism or arthralgia; there were seven cases of rheumatoid arthritis (7 percent) and thirteen cases of osteo arthrosis (13 percent). These observers made no mention of disk disease so it is difficult to compare them with figures from Lancashire or Australia.

(24)
Tish made a survey of Government Employees in the United States of America who were receiving annuities for disabilities. Between the years 1948 and 1955 he collected information about the cause of disability for 54,462 employees and he found that diseases of the locomotor system accounted for 6880 (13 percent) of these. Unfortunately the term locomotor diseases or, to use his own words 'diseases of the bones, joints and muscles' is too wide to do more than give a general impression of the size of the problem in that country.

The general impression from studying these different reports is that rheumatic diseases have a high prevalence rate in all parts of the world. This is no new concept however; the fact that chronic articular and non articular rheumatism affected all races and occurred in all lands was recognised by Hirsh (5) who based his arguments on the reports of Army and Navy Medical Officers serving in all parts of the world. The British troops, their wives and their children were affected by these

conditions even when they were posted to warm countries. They were recognised also as having occurred in native troops and servants as well.

There seems no reason to doubt that rheumatic diseases affect both coloured and non coloured races. Countries with medical resources stretched beyond manageable limits however have to concentrate their attention on the more dramatic causes of death and gross deformity such as the infectious diseases, and those associated with malnutrition and privation. This tends to give a false impression of the rarity of rheumatic diseases in under developed countries. It seems fair to assume however that the morbidity pattern of such countries is similar to that occurring in more prosperous countries a century ago and that the problems of rheumatic diseases are still below the surface.

STUDIES OF RHEUMATIC COMPLAINTS IN INDUSTRY.

Surveys of the type which give an overall picture of the prevalence of rheumatic complaints are of only limited interest to those who are engaged to preventive medicine in the industrial field. Such observers must look more deeply at the physical demands of those engaged in industrial processes.

Many attempts to relate rheumatic complaints to specific occupational hazards have been made by both clinicians and epidemiologists during the past forty years. The studies of insurance certificates and sickness records in Sweden and Britain (13,14,15,16) have already been mentioned (25) and some differences between occupations were noted. Lawrence and Swan carried the study in Leigh a stage further by comparing the prevalences of rheumatic symptoms for miners and non miners in different age groups. They

TABLE V

RHEUMATIC COMPLAINTS IN MINERS AND OTHERS

AGE IN YEARS	MINERS			NON MINERS		
	NUMBER INTERVIEWED	NUMBER WITH RHEUMATISM (%)		NUMBER INTERVIEWED	NUMBER WITH RHEUMATISM (%)	
15-	99	2	2.0	277	16	5.8
20-	367	47	12.8	538	69	12.8
30-	302	105	34.8	360	93	25.8
40-	429	165	38.5	348	140	40.2
50-	310	124	40.0	217	88	40.6
60+	235	111	47.2	191	81	42.4
Total	1,742	554	31.8	1,931	487	25.2

SOURCE LAWRENCE AND AITKEN-SWAN

(25)

found that there was little difference between the two except in the fourth decade of life when they observed that 35 percent of miners compared with 25 percent of non miners had complaints; these figures are reproduced in Table V. It was suggested that this difference might have been caused by an earlier onset of symptoms in the miners.

T A B L E V

The overall impression gained from these observations was that the prevalence of rheumatic complaints was not affected grossly by occupation. In contrast to this however loss of work because of rheumatism was found to affect the two groups differently. Thus 13.2 percent miners had lost at least one week during the previous 5 years whereas only 7.6 percent of non miners had lost a week or more during the same period. The figures for periods of absence lasting 3 months or more were 5.5 percent for miners and 1.9 percent for non miners.

(26)
A subsequent report by Kellgren and Lawrence indicated that X-Ray examination revealed more marked degenerative changes in the knees and lumbar discs among coal miners of 40 - 50 years than among office workers or other manual workers.

(27)
Miall reporting on a study of 9430 males over the age of 15 found 66 cases of rheumatoid arthritis (0.7 percent) and could find little difference in the prevalence rates between miners and non miners except between the ages of 40 and 44 years, when the former had a significantly higher prevalence.

(28)
In other occupations McGregor compared returns for sickness absence for forestry workers in North Scotland with those working in post office gangs. He found that in those over 50 years of age sickness absence from

rheumatic causes and backache were greater in post office employees than
in forestry workers. Lawrence⁽²⁹⁾ again reporting from Leigh observed
Heberden's nodes⁽³⁰⁾ in 26 out of 69 male cotton operatives aged over 45
years (38 percent) and he contrasts this with twelve percent of controls
of the same age.

Frenkil⁽³¹⁾ in an article reviewing evidence of relationship between
occupation and arthritis accepts that trauma may set the stage for
secondary degenerative changes, but he was unable to find conclusive
evidence that heavy work alone predisposed to rheumatic disease.

Caplan, Freedman and Conelly⁽³²⁾ expressed the view in 1962 that
degenerative changes causing narrowing of the intervertebral discs were
not solely the result of ageing. They found that the degree of spurring
of the edges of the intervertebral bodies was a function of age, while
narrowing of the disc spaces could be related to a history of injury.
They could find no relationship between heavy work without injury and
the development of disc changes. These observations confirmed those
of Bradshaw⁽³³⁾ who was unable to find any evidence to suggest that
occupational stress predisposed to cervical spondylosis. He did
indicate however that neurological symptoms arising from spondylosis
were more liable to occur when there was some occupational stress.

Diveley and his co workers^(34,35) studied 6523 prospective employees
who had low back pain, and subsequently reviewed 3587 employees who had
had this type of pain for three years or more. Of the group with persistent
symptoms there were 83 (2 percent) who were described as having prolapsed
discs and a further 495 (14 percent) in whom the symptoms were unexplained;
1108 (31 percent) had congenital abnormalities and 1897 (53 percent) had either

suffered from lumbosacral or sacro-iliac strain.

There is general acceptance therefore about the importance of back pain as a troublesome complaint, but singularly little agreement about diagnostic criteria or terminology. There is also some ambiguity about the extent to which heavy work may cause certain forms of rheumatic disease, or at least hasten their onset.

RADIOLOGY AS A MEANS OF DIAGNOSIS.

The studies which have been described made use of radiological examinations to try and confirm the diagnoses but they did not seem to help very much. One possible reason is the frequency with which degenerative changes can be observed in the radiographs of normal people. Cobb, Merchant and Robin⁽³⁶⁾ have reported that 70 percent of patients showing radiological changes, which are generally accepted as being associated with osteoarthritis, were in fact symptoms free at the time of examination.

Such misleading findings on radiological examinations raise doubts as to its value. These are accentuated when it is recalled that observers are not always consistent. Even when two workers are collaborating quite closely there is no guarantee that they will concur in their interpretation of radiographs.

One example of limited agreement is to be found in the comparative analysis of the prevalence of rheumatoid arthritis by Cobb and Lawrence, who made the observations/in Lancashire than there is in Pittsburg. They support their argument by the fact that Lawrence, who made the observations in Lancashire is less likely to put a positive interpretation on radiographs than Cobb who made the observations in Pittsburg. Table VI which

T A B L E VI

COMPARISON OF 156 X-RAY READINGS BY TWO OBSERVERS

<u>SEVERITY OF R. A.</u>	<u>COBB</u>	<u>LAWRENCE</u>	<u>AGREEMENT</u>
0	109	129	99
1	35	20	7
2	10	6	3
3	1	0	0
4	<u>1</u>	<u>1</u>	<u>1</u>
TOTAL	156	156	110
	—	—	—

Source Cobb and Lawrence

(37)

is reproduced from their paper certainly confirms this trend.

TABLE VI

From the point of view of the present study however the inescapable conclusion is that there can be differences of opinion over the interpretation of radiographs by collaborators; there was agreement in 70.5 percent of cases. Until clearer criteria are evolved it seems unlikely that radiology with its attendant hazards will prove a satisfactory screening technique for widespread use in studies of rheumatic diseases.

OTHER SOCIAL AND PSYCHOLOGICAL FACTORS.

Apart from the physical effects of occupation there are other factors which might be related to rheumatic complaints. Dahlberg and Grubb⁽³⁸⁾ surveyed 292 cases of polyarthritis and compared them with 296 cases of neurosis. They were unable to find any differences in housing conditions between the two groups. In particular they studied such factors as dampness, temperature, type of heating, sharing bedrooms and overcrowding. It is interesting that these workers should have selected cases of neurosis as controls since other observers have claimed that emotional factors may be related to rheumatic complaints.

Ellman and Shaw⁽³⁹⁾ studied 159 cases of non articular rheumatism and 58 controls they found higher rates of emotional stress, neurotic traits and family history of neurosis or psychosis in the group with rheumatic complaints than in the controls. Kidd and Park⁽⁴⁰⁾ studied inception rates for arthritis and rheumatism and observed that the rates were higher in males than in single females, but were highest of all in married females.

Personal observations by the writer (unpublished) of 3462 patients were made in collaboration with Scott and others in general practice over a period

of one year. These indicated that obesity and emotional instability were related to rheumatic complaints. Forty seven (15 percent) out of 314 patients suffering from rheumatic disease had obesity, this contrasted with 3 percent in the rest of the practice. In the case of emotional instability it was observed that 18 percent of rheumatic patients were affected whereas the percentage of patients with other complaints who also had emotional instability was fourteen.

(41)

Claussen expresses the firm belief that rheumatic traits are inherited and quotes in support the fact that in 14 out of 43 pairs of identical twins both parties had rheumatic disorders while the figures for non identical twins was 2 out of 30.

(42)

Bremner studied 1794 adults in a rural community. She found that 494 out of 1266 (39.0 percent) who had been born in the dale had rheumatic complaints whereas the figures for those who had been born elsewhere and moved in was 246 out of 528 (46.6 percent). This trend could be demonstrated in both males and females and was most noticeable in those who had degenerative osteoarthritis and disc disease. There is however no indication whether this is a genetic or an environmental trait.

SPECIAL PROBLEMS OF RHEUMATOID ARTHRITIS.

Rheumatoid arthritis stands above all other rheumatic diseases in the challenge it presents. Not only is it the most malignant of the arthritides but its aetiology is baffling. Fanning (43) reported on the result of a study of 532 patients with rheumatoid arthritis and controls which had been matched by age, sex and marital status. They were drawn from rheumatic clinics in all parts of Britain in a combined project under the auspices of the Empire Rheumatism Council.*

* Now called: Arthritis and Rheumatism Council.

Some 25 social and psychological factors were investigated but the only aetiological factor of immediate interest to produce a significant result was that of inheritance. People suffering from the disease had more blood relatives who were also afflicted than did the controls.

These findings are not entirely in agreement with those of Miall, Ball and Kellgren⁽⁴⁴⁾ who studied the prevalences of rheumatoid arthritis in an urban and a rural population in Wales. When strict criteria of a positive sheep cell test and radiological changes were used as diagnostic indices then there appeared to be an earlier onset of the disease among town dwellers.

Whatever uncertainty there may be about the importance of social and psychological factors in the aetiology of rheumatoid arthritis there seems little doubt that the effects of the disease are reduced if the social situation of the patient is improved (Duthie and others⁽⁴⁵⁾). Furthermore⁽⁴⁶⁾ Cobb and his co workers found that the prevalence of rheumatoid arthritis⁽⁴⁷⁾ was higher among divorcees than among those remaining married. Moos reviews the observations of these and other workers and suggests that comparative studies between rheumatoid patients and controls indicated that the former are self sacrificing, masochistic, conforming, self conscious, shy, inhibited, perfectionistic and interested in sports and games. Scotch and Geiger⁽⁴⁸⁾ however are much more guarded and draw attention to the confusion arising from inconsistent definitions and lack of comparable material in respect of this disease. Quite apart from commenting on the lack of agreement over interpreting radiographs they point out that there is also lack of agreement between observers on such factors as social class, occupation, economic grading and marital status.

GENERAL REVIEWS

At intervals the American College of Physicians publish a review of British and American Literature on the subject of rheumatism. The latest of these, published in 1960, is the thirteenth rheumatism review by Smyth and others. (49) These writers stress the confusion caused by the present nomenclature but there seems little chance of simplifying this until the aetiology and pathological processes underlying the different members of the rheumatic group are more fully understood. They are reluctant to accept figures obtained by lay interviewers unless they are rigorously checked by medical interviews and examinations. They also emphasise the importance of disc disease and backache as causes of economic stress among industrial workers. They do however underline the lack of consistency in defining disc disease.

Of more immediate interest to those working in Britain are the tables of morbidity statistics published by the General Register Office. (50) These are based on information gathered with the help of the College of General Practitioners from 106 practices in England and Wales with a total population of 382,829. The participating doctors were of necessity volunteers so it can be argued that the patients whom they attended might not be representative of the population as a whole. Nevertheless these tables give a fair idea of the importance of rheumatic complaints in the working population.

Rheumatic diseases (i.e. those listed between 720 and 749 and also 363 in the International Classification of Diseases (9) - see Appendix I) were present in 6.3 percent of males and 7.5 percent of females between 15 and 65 years of age. Furthermore 10.8 percent of males and 11.6 percent of females in this age bracket who consulted their doctor were diagnosed as having one of these complaints.

In a more detailed study of these diseases listed under the heading of Arthritis and Rheumatism - excluding rheumatic fever (720 - 727) the male fraction has been broken down by social class as reproduced in Table VII.

T A B L E VII

The prevalence of rheumatoid arthritis among those consulting family doctors varies only slightly between one social class and another. Osteoarthritis shows similar lack of variation, but the prevalence of those with non articular rheumatic diseases tends to increase as one goes down through the social classes. This trend might be related to the physical demands of occupation but there are numerous other factors such as housing and nutrition which are also related to social class. The other point of note is the ratio of articular rheumatism to the total number is some 10 percent. This figure compares quite closely with that of 11 percent quoted by Kellgren and his colleagues⁽¹⁷⁾ in their survey of Leigh (see Table II). In contrast Kablak⁽¹⁹⁾ observed that the ratios of articular rheumatism to all rheumatic complaints among hospital patients were 40 percent for outpatients and 60 percent for inpatients. This emphasizes the selection of cases which takes place leading to a biased picture being presented to the consultant in rheumatic diseases who confines his observation to hospital patients.

T A B L E VII

PATIENTS CONSULTING GENERAL PRACTITIONERS WITH RHEUMATIC COMPLAINTS

(Rates per 1,000 population)

Int. Class No.	Diagnosis	<u>S O C I A L C L A S S</u>					TOTAL
		I	II	III	IV	V	
722.0	Rheumatoid Arthritis	0.7	1.9	1.7	1.9	1.5	1.7
722.1	Spondylitis	-	0.4	0.3	0.3	-	0.3
723	Osteoarthritis	3.1	6.6	5.5	5.6	5.3	5.6
725	Arthritis (Unspec)	2.4	3.1	3.9	4.5	4.0	3.8
726.0	Lumbago	7.5	9.6	15.4	19.6	19.6	15.2
726.1 726.3	Other Musc. Rheumatism	20.1	23.7	33.3	37.2	35.8	33.2
727	Rheumatism (Unspec)	3.1	2.8	5.1	5.8	7.9	5.0
All Rheumatic Complaints (720-727)*		37.2	47.0	66.3	72.5	72.6	63.4

* The rates for Acute Pyogenic, Non Pyogenic and other specified forms of Arthritis (720,721,724) are not available.

Source General Register Office (1960) (50)
Studies on Medical Population Subjects No. 14 Vol. 11

In his commentary on the figures in the report from the General Register Office, Logan (50) makes allowance for age by recording the Standardised Patient Consulting Ratios (S.P.C.R.) of patients in different social classes and socio economic groups. The S.P.C.R. is calculated from the formula:

$$\frac{\text{Actual Number of Patients Consulting}}{\text{Expected Number of Patients Consulting}} \times 100$$

T A B L E V I I I

The figures for all diseases and for rheumatic diseases (720 - 727) are given in Table VIII. The most significant ratios from the point of view of the present study are those for the manual workers (socio economic groups 9 - 12 inclusive) which are all over 100. The ratios for men in social classes III, IV, and V are also above the mean while that for coal miners (social class IIIA) is 309.



T A B L E VIII

STANDARDISED PATIENT CONSULTING RATIOS

Social Class	S. P. C. R.		Socio Economic Group	S. P. C. R.	
	Rheumatic	All Diseases		Rheumatic	All Diseases
I Professional	58	93	1. Farmers	77	81
II Intermediate	72	96	2. Agric. workers	70	80
III Skilled	107	103	3. Higher Admin. & Prof.	58	93
IV Partly skilled	115	99	4. Other Admin.	71	102
V Unskilled	111	99	5. Shopkeepers	70	95
IIIa Mine workers	309	124	6. Clerical workers	86	99
IIIb Transport	111	101	7. Shop Assts.	85	99
			8. Personal service	83	96
			9. Foreman	120	114
			10. Skilled	114	104
			11. Semi-skilled	148	113
			12. Unskilled	111	99

Source Morbidity Statistics from General Practice Vol. II (50)

CHAPTER II

AIMS AND PRELIMINARY OBSERVATIONS

AIMS AND OBJECTIVES.

The work for this thesis was done as part of a project to study the social and economic effects of rheumatic diseases in the working population.

The aims of the project as a whole were defined by Duthie and
(51)
Anderson and are listed below.

1. To gain a more accurate picture of the prevalence of rheumatism in specific industries that can be derived from statistical records.
2. To investigate the importance of conditions at work which may predispose to or aggravate rheumatic complaints.
3. To estimate the financial implications to both employer and employee.
4. To examine industrial process with a view to advising employers how the incidence of such complaints might be reduced.
5. To designate occupations which could be efficiently performed by workers already partially disabled by rheumatism. Many of these aims can only be fulfilled with the assistance of those with expert knowledge of Sociology, Economics and Ergonomics.

The aims of the present work have been restricted to the findings of a single observer and deal with three specific aspects of the whole project.

1. The prevalence of rheumatic diseases in certain occupations and a comparison of the rates for different occupations.
2. The amount of absence attributed to rheumatic diseases and observations about the patterns of this absence in different occupations.
3. Observation of the working conditions in the occupations studied and links between these conditions with the prevalence of complaints and sickness absences.

PERSONAL OBSERVATIONS OF EXISTING MATERIAL.

Each year the Ministry of Pensions and National Insurance publishes a digest of statistics about absence from work due to illness with a special section devoted to injuries. From this publication for the year 1955-56⁽⁵⁶⁾ it is possible to study the number of days of sickness absence, the average duration of an episode of sickness and the proportion of absence which have been caused by different diseases.

Workers claiming insurance from the Ministry have to declare their occupation, but there is no accurate method of ascertaining the number of workers at risk in a particular occupation. The figures are included in the report on the National Census but these must be used with caution since they are obtained at ten yearly intervals and men classed in one occupation may be working in a different one when they claim sickness benefit.

A second source of inaccuracy is the difficulty of defining rheumatic

disease since the digest adheres to the international classification of diseases. Whereas the list of diseases in Appendix 1 extends through quite a wide range of diagnoses only a few of these can be picked out in the digest as separate entities. Table IX shows the number of days of absence per 100 workers at risk for certain selected occupations. The diseases included under the heading of rheumatism in this table are those grouped in the classification as follows:-

1. Arthritis and Rheumatism excluding rheumatic fever 720 - 727
2. Other locomotor diseases 730 - 749
3. Sciatica 360.

Such diseases as gout, neuralgia, neuritis and vague pains and swellings of the limbs or back are excluded because the information available is not sufficiently detailed.

In this table the number of days lost to industry is based on the insurance claims submitted by workers from the different industries; the denominators have been taken from the Census tables for 1951. (53) Since there may well have been changes in the numbers in some industries during the intervening four years it would have been more accurate to use the means of the totals for 1951 and 1961 as the denominators. Unfortunately permission to use the appropriate figures from the Census of 1961 was refused as they have not been presented to Parliament. In spite of this drawback and pending a reappraisal in the light of future knowledge it seems reasonable to infer that there is quite a wide range of differences in the sickness absence rates and that broadly speaking the heavier occupations have a higher rate than those associated with less arduous physical effort.

TABLE IX
AVERAGE LOSS OF WORK FROM RHEUMATIC DISEASES
 MALES 1955 - 56

OCCUPATION	ORDER NUMBER	DAYS LOST PER 100 WORKERS
Coal miners	III (i)	266
Unskilled Labourers	XXVI	203
Builders and Contractors	XIV	167
Painters and Decorators	XV	139
Transport Workers	XVII	129
Farmers and Foresters	II	117
Metal Workers	VI	86
Clerical Workers	XXIII	81
Commercial and Insurance Workers	XVIII	59
Others		103
All Male Manual Workers		123

Source Appendix II

T A B L E IX

The full list of occupations together with the number of days lost and the rates percent are given in Appendix II, but Table X shows a more detailed breakdown in respect of some members of the group classed as metal workers. Here again there is a wide difference between those at either end of the scale, ranging from an annual loss of 14.3 days per hundred foundry workers down to 8 days per annum for every hundred men working with precious metals. The trend suggested is that claims for sickness benefit increase with the physical demands of the occupation; the exception being the group of inspectors and testers (annual rate 136 days). This may be explained by the tendency to reserve these tasks for older workers with some chronic disability.

T A B L E X

The Ministry of Pensions does not make any allowance for age in compiling these figures. This together with the restriction on the definition of rheumatic diseases and the difficulty in obtaining a reliable denominator makes this material unsatisfactory for anything other than a broad view of the problem of rheumatism in industry.

T A B L E X

AVERAGE LOSS OF WORK FROM RHEUMATIC DISEASES

MALE METAL WORKERS (ORDER VI) 1955-56

OCCUPATION	SUB ORDER NUMBER	DAYS LOST PER 100 WORKERS
Foundry Workers	4	143
Inspectors and Testers	17	136
Platers, Riveters and Shipwrights	8	95
Machine erectors and fitters	10	94
Plumbers	12	80
Electrical Aparatus Workers	16	65
Foremen and overlookers	1	53
Precious Metal Workers	15	8
Others		78
All Metal Workers		86

Source Appendix II

PRELIMINARY OBSERVATIONS AND CONCLUSIONS.

From studying the literature and by making the special analyses of existing material which have been described above it appeared that certain difficulties would have to be resolved in any study seeking to relate occupational factors and rheumatic diseases.

Some preliminary observations were made in order to help with planning the enquiry. The results of some of these have been published and the appropriate references are given. They form a background for the main study and their inclusion here is thought to be justified.

(i) DEFINITION OF RHEUMATISM.

There is a wide range of diseases which are included under the rheumatic umbrella and there is an extensive nomenclature particularly with reference to vague syndromes. Medical opinion is divided as to what diseases are rheumatic and patients are even more uncertain. A pilot study (unpublished) in which sixty assorted workers were observed was preceded by a screening questionnaire asking about the presence of rheumatic complaints (Appendix III). Eighteen of those who completed the questionnaire (30 percent) replied that they had had complaints during the previous twelve months.

When however these workers were interviewed and examined subsequently by the doctor it was found that a further five (i.e. a total of 38 percent) had symptoms which could be ascribed to rheumatic causes.

The only comparable figure available was that of Kellgren and others (17) in their work in Leigh. They reported that 33 percent of adults had had complaints during the previous 5 years; in that survey however the doctor only saw those who had admitted having complaints in a preliminary interview

with a social worker. It was therefore decided that all workers should be interviewed by the doctor and that the preliminary question at such interviews should include the terms arthritis, disc disease, lumbago and sciatica.

(ii) DIAGNOSTIC TECHNIQUE.

The diagnostic pattern in all the surveys of rheumatic diseases which have been discussed in Chapter I have indicated that there is a high proportion of cases with vague aches and pains to which no satisfactory diagnostic label can be attached. The use of such terms as indeterminate pains or pains of undetermined origin is unsatisfactory both to the clinician and to the epidemiologist. The latter particularly tries to find some impersonal method by which he can measure the prevalence of a disease. Unfortunately such methods are not possible as far as the bulk of rheumatic diseases are concerned at the present time. If the title of indeterminate pain is changed into one sounding much more scientific but in fact meaning the same thing little is going to be achieved.

The number of specific rheumatic diseases where diagnostic aids such as seriology or radiology can be helpful is proportionately small. Most cases of rheumatoid arthritis, osteoarthritis, disc disease and other definable diseases can be diagnosed by clinical examination. The doubts cast on the additional help provided by radiological examination (36,37) have already been discussed and did not seem to justify their extensive use.

During the planning of the enquiry a brief visit was paid to Lawrence and his coworkers, and it was observed that it took them two weeks to complete a radiological survey of a hundred men. One method

of increasing the speed of interviewing and examination might have been to use more than one observer. However this is not without drawbacks. Both Lawrence and Aitken-Swan⁽²⁵⁾ and Cobb and others⁽⁵⁴⁾ have expressed views on the problems presented by asking a series of individuals whether or not they have rheumatic symptoms. The first authors state that two observers working closely together can obtain similar prevalence rates to a single observer working on his own. Cobb and his colleagues agreed that an individual observer could be reasonably consistent providing he was careful. They indicate however that variation can be expected between different observers since each is likely to have a slightly different interest.

It seems therefore that there are advantages in using a single observer to make clinical examinations. This makes for greater speed and economy without serious loss of accuracy, and does not expose those taking part in the enquiry to unnecessary radiological hazards, nor to the discomfort of venepuncture.

(iii) MORBIDITY PATTERN.

The pattern of rheumatic diseases seen in hospital wards or at outpatient departments is different from that found among people at work. The latter is likely to contain a higher proportion of people with non-articular rheumatism and consequently there will be fewer people with severe disabilities.

Some of the findings of the part of this survey carried out on coal miners have already been published.⁽⁵⁵⁾ These gave an indication of the importance of disc disease and also of vague pains of the back or neck. Many cases which did not satisfy the criteria of disc disease and which

were labelled as indeterminate pains might well develop these features at a later date. As has been pointed out Kellgren and Lawrence (26) had previously postulated that degenerative disc lesions might be an occupational hazard of coalminers though this view was not entirely supported by the observations of Caplan and others (32) nor those of Bradshaw. (33)

Because of these differences of opinion it was decided to pay special attention to disc disease and vague pains of the neck and back and to make a special assessment of the stresses likely to affect the axial skeleton in each job encountered during the survey.

(iv) AGE.

There is an overall increase of rheumatic complaints with advancing years and there is a possibility that vague pains might change with age into definitive rheumatic diseases.

Studies which have been published about different groups of workers (51,55,56,57) and also that carried out on a group of disabled men who were unemployed (58) gave ample confirmation of the importance of age as a factor influencing the prevalence of symptoms. It was concluded that a method of standardisation would have to be employed when the prevalence of complaints for one occupation was compared with that for other occupations.

(v) OCCUPATION.

It was decided to concentrate on manual workers in social classes III, IV,V, since these had been shown to have Standardised Patient Consultation Ratios above the average. (50) Industries were selected with occupations in which rheumatic complaints might be expected to have repercussions on the worker in the form of sickness absence. There was also a chance that other social effects might be demonstrated in affected workers.

It was accepted that comparisons with other studies could only be made if the different occupations were labelled in the manner indicated by the Register General. (50) On the other hand it was felt that a separate classification based on the physical demands of the different jobs in any given occupation should be used in addition. The label attached to a job does not always give a true reflection of the nature of the work; nor is it necessarily correct to assume that a man with a given occupation will do the same work in two different firms.

(vi) MEMORY.

The likelihood of anyone remembering accurately over a long period of time is small. On the other hand the spontaneous remissions of most rheumatic diseases means that a survey of complaints at a single point in time rather unrealistic. In this connection it is worth recording that Beall and Cobb (59) examined 274 employees who were working as craftsmen. These examinations were made at monthly intervals for six months and the observations were compared with the estimates made by the employees themselves of the number of days on which swelling was present. The fraction of time that swelling was present as estimated by the workers was very slightly lower than the fraction noted by periodic examination for those who had swellings for less than 30 percent of the time. The reverse was the case in the men who had swelling for more than 40 percent of the time.

In an early study of the records of general practitioners (60) Stocks showed that observations based on memory tended to underestimate the length of periods of sickness, and it seemed reasonable to assume that this tendency would increase with the passage of time. Since it

was intended to interview workers throughout the year it was felt that enquiries about symptoms should extend back for one year to try and reduce seasonal errors. On the other hand men whose rheumatic symptoms had last been noticed more than a year before the interview could not be classed as free from symptoms and would have to be treated separately.

(vi) FEMALE WORKERS.

One of the main difficulties about these important members of the industrial community is that they are not obliged to work when they are married. Furthermore a comparison between males and females can only be attempted in those occupations where workers of either sex do the same type of work.

An additional difficulty was revealed at an early stage of the enquiry when the response rate by women could not be raised above 64 percent. Discreet enquiries suggested that the high refusal rate might have been caused by the fact that an early question in the interview was: "How old are you?"

It was decided to make such a comparison in the case of electronic workers. It was felt however that the factors mentioned would be likely to introduce a bias towards health among female workers who do seek employment. Female workers have been excluded from other parts of the study.

CHAPTER III

METHODS USED IN THE SURVEY.

(a) Preliminary Approach

(i) Management.

A study of all industries in Scotland was beyond the scope of one observer. The study was limited therefore to observations on manual workers in industries readily accessible to an observer based in Edinburgh. Co-operation of both the managers and the workers was of paramount importance, so the selection of firms was made from those who were prepared to co-operate rather than being truly random.

Approach was made through industrial medical officers in those firms where they were employed, otherwise a direct request was made to the management. The letter making the initial approach stressed the importance of rheumatic complaints as a cause of sickness absence, it also said that the findings would be confidential; no details of method were given. Except in the case of the first industry a reference was supplied naming one of the factories which had previously been visited so that the manager of the firm being approached could satisfy himself that the enquiry was not likely to result in industrial strife or undue loss of production.

The first two firms which were approached (a paint manufacturer and a rubber works) refused to co-operate, but thereafter there was little difficulty.

The second step was to meet the manager or his deputy. In large

firms the personnel manager was often the one selected for this task.

At this interview the basic requirements for conducting the survey were discussed:

(a) The first requirement was a nominal roll of every manual worker in the factory together with the date of birth and occupation. This seldom presented any difficulty but lists which had been compiled from a central register sometimes had to be broken down subsequently so that those working in different parts of the factory could be dealt with conveniently in one place and at one time.

(b) The second necessity was a reasonably quiet room in which to conduct the interviews. The use of a first aid room or dressing station for this purpose was unsatisfactory. Many workers have a strange dislike of attending such places and there are usually many of the local professional patients in or around them. Furthermore they are often too busy handling minor casualties to allow for a quick turnover of men being interviewed.

The best place for interviews and examinations was the office of the foreman of the department. This had the advantage that few men objected to visiting it; also the over anxious were reassured that there were no needles or complicated machines associated with the visit. Finally the use of such offices brought the doctor into contact with the foreman of the departments who were key figures in maintaining the flow of men. In a few cases the office which was allocated was found to be inadequate for the purpose of a full examination. In these circumstances and when such examinations were indicated the worker was invited to attend for such a special examination in more suitable surroundings, at a time convenient to the worker; such arrangements were seldom necessary. The majority of men whom it was necessary to examine subsequently by a special appointment

had fairly marked symptoms and there was never any difficulty in persuading such people to agree to co-operate.

(c) The third requirement for success was permission to interview during working hours. The main problem from the point of view of a management interested in production was that of allowing each worker who had been selected to have ten minutes absence from the bench in order to attend the interview. This time in itself did not present too much of a stumbling block, but there was often a fear that the man once freed from his work bench would get lost in some way and might be absent for half an hour or more. Also, though the interviews lasted an average of ten minutes, some would take longer than others, and workers might have to wait for a time before being interviewed. It was possible to give some reassurances on these points particularly if the room being used for interviewing was also the foreman's office. Under these circumstances the man never left the immediate area of his place of work and he remained under the control of his foreman.

(ii) Foremen

One or more meetings was held with those who were involved in supervising those who were to be interviewed (foremen, deputies Etc.). These foremen received a full explanation of the objectives and were given ample opportunity to ask questions. Such meetings either in groups or singly usually ended with a few individuals describing their own rheumatic symptoms and ventilating their views on the likely causes and cures. Interest had to be aroused, however, since it was often these men who were giving up their offices to accommodate the interviewers. Whenever possible it was arranged that the foreman would send the men to the doctor at ten

minute intervals on the appointed days; this meant that if a man was on some vital work he could be omitted temporarily.

(iii) Unions

The plans for the whole survey were presented to the committee of the Scottish Trades Union Congress and discussed at length. Thereafter the committee was notified of each industry which was approached. The area secretary of the unions concerned in an industry was also contacted after the management had agreed to take part. The area secretary was asked to warn members in the factory that the work was going to take place.

After the meetings with the foreman or deputies the objectives of the survey were explained to the shop stewards. All these were subsequently interviewed. When the name of a particular shop steward was not included in the sample then his form was destroyed. This had the advantage that all the stewards were aware of the questions which were asked, and they could satisfy themselves about the reasons why they were asked. This meant that they would be in a stronger position to persuade the men to come if they were unwilling to do so in the first place. It is a fact, however, that not all workers either like or respect their union representatives, and it was found by experience that it was worthwhile putting the names of certain men in the sample at the head of the list to be interviewed. These men were selected after discussion with the foreman on the basis that they were popular and likely to influence their fellows.

(b) Selection of Sample.

While these preliminary approaches to Foreman and Union representatives

were being made a nominal roll of all workers in the branch of industry under study was being compiled. When the number in any firm was less than 100 all the employees were included in the sample. In the larger firms the employees were grouped into occupation and samples of not less than 75 were picked by taking names at regular intervals from the alphabetical lists of the men in each occupation. The starting point on the list was selected from a list of random numbers.

The only remaining problem was that of persuading the men who had been selected in this way to "volunteer" for interview since the voluntary nature of the enquiry was always stressed in the conditions laid down by both Managements and Unions. The preliminary talks and the seeding of selected men from the samples for early interviews were only partly successful.

In only one workshop did the above methods prove sufficient to produce a 90 percent response in the first instance, since men were often absent through illness, or engaged temporarily on work elsewhere. A repeat visit after an interval of some two weeks usually resulted in such men being seen. When necessary however, a personal introduction was obtained. The foreman was asked to introduce the doctor to the reluctant "volunteer" at the bench. An attempt was then made to persuade these workers to change their minds. Few were able to resist this direct approach though some persistently refused to speak when they were accosted; one retired hastily to the toilet and locked himself inside every time the doctor approached his bench. Men who were absent for prolonged periods from illness or injury presented special problems. Since it seemed possible that many of these absences might be due to the effects of rheumatic disease it was important to contact the men concerned.

All the firms included in the survey required some medical certificate to be submitted if absence was prolonged so the names of the doctors in charge of these people were available.

Permission was sought from the practitioner in charge of the case to visit his patient at home (or in hospital) and the interview (and examination if necessary) was conducted there.

Fifteen sick people could not be contacted since they were staying with relatives a long way away. The medical certificates submitted by these men were studied and none of the diagnoses were among those listed in Appendix I.

In those industries which had industrial medical officers (Coalmine, Electronics Factory and Dockyard...) the records of previous visits to the surgery were available. A study of the records for those men who were not available or who refused to co-operate indicated that few of them had ever consulted the industrial medical officer. The numbers were small and some dates of birth were unknown, but the impression is that these men tended to be older than the average ages of the groups to which they belonged. The personal manager (or the industrial medical officer when there was one) was asked about each man that the interviewers failed to see. In no case were these 'defaulters' known to have severe rheumatic disease, though some were known to have "aches and pains from time to time". A check of the hospital records at the Rheumatic Unit of the Northern General Hospital indicated that none of the defaulters had attended that department as a new patient during the previous three years.

(c) Interview.

All the workers in the sample were interviewed personally by a single observer and each was allocated a code number to indicate his place of

work and his individual number on the nominal roll. Details were obtained about his medical and social history and in particular whether or not he had rheumatic symptoms or complaints or whether he had ever had these.

Rheumatism was defined as persistent or recurring musculo-skeletal pain without immediate traumatic cause. Men with complaints were divided into those who had symptoms at the time of the interview, those who had had such symptoms during the past twelve months, and those who had had no symptoms during the past year. Men in the first two groups were classed as 'positives' while those in the third were called 'intermediates'. Those who denied having had symptoms at any time were labelled 'negatives'.

Each man with current or past rheumatic complaints was asked about absences due to these complaints and he was also asked if he had had medical or hospital treatment for them. All workers in the sample were asked about absence from work on account of injury or illhealth other than rheumatism. Information was obtained about their present occupation; a record was also made of the past work record, and in particular changes caused by ill health. Finally questions were asked about home conditions and arrangements for coping financially with ill health.

(d) Clinical Examination.

Positives and intermediates were given a simple clinical examination by the same single observer; this was done in order to localise the site, to try to determine the cause of the pain, and to assess the presence of absence or arthritic changes. At the same time an estimate was made of the local and general functional limitations resulting from the symptoms.

The diagnosis was made without recourse to haematological or radiological investigations and the following diagnostic groups were recognised:-

1. Rheumatoid Arthritis:

The presence of three of the six clinical criteria recommended (61) by Ropes and his colleagues and accepted by the American Rheumatism Association. These criteria are quoted in Appendix IV.

2. Osteoarthrosis:

Clinical evidence of degenerative changes affecting the joints of the limbs. If nodes were present over the distal inter phalangeal joints and if there were several joints affected without predisposing injury or deformity, a subgroup of General Osteoarthrosis (G.O.A.) was recognised. These nodes were the subject of a few speculative paragraphs (30) by Heberden and now carry his name. The syndrome was described in (62) detail by Kellgren and Moore in 1952. It is possible that the liability to develop nodes at the distal inter phalangeal joints is inherited as a dominant gene by females and as a recessive gene by males as suggested (63) by Stercher in 1955 but no adequate confirmation can be found. Those without generalised changes were described as Local Osteoarthrosis (L.O.A.).

3. Disk Disease:

Pain in the back or neck which was either recurrent or of prolonged duration (six weeks +) and which could be accurately localised. There also had to be a history of pain radiating along the distribution of a spinal root at some time though not necessarily with every attack. No distinction was made between herniation of the nucleus pulposus and degenerative disk disease.

4. Chronic Tenosynovitis:

History of continuous or intermittent pain on movement of a tendon within its sheath or on pressure over the sheath for at least six weeks.

5. Chronic Bursitis:

Chronic painful swelling of a bursa, or a history of continuous or recurrent swelling for at least six weeks.

6. Gout:

History of excruciating pain of a joint of sudden onset together with history of beneficial treatment with uricosuric drugs.

7. Ankylosing Spondylitis and Collagen diseases only diagnosed if the patient had been diagnosed as such in hospital.

8. Indeterminate Rheumatic Pain:

Musculo skeletal pain not falling into one of the above categories and which had not been diagnosed as one of the other rheumatic conditions.

(e) Job Analysis.

A wide range of occupations was encountered during the study. For some of the observations workers have been grouped according to the name of the occupation. This method was not entirely satisfactory since it takes little account of the differences in working conditions which have to be endured between men doing the same trade but in different parts of the same workshop, or in different workshops. Furthermore it is not possible to distinguish from the title of an occupation between those who work under cover and those who work in the open air. Similarly there is no differentiation between those who work in a sitting position, those who are usually standing at benches, or those who have awkward postures to adopt in connection with their jobs.

In order to take such factors into account each man was asked for his exact occupation and place of work at the time of interview. The man himself was asked to give his own opinion of his job and to describe it as heavy or light and also to state his views on the temperature and dampness of his place of work. These points were recorded and his place of work was visited subsequently.

The area where each man worked was observed and the type of work being carried out was inspected in company with the foreman of the group. In many cases the differences between the work being done by two men nominally in the same employment were imperceptible. On other occasions they were considerable and in order to make allowance for these differences a grading was recorded for each of six variables concerned with particular aspects of the job.

The first four of these variables related to the muscular effort involved by the back, arms, hands, and legs of the worker and the last two related to the posture that was adopted at work and to the climatic conditions of the place of work.

The abbreviation 'BAHLPS' (being the initial letters of the words Back, Arms, Hands, Legs, Posture and Site) has been used to describe this form of classification. In application it is similar to that used in medical examination of service personnel. ⁽⁶⁴⁾ In the latter case the systems is known by the title: PULHEEMS (standing for Physique, Upper Limb, Lower Limb, Hearing, Eye-right, Eye-left, Mental capacity and emotional Stability). This assessment is applied to a man while the BAHLPS assessment is applied to a job. Both methods however are concerned with allocating a numerical grading to each of several variables.



T A B L E X I

OUTLINE OF JOB ANALYSIS - DETAILS IN APPENDIX V

GRADE	BACK ARMS HANDS LEGS	GRADE	POSTURE	GRADE	SITE	HOLLERITH CODING
I	Use not essential for job	I	All sitting	Ia	Indoor "office"	1
II	Use essential but no effort required	IIa	Some standing S T A T I C	Ib	"Office" with some outdoors	2
IIIa	Slight effort required not sustained	IIb	Some standing M O B I L E	IIa	Indoor-workshop Temperate	3
IIIb	Slight effort required sustained for long periods	IIIa	Mainly standing S T A T I C	IIb	Temperate workshop with some outdoors	4
IVa	Moderate effort required not sustained	IIIb	Mainly standing M O B I L E	III a	Indoor workshop Intemperate	5
IVb	Moderate effort required sustained for long periods	IVa	All standing S T A T I C	IIb	Intemperate workshop with some outdoors	6
Va	Maximum effort required not sustained	IVb	All standing M O B I L E	IV	Mainly outdoors	7
Vb	Maximum effort required sustained for long periods	V	Walking long distances	V	Outdoors all weathers	8

T A B L E X I

In the case of each of the six factors which are assessed in the BAHIPS system of job analysis only one grade is recorded. As far as the first four factors are concerned jobs with little muscular effort are given low classifications while the heavier jobs are allocated a high number. Increasing numbers are also applied to an increasing amount of standing and walking in the assessment of posture, while a reduction in warmth and comfort correspond with higher numbers when the site of the job is being considered.

In general a higher number takes precedence over a lower if the job consists of doing two or more different procedures. This scheme is laid out diagrammatically in Table XI and detailed definitions of the different grades under each heading are given in Appendix V.

The estimate of the effort required by each part of the body in carrying out any particular job was made without the use of instruments. Nevertheless some uniformity was possible since all the observations were carried out by one person and the assessment was made after close study and discussion with the foreman concerned.

(f) Processing Information.

All the information obtained at interview, on examination and when the job was assessed was recorded on a questionnaire where the answers were mostly precoded; the layout of this questionnaire is given in Appendix VI. The form in which the main and subsidiary questions were phrased is also given in this appendix together with notes on the methods of coding when these are not obvious.

The order in which the questions occur is that which was used

during the interviews and which was found to be the easiest one during trial interviews in pilot studies. Some of the earlier questions were answered before the interview by the personnel manager. The space for inserting the job analysis (BAHLPS) was placed on the front page of the questionnaire in order to make it easily available for subsequent completion when the place of work had been inspected. It was also noticed during pilot studies that much of the information about relatives and home conditions was obtained more easily either during or after the clinical examination.

Certain information in the latter part of the questionnaire dealing with social factors in greater depth was obtained by a medico-social worker who saw selected men after the medical interview and examination. These questions have been omitted from the questionnaire in Appendix VI.

Technical assistance was available to transfer the information contained on the questionnaires to Hollerith punch cards. Subsequently help was also obtained in order to prepare tabulations from these cards, but not for handling the results which were made available in this way.

CHAPTER IV

GENERAL RESULTS.

A total of 2823 men were selected for interview. They were drawn from seven different sources. The seventh and largest (a dockyard) was divided into six separate departments each with its own manager and administrative organization. The sample sizes and response rate for the six smaller concerns and for the six departments of the dockyard are given in Table XII where it will be seen that there was a response rate of at least 90 percent in each industry and an overall response rate of 95 percent. A total of 2684 men were interviewed over a period of two years starting in February 1961.

There were 1399 men who had had symptoms at some time during their working lives. Three of these, all in the dockyard, said they had had symptoms but refused examination. These men had not been absent from work because of rheumatic pains and reference to their medical records in the central surgery of the dockyard revealed that no contact had been made with the medical staff of the yard for any rheumatic condition. One possible explanation for their refusal could be that they were under treatment from their own doctor for some disease about which they did not want the admiralty to know. None of the three was established as a pensionable worker at the dockyard, but all had been there long enough to be under consideration for this. In the sections of this thesis where examination findings are under consideration these three men have been omitted. They have, however, been included in those sections related to clinical and social histories, and also those relating to job analysis.

T A B L E X I I

NUMBERS IN SAMPLES OF EACH OCCUPATION IN SURVEY AND
RESPONSE RATES.

<u>OCCUPATION</u>	<u>NUMBER IN SAMPLE</u>	<u>NUMBER INTERVIEWED</u>	<u>SUCCESS RATE %</u>
Hardware Store	56	54	96.4
Printing Works	62	56	90.3
Foundries	112	101	90.2
Breweries	456	437	95.8
Coal Mine	424	402	94.8
Electronics Factory	223	212	95.1
Dockyard - Construction	558	533	95.5
- Engineering	312	298	95.5
- Electrical	167	159	95.2
- Harbour Craft	186	177	95.2
- Stores	185	176	95.1
- Maintenance	82	79	96.3
	—	—	—
	28203	2684	95.2
	—	—	—

T A B L E X I I

EFFECTS OF AGE ON RHEUMATIC COMPLAINTS

There were 397 men in the sample who had symptoms arising from rheumatic complaints at the time of interview, and a further 676 had had such symptoms during the course of the previous 12 months. Thus there were 1073 positives as defined in Chapter III. There were a further 309 men who had had complaints at some time during their working lives but who had been symptom free during the previous twelve months. To these were added 17 men who initially denied that they had rheumatism but who were found during the course of the interview to have had symptoms of a rheumatic disease. These two groups of men have been classed together as intermediates giving a total of 326 under this heading. The remaining 1285 men had never had rheumatic complaints at any time during their lives and were therefore classed as negatives. Of these negatives there were 3 men who stated initially that they had had symptoms of rheumatism but on examination two were found to have varicose veins with no evidence of concurrent rheumatic disease. The third gave a classical history of angina of effort; the 'rheumatism' only came on when he climbed the stairs to his flat and the pain was confined to the medial border of the left arm. It seemed justifiable to grade these false positives along with the negatives. Table XIII shows the prevalence rates of the three categories in five age groups.

T A B L E X I I I

From this table it can be seen that the prevalence of positives increases with age up to 54 years but thereafter the gradient flattens out. The proportion of intermediates continues to increase above the age of 55 years, however, with the result that the combined rates for positives and

TABLE XIII

PREVALENCE OF SYMPTOMS

(RATES PERCENT IN EACH AGE GROUP)

	<u>AGE IN YEARS</u>					
	15-	25-	35-	45-	55+	
Positives	14.5	33.7	45.3	51.1	51.1	40.0
Intermediates	3.4	8.3	12.0	14.9	20.3	12.1
Negatives	82.1	58.0	42.6	34.0	28.5	47.9
Total Interviewed on which percentages are based	504	481	523	605	571	2684

SOURCE APPENDIX VIIa

intermediates increase steadily with age. This is reflected in the steady decrease in the rates for negatives, thus whereas 82 percent of the samples under the age of 25 had always been symptoms free, only 28 percent of those over the age of 55 years were in this fortunate position. Furthermore 51 percent of men over the age of 45 had had symptoms of rheumatic disease at some time during the previous year.

The decades in which symptoms were said to have started are shown in Table XIV. In each decade of life during which symptoms might have started the numbers decreased with advancing age. In other words older men tended to forget the exact length of time for which they had had symptoms. This is in keeping with the opinion expressed by Beall and Cobb ⁽⁵⁹⁾ that memory tends to be foreshortened in the case of a chronic disease with intermittent symptoms.

T A B L E X I V

The diagnoses which were made at the time of examination are shown in Table XV which gives the prevalence rates percent in each age group. Rheumatoid Arthritis though a serious disease was relatively uncommon. The overall prevalence of 1 percent is less than that recorded by Lawrence ⁽⁶⁵⁾ who has suggested a prevalence of 2 percent for males using the criteria of the American Rheumatism Association for 'definite' and 'probable' cases. It must be remembered however that his sample included men who were housebound through permanent disability and who were unable to go to work. The decline in the prevalence rates of rheumatoid arthritis over the age of 55 is interesting but the figure is not significantly different from the rate for the previous age group (the standard error of the difference between the two rates being 0.6). It is possible however that the reduced rate may be accounted for by compulsory retirement of older men with this disease.

T A B L E X I V

AGE OF ONSET OF SYMPTOMS

Decade in which symptoms started	15-	25-	35-	45-	55-	All 55+
0-	1	1	0	0	0	2
10-	56	34	15	23	14	142
20-	32	131	90	43	28	324
30-		33	152	116	75	376
40-			39	171	99	309
50-				39	148	187
60-					30	30
UNKNOWN	1	3	4	7	14	29
NEGATIVES	44	279	223	206	163	1285
TOTAL INTERVIEWED	540	481	523	605	571	2684

Source Cols 6 7 x 21

TABLE XV

DIAGNOSIS

(RATES PERCENT IN EACH AGE GROUP)

	AGE IN YEARS					
	15-	25-	35-	45-	55-	All 55+
Rheumatoid Arthritis	0.0	0.4	1.1	2.3	1.6	1.2
Osteoarthrosis	1.0	2.5	5.2	9.9	20.8	8.3
Disc Disease	2.2	7.9	12.8	17.0	18.9	12.2
Indeterminate Pain of Back & Neck	9.1	17.9	22.0	20.2	19.1	17.8
Indeterminate Pain of Limbs	4.8	10.6	13.8	14.9	10.2	11.0
Other Rheumatic Diseases	0.8	3.5	3.4	4.5	4.0	3.3
Unknown	0.0	0.0	0.2	0.2	0.2	0.1
Negatives	82.1	58.0	42.6	34.0	28.5	47.9
Total with symptoms on which percentages are based	504	481	523	605	571	2684

Source Appendix VII (b)

T A B L E X V

The prevalence rate for osteoarthritis shows a steady increase with advancing years while the rates for disc disease also increase with age though less markedly above 55 years. These definitive diagnoses must be considered in conjunction with the rates for indeterminate pains affecting the trunk and limbs, both these tend to decrease in importance with advancing years and it seems probably that the vague ill defined pains of men in their thirties may become diagnosable as disc disease, osteoarthritis or possibly rheumatoid arthritis in later life. It will be seen from the table that pains of the back and neck have their maximum prevalence rate (22 percent) between the ages of 35 and 44 years. Above the age of 45 the combined prevalence of disc disease and vague pains of the back and neck are fairly constant being 37.2 and 38.8 percent respectively for the two oldest age groups. The other rheumatic diseases to which diagnostic labels could be attached were made up almost entirely of chronic inflammatory conditions affecting tendon sheaths and bursae; there were however three cases of gout, two of ankylosing spondylitis and one each of psoriatic arthritis and scleroderma, which were included under this heading.

There were 44 men (1.6 percent of those interviewed) who were suffering from more than one rheumatic disease. Of these three had got three different complaints arising from osteoarthritis, chronic bursitis and disc disease.

SEVERITY OF RHEUMATIC DISEASE

When each man was examined an estimate was made of the severity of his disability. This was done by using a five point scale and allocating one of these gradings to all those who had symptoms. Table XVI shows the result of this grading and indicates that the severe forms of handicap are to be found more frequently in older men. This may be due partly to increasing severity

T A B L E X V I

SEVERITY OF DISABILITY

(RATES PERCENT OF THOSE WITH RHEUMATISM)

	15-	25-	35-	45-	55+	All 15 +
No physical signs	71.1	63.7	60.7	51.8	44.2	54.4
Minimal signs no disability	18.9	22.4	23.7	26.6	26.0	24.7
Slight impairment	6.7	8.5	11.0	15.1	16.5	13.1
Moderate impairment	3.3	5.5	4.7	5.8	11.3	6.9
Severe impairment	0	0	0	0.8	2.0	0.8
Total with complaints on which percentages are based	90	201	300	398	407	1396

SOURCE APPENDIX VII (c)

of the complaint with advancing years but could also mean that older men with severe disabilities may be kept on in their jobs more readily than younger men with similar troubles. These latter may be driven out of the heavier occupations which were being studied in this survey since they have not been with the firm long enough to merit sympathetic consideration by the management.

T A B L E X V I

There were 760 men (23 percent of the whole sample and 54 percent of those with symptoms) who had such minimal signs that no disability could be detected by the examiner. A further 345 (25 percent of those with symptoms) who had detectable signs which were not reckoned to cause any disability. The remaining 291 (21 percent of those with symptoms) were divided between the three lower grades. The majority of those in these lower grades (i.e. 207 or 71 percent) were over the age of 45 years, and the diagnoses associated with these men with some degree of functional impairment are as shown in Table XVII.

T A B L E X V I I

Since 44 men had more than one complaint and three of these had three separate rheumatic diseases the number of complaints exceeds the number of men by 47. The striking thing about the table however is that 747 (97 percent) out of a total of 773 cases of indeterminate pain had no significant impairment whereas the equivalent rates for men with definitive types of rheumatic diseases ranged from 42 percent for those with rheumatoid arthritis up to 64 percent for men with diseases such as chronic tenosynovitis and bursitis. The arthritides were deemed to cause more impairment than

T A B L E X V I I

RHEUMATIC COMPLAINTS AND FUNCTIONAL IMPAIRMENT (RATES PERCENT)

DEGREE OF IMPAIRMENT	R. A.	LOA	COA	DISKS	INDETERMINATE PAIN	OTHER RHEUMATIC DISEASES	TOTAL NUMBER OF COMPLAINTS
Nil	41.9	54.3	50.8	58.1	96.6	54.0	78.0
Slight	32.3	28.0	27.2	25.1	2.7	29.2	13.9
Moderate	22.6	15.2	22.0	15.3	0.5	5.6	7.2
Severe	3.2	2.4	0.0	1.5	0.1	1.1	0.8
Total number with rheumatic disease (on which percentages are based)	31	164	59	327	773	89	1443

SOURCE APPENDIX VII (d)

were disk disorders; this was probably because in many cases the latter tend to clear up between attacks leaving little or no discernable disability.

Apart from the grading which was made at the time of the examination there were other ways in which rheumatic diseases were assessed for the severity of their effects. Each man was asked about certain aspects of medical care which he had received. These were divided into those which had occurred during the previous twelve months and those which had occurred at any time. Table XVIII shows the rates in each age group for certain medical events during the previous twelve months expressed as percentages of the numbers with symptoms during that period (i.e. positives).

T A B L E XVIII

As far as self treatment is concerned the rate increases with age from 13.7 percent for those between 15 and 24 years up to 46.6 percent for those over 55 years of age. The rate of increase falls away after the age of 35 years.

The rate for those consulting general practitioners shows slight but irregular variation between the different age groups. The rate for men aged from 35 to 44 years is lowest of all; only 71 men of this age out of 237 (30 percent) consulted their doctors during the previous year. This rate is significantly lower than that for all the other age groups together ($X = 5.03$ $p < 0.025$) though it is not significantly lower than any other group considered separately. Men aged between 25 and 34 years have one of the highest consultation rates.

T A B L E XVIII

MEDICAL CARE IN THE PAST YEAR BECAUSE OF RHEUMATISM

(RATES PER 100 POSITIVES)

MEDICAL CARE	A G E I N Y E A R S					
	15-	25-	35-	45-	55+	All 15+
Self treatment	13.7	30.2	40.9	46.0	46.6	40.4
Consulted G.P.	32.9	38.3	30.0	36.6	41.1	36.3
Absent from work	19.2	17.9	14.3	16.2	17.5	16.6
Weeks per 100 men	65.8	82.7	68.4	87.4	105.5	85.9
Total Positives (100%)	73	162	237	309	292	1073

SOURCE APPENDIX VII (e)

The proportion of men with rheumatic complaints who had to stay off work during the previous year is also lowest for those aged between 35 and 44 though the difference from the rate for those of other ages is not statistically significant. It seems likely however that the highest rate of absence and the high rate of consultation with a general practitioner are connected since it is necessary for men who stay off work to consult their doctors if only to obtain a certificate of incapacity for insurance purposes.

Finally in considering the average number of weeks lost by affected men during the previous year the table shows that those between 35 and 44 have a rate of 69 weeks absence for every hundred men with symptoms. This is below the average for all the positives (86 weeks absence per 100 men) and is much less than the absence experienced by those of the younger age group, 25 - 34 years.

Thus there is a reversal in trend for the rates of sickness absence and doctor usage between men aged 25 to 34 and those in the age group above. This reversal could have been brought about by the younger men having to leave the industries included in the survey, or alternatively the social demands of middle age may become so great that the older men cannot afford to stay off work.

This relatively high rate of absence because of rheumatic complaints among the men in such a young age group could possibly lead those who are having so much trouble to retire from heavy work and seek lighter work elsewhere. As has been mentioned younger men do not always merit as much consideration as their elder colleagues when it comes to placement in a light job

OTHER CAUSES OF ABSENCE.

It is not always possible to be certain that all the periods of absence which are ascribed to one group of illnesses are in fact caused by one of the diseases in that group. Either the doctor or patient may be influenced consciously or unconsciously by the knowledge that the sick person is known to be subject to rheumatic disease. Aches and pains, which in a normal individual might be accepted as part of a febrile illness, will be more likely to be designated 'rheumatic' and this would tend to give an exaggerated picture of sickness absence from this cause.

It is not possible to make an exact estimate of the extent to which this type of substitution occurred but some indication of it can be obtained by comparing the absence from causes other than rheumatism in the group of men with current rheumatic symptoms (positives) and those who stated that they had never had such symptoms (negatives). This has been done in Table XIX where the total sickness absence from other causes is shown for each of five age groups of both positives and negatives.

T A B L E X I X

In the youngest age group (15-24 years) the positives have a greater amount of absence from causes other than rheumatism. Indeed the average rate of absence for men in this group is higher than that for any age group of either the positives or the negatives below the age of 45 years. Much of the sickness absence in those under 25 and certainly most of the prolonged spells are likely to be due to injuries, though details of the exact causes are not known. Some of these injuries may themselves have led to residual rheumatic pain, but it is also possible that some young men with a tendency to chronic rheumatic disease may be more prone to

T A B L E X I X

WEEKS ABSENCE FROM CAUSES OTHER THAN RHEUMATISM

(RATES PER 100 MEN)

	15-	25-	35-	45-	55-	All 55+
Positives	177	160	159	199	225	190
Negatives	131	165	161	208	236	169

SOURCE APPENDIX VII (f)

sickness in general; these are likely to be the ones who have to give up the heavier forms of employment.

The negatives have a higher rate of absence for reasons other than rheumatic disease than do the positives at all ages over 25 years; this is particularly marked in the oldest workers (aged 55+). It would appear therefore that there is a certain amount of substitution taking place and that there is a tendency for this to increase with age, possibly as the rheumatic label becomes more firmly associated with the patient. At no point, however, is the total amount of absence from rheumatic and other diseases lower in the positives than it is in the negatives. It follows therefore that sickness from causes labelled as rheumatic constitutes a burden of morbidity over and above that born by those who are free from rheumatism.

OTHER MEDICAL CARE

Another way in which the effects of rheumatic diseases were assessed was by studying the responses to enquiries about prolonged sickness absence and also hospital referral or admission. Since these were likely to be remembered with greater accuracy than ^{short} absences from work or visits to the doctor, the enquiry was extended throughout the period of working history. Table XX shows the rates in the same five age groups for each of these events in the medical histories of all those who had had rheumatic symptoms at any time (positives and intermediates).

T A B L E XX

The rate of referral to hospital is somewhat high for men aged 25 - 34 years (23 percent). The difference between this rate and that for the next higher age group (22 percent) is very slight and not significant by statistical testing. It is possible however that this finding may be an additional

T A B L E X X
MEDICAL CARE SINCE STARTING WORK
(RATES PER CENT)

Medical Care Since Starting Work	AGE IN YEARS					
	15-	25-	35-	45-	55+	All 15+
Hospital Referral	17.8	22.8	21.7	32.6	27.0	26.2
Hospital Admission	2.2	5.4	6.7	7.3	4.9	5.9
Absence from work 3/52 +	10.0	19.8	19.3	25.3	26.7	22.7
Total with symptoms (100%)	90	202	300	399	408	1399

SOURCE APPENDIX VII (g)

reflection of severe incapacity in these comparatively young men. Subsequently such men may be obliged to change their jobs; this would result in a fall in the rate of referral to hospital in those aged 35 to 44 who remain in the industry. Also of interest in the proportions of those referred to hospital is the rate of referral in the oldest age group (27 percent) which is lower than that for those between 45 and 55 (33 percent). Since the questions relating to referral or admission to hospital were not restricted in time it can only be assumed that either the older men forgot that they had been to hospital or that a number of them were no longer working in the industries selected for this study.

The relatively small percentage of men aged over 55 who had been admitted to hospital is also shown in Table XX. Only 20 (5 percent) of the 408 affected men in this age group admitted having been in hospital, whereas the rate for 699 men aged between 35 and 55 was 7 percent, and even those aged between 25 and 34 had a slightly lower rate. The difference between these rates is not however significant on statistical testing but the change away from the trend in the oldest group is quite clear.

The rates for prolonged periods of absence (i.e. three weeks or more) show a steady increase with age. It seems unlikely that the older men who appear to remember these prolonged spells of absence would forget an admission to hospital; this may therefore be taken as slight supporting evidence for the theory that some of those whose rheumatic diseases led to admission to hospital were unable to continue to work after the age of 55 years in those occupations which were included in this study.

MEDICAL CARE FOR DIFFERENT DISEASES

Differences in the pattern of medical action can also be observed for

T A B L E X X I

MEDICAL CARE IN PAST YEAR

(RATES PER 100 POSITIVES IN EACH DIAGNOSTIC GROUP)

Medical Care	Rheumatoid Arthritis	Osteo- arthrosis		Disk Disease	Indeterminate Back	Pains Limbs	Other Diagnoses
		General	Local				
Self treatment	28.6	43.2	4.03	55.7	33.4	31.6	38.9
Consultation with G.P.	42.9	38.6	38.9	50.0	33.4	18.6	37.5
Weeks absence	325.0	43.2	105.4	166.8	42.0	14.4	80.6
Number with symptoms in past year (100%)	28	44	149	280	326	215	72

SOURCE APPENDIX VII (h)

men suffering from different types of rheumatic complaint.

T A B L E XXI

The rates percent for self medication and consultation with a general practitioner have been listed in Table XXI to show the relative importance of each diagnosis. There were 156 men with disk disease who treated themselves during the year before interview (56 percent). This is the highest rate for any of the diseases named in the table. There were 278 men out of 793 with all other types of rheumatic disease (35 percent) and the Standard Error of Difference (S.E.D.) between this proportion and that for disk disease is 3.4 so the difference is a highly significant one.

Men with general osteoarthritis also had a high rate of self medication during the year (43 percent). There were only 44 such men in the whole sample; even so the rate is significantly different to that found in the 149 men with local osteoarthritis who had a rate of self medication over the same period of 4 percent (S.E.D. 7.6).

The proportion of men consulting general practitioners during the year was highest for men with disk disease of whom 140 out of 280 (50 percent) sought such help. Men with rheumatoid arthritis also have a high consultation rate (46 percent) but with the small number of such cases it is not possible to demonstrate statistically significant differences. It is however interesting that less than half the men (43 percent) with a diagnosis of rheumatoid arthritis and who admitted having had symptoms from this disease during the previous year had bothered to consult a doctor about these. Further more the rate of self medication is lower for those with rheumatoid than it is for men with any other rheumatic disease.

Sickness absence during the previous year also varied considerably with the diagnosis. The rates expressed as weeks per hundred men are also given in Table XXI. Those with rheumatoid arthritis were absent for an annual rate of 325 weeks for every hundred men affected while the next highest group was composed of those with disk disease (annual rate of absence 167). Since however 64 (78 percent) of the total of 91 weeks of absence claimed to have been lost by those with rheumatoid arthritis were lost by only 3 men it would be unwise to make deductions about the importance of such a high average rate.

Rates for hospital referral, hospital admission and prolonged absence (3 weeks or more) for men suffering from the different types of rheumatic diseases are given in Table XXII.

T A B L E XXII

The rate of referral to hospital is highest for those with disk disease. Men who had this complaint at some time during their working lives had a rate of 37 percent whereas the rate for those with any other type of rheumatic disease was 24 ($X = 26.5$, $p < 0.001$). Men with disks also had a very high rate of admission to hospital (12 percent compared with an average for all the men with complaints of 6 percent). The disease which was associated with the highest rate of admission to hospital was rheumatoid arthritis. Twentynine percent of men with this diagnosis had been admitted at some time during their lives.

Rheumatoid arthritis and disk disease stand out, therefore, as two conditions which are more likely to lead to a spell in hospital than other types of rheumatic disease. They also lead to a higher rate of prolonged absence than do the other members of the rheumatic group of diseases. Sixty one percent of men with rheumatoid arthritis and 46 percent of those with disk disease had had absence lasting at least three weeks. Furthermore

T A B L E XXII

MEDICAL CARE SINCE STARTING WORK

(RATES PER 100 MEN - POSITIVES AND INTERMEDIATES - IN EACH DIAGNOSTIC GROUP)

Medical Care	Rheumatoid	Osteo-	Disk		Indeterminate		Other
	Arthritis	arthrosis	General	Local	Back	Limbs	
Hospital Referral	25.8	22.0	28.0	37.0	11.9	8.8	31.5
Hospital Admission	29.0	3.4	4.3	11.9	2.1	1.4	15.7
Absence 3/52	61.3	23.7	27.4	45.6	13.0	6.4	29.2
Number with symptoms since starting work (100%)	31	59	164	327	478	295	89

SOURCE APPENDIX VII (i)

168 (53 percent) out of the 317 men who had ever had such prolonged spells of absence because of rheumatic disease were those who were found to be suffering from one of these two conditions. In this connection it is worth recording that the average age of those suffering from rheumatoid was 49.7 (S.D. 8.5) and the average age of those with disk disease was 47.9 years (S.D. 11.2). These are both lower than the average age of those with osteoarthritis (52.4 years S.D. 10.1). This fact taken in conjunction with the rates of prolonged absence and admission to hospital would support the theory that it is younger men with disk disease and rheumatoid who are most likely to be forced to leave their employment prematurely and of these two, disk disease is by far the most important numerically.

SITE AFFECTED BY RHEUMATIC DISEASE

Because of the vague nature of so many of the pains in those suffering from rheumatic disease and because so many have to be classed as of indeterminate origin it was decided to make an assessment of the rheumatic disability affecting different parts of the body.

During the course of the examinations which were made on all those with symptoms an assessment was made of the degree of functional limitation caused by rheumatism in each of eight parts of the body. Limitation observed in this way was divided into two grades, mild or severe and the results of this part of the examination are shown in Table XXIII.

T A B L E XXIII

There were 692 men (49.6 percent of those with complaints) who had never had symptoms referable to the back. This means that just over half the men (704 or 50.4 percent) who were affected by rheumatism at some time in their lives had had pains in their backs. There were also 273 men who had had

T A B L E XXIII

RHEUMATIC DISABILITY IN 1396* MEN

(EXAMINATION OF 8 SITES)

Site	Never had symptoms in this site	SYMPTOMS AND SIGNS OF RHEUMATIC DISEASE				MAJOR DEFORMITY OTHER THAN RHEUMATISM
		Symptoms in the past	Symptoms now but no signs	Limitation of deformity MILD	SEVERE	
Arms R	1037	241	56	52	10	14
Arms L	1144	153	56	34	9	10
Hands R	1199	73	21	95	8	38
Hands L	1223	60	16	88	9	25
Legs R	996	217	62	107	14	27
Legs L	1027	208	46	102	13	28
Back	692	486	77	119	22	14
Neck	1123	174	40	56	3	1

* (Positives & Intermediates less 3 who refused examination)

SOURCE COLS 47-54 inclusive.

symptoms related to the neck but 173 of these had also had backache.

Preliminary observations in pilot studies indicated that it was unrealistic in many cases to try and allocate symptoms of the back and neck to one side or the other so both sides have been considered together. In the limbs it was felt that it was possible to allocate symptoms to one or other side in many cases. It is quite possible of course for people to have symptoms in both limbs and in the table each site has been considered separately. The upper limb was divided into two regions for the purpose of this assessment (the arm and the hand), while the lower limb was treated as a single unit.

Divisions of this kind are somewhat artificial and do not contribute much to clearing up the question of what causes the pains or functional limitations in the different sites but the table does give a fairly clear indication that the limbs of the right side of the body were more often affected than those of the left hand side. This trend can be observed in those with functional limitation at the time of examination, for those with symptoms but no detectable limitation and also for those who were symptomless at the time of the examination but who stated that they had had symptoms at some time in the past.

Those with deformities other than those attributable to rheumatic diseases are also shown in Table XXIII. These were men with such things as paralysis from poliomyelitis or other neurological disease, or who had had part or all of the limbs amputated. The presence of these deformities was recorded whether or not one of the rheumatic diseases was present as well (e.g. secondary osteoarthritis).

In the hands and to a lesser extent in the arms more deformities were observed to be present on the right side than on the left. This larger number of deformities could have resulted in an increase in rheumatic diseases occurring secondarily in the right hand and right arm thus leading to the relatively high prevalence in these sites which has already been noted. In the legs however major deformities from other causes were not more common on the right side, yet past and present symptoms and to a lesser extent functional limitation from rheumatic disease were more commonly found in the right leg than the left.

In Table XXIV a more detailed study is made of the men with positive findings (i.e. those with mild and severe functional limitation). The number of men with functional limitation of the right limbs of the body is greater than those with similar limitations of the left limbs and this trend^{is} fairly consistent for each assessment: with the small numbers involved however the slight excess of men with some functional limitation of the limbs of the right side compared with those with similar disabilities of the left can merely be used to confirm the trend which has already been observed.

There were 162 men out of all those interviewed (6 percent) who said that they were completely left handed in their normal actions. Seventythree of these men (51.2 percent) had had rheumatic symptoms during their working lives. This is not significantly different from the prevalence rate for the remainder who were interviewed (1326 out of 2522 or 52.6 percent). Unfortunately the number of left handed men with physical signs in each of the selected sites of the body was too small to enable comparisons to be made.

T A B L E XXIV

AGE DISTRIBUTION OF RHEUMATIC DEFORMITIES ON EXAMINATION OF EIGHT SITES.

(RATES PER 100 MEN WITH SYMPTOMS IN EACH AGE GROUP)

SITE	AGE IN YEARS					
	15-	25-	35-	45-	55+	All 15+
Arms R	0	0.1	2.7	4.8	8.1	4.4
Arms L	0	0.1	1.3	2.5	6.6	3.1
Hands R	1.1	1.5	4.0	5.3	16.2	7.4
Hands L	1.1	1.5	3.0	5.8	15.0	7.0
Legs R	3.3	3.5	5.7	9.8	13.5	8.7
Legs L	8.9	3.5	5.0	8.5	12.5	8.2
Back	4.4	11.4	5.7	11.3	12.8	10.1
Neck	0	2.0	4.0	6.3	4.4	4.2
Total examined(100%)	90	201	300	398	407	1396

SOURCE APPENDIX VII(j)

T A B L E XXIV

The table also shows that the percentage of men with some degree of functional limitation in arms hands and legs tends to increase with advancing age. This trend is also true for those with physical signs in the neck up to the age of 54 years; above that age, however, there is a slight fall in the prevalence of positive findings in that part of the body.

The rates for men with some degree of functional limitation of the back show that there is a high prevalence between the ages of 25 and 34 years. There were 202 men in this age group who had symptoms and 201 were examined; of these 23 (11.4 percent) were found to have functional limitation of the back caused by rheumatic disease. In the age groups 35 to 44 years there were 17 (5.7 percent) out of a total of 300 with symptoms all of whom were examined. The difference is statistically significant (S.E.D. = 2.6) though it is not possible to say whether the rate for men in the younger age group is unduly high or that for the older men is unduly low. Which ever is the case the observation suggests either that men with functional limitation of their back as a result of rheumatism may have to leave their jobs and seek employment elsewhere or alternatively that they recover between the ages of 35 and 44 and then deteriorate again over the age of 45 years.

A more detailed study of the distribution of past and present symptoms and of the severity of the physical findings in the backs of the men in the sample is shown in Table XXV. In this table the rates apply to all those interviewed so that those who have never had symptoms include the negatives who were not examined. The proportion of men with symptoms increases with advancing age, but the increase is very slight above the age of 25 years.

T A B L E XXV

T A B L E XXV

EXAMINATION OF THE BACK

(RATES PER 100 MEN INTERVIEWED)

CLINICAL STATE	AGE IN YEARS					
	15-	25-	35-	45-	55+	All 15+
Never had symptoms	90.1	79.2	73.6	67.1	61.9	73.7
No symptoms at present	8.1	13.8	18.9	21.9	26.0	18.1
Symptoms but no signs	1.0	2.3	4.2	3.6	3.0	2.9
Limitation)Mild of Function } Severe	0.8	4.2	2.7	6.5	7.4	4.4
	0	0.6	0.6	1.0	1.8	0.8
Total Interviewed (100%)	504	480	523	604	570	2681

SOURCE APPENDIX VII (k)

The proportion of men with a past history of backache, also, increases with advancing age. The high prevalence of physical signs (particularly minor ones) in those aged 25 - 34 is again observed in this table, which also shows that the prevalence of current symptoms of the back without detectable physical signs tends to decrease slightly after the age of 45. Neither of these departures from the general pattern is big enough to be significant on statistical analysis but their presence is thought to be worthy of comment.

CHAPTER V

OCCUPATION AND RHEUMATIC COMPLAINTS

There were twelve different industrial groups included in the study. Six of them were concerned with construction and maintenance of ships. The acceptance rates for the samples selected from each of these industrial groups have already been given (Table XII), and a brief description of each industry is given here. These are not intended to cover all the occupations in any particular industry since each had a staff of men engaged wholly or partly in maintaining the fabric of the structure in which the industry was being conducted. In most cases these men were also employed in maintaining electrical and mechanical machines which were being used in the manufacture of the end product.

(1) HARDWARE STORE.

Men working in this industry were mainly concerned with selling ironmongery and household equipment. The counter staff had to handle some of the objects, but not the heavier equipment such as refrigerators or fireplaces. The despatching staff had to handle all the goods in the store though they had lifts and other mechanical aids to assist them. The third main group in this industry were those who went out to houses and fitted some of the heavier goods in particular fireplaces and grates.

(2) PRINTING WORKS.

The work here was carried out almost entirely undercover. Types and dyes were constructed and blocks or frames of letter press were composed. Printing presses and lithographic machines were supervised and maintained

and stacks of paper fed into these. The work varied from being light in the case of men working with printed notepaper to fairly heavy in cases of large books and ledgers. One part of this industry was concerned with the printing of bank notes. Unfortunately access to this area of the factory was forbidden on security grounds so those employed in it had to be excluded from the study.

(3) FOUNDRY.

This was one of the heaviest of the industries. The majority of the manual workers were concerned with constructing moulds into which molten metal was poured. The buildings were cold and draughty except when casting was taking place at which times the heat became very oppressive. Those working in or near the furnaces were subjected to extremely hot conditions though the temperature dropped rapidly when these men left the immediate area of the fires as they had to do at different times of the day. The men had to man-handle the finished articles from the moulds on to conveyer belts nearby. The articles being manufactured at this particular foundry ranged from individual gas rings to the man-hole covers seen on many streets and pavements and which are used to cover the points of access to drains, electrical or telephone cables and water supplies.

(4) BREWERY.

Three different breweries were visited but the working conditions were similar in each. There were six main occupations in the industry in addition to those concerned with general duties and maintenance.

(a) Coopers manufacture barrels and repair those which are damaged. They have to man-handle wooden slats, hoops and the completed barrels;

much of their work consists of heavy and prolonged hammering. The introduction of metal containers has reduced the need for these craftsmen in the brewing industry.

(b) Washers work entirely out of doors and clean out the empty barrels and cannisters. These have to be humped on to ramps and washing points. Apart from the atmospheric conditions these men are subjected to a lot of moisture in the form of condensed steam and water jets.

(c) Mashers work in the mash house and tun room. They are concerned with handling the grain and other ingredients of beer. They also have to clean out the tuns vats and other containers used in the different processes.

(d) Cellarmen handle the full barrels of beer after it is brewed and fermented.

(e) Bottlers work on a production line and have to supervise the processes which are required to fill the bottles (or cans) with beer to label these and to load them into crates or cartons. Prior to bottling the beer is kept in containers stored in refrigerated rooms and some of the workers concerned with this process are exposed to very cold temperatures. In the bottling itself however the conditions are usually warm particularly near the machines which sterilise and dry the bottles. The crates which have been filled with bottles have to be lifted into position for removal by fork-lift trucks.

(f) Draymen take the beer from the brewery to public houses, hotels and grocers. The drivers and their mates have to load the vehicles in loading bays, which are carefully sited and have ramps and

platforms to avoid the need for heavy lifting. Once away from the brewery however the team may have to face many difficult situations in trying to coax barrels containing 90 gallons of beer into awkwardly shaped cellars.

(5) COAL MINE

Here too there were different occupational groups performing quite distinct tasks.

(a) Face workers are concerned either with heaving the coal from the seams (strippers) or with building the tunnels and galleries which run for long distances underground (brushers). Other face workers include those who man-handle the most forward section of the conveyer belt and those who under-cut the seam in preparation for the work of the stripper. These men all have to work for long spells in cramped conditions since the seams in the colliery included in this study are less than three feet in height.

(b) Other underground workers supervise the conveyer belts and transporting hutches between the area of the coal face and the pit-bottom. The passages in which they work are tall enough to allow the men to stand upright and are usually about twelve feet high. If things go well there is little call for extreme exertion by these workers, but if there are any blockages or derailments then manual effort may be needed to get things back to normal.

(c) Surface workers supervise the transporting system from the pit-head to the distribution points. These men are also expected to remove rocks and stores from amongst the piles of coal and dispose of these into trucks which are then emptied on to the slag heap. This process may entail

some heavy lifting occasionally.

(6) ELECTRONICS FACTORY.

Men working in this industry had the lightest job physically. Most of them were sedentary and they had to carry out rapidly repeated fine movements while bent over benches. Approximately half were concerned with assembling the material and half with testing the finished article. There was however little difference in the physical effort required by these two groups.

(7) DOCKYARD.

Most of the skilled occupations concerned with electrical and mechanical engineering were represented in one or more of the departments of the dockyard. There were six departments each administered as a separate unit, though their efforts were co-ordinated centrally. A certain number of Naval Officers and ratings were engaged in supervisory or technical tasks in the yard, but all the manual workers were civilians though many had been in the navy previously.

Within each of the six departments there were representatives of different occupations of which fifteen had sufficiently large numbers to make grouping justifiable. These are listed below:

Engine Fitters	Blacksmiths	Drivers
Electrical Fitters	Boilermakers	Storehousemen
Ship Fitters	Coppersmiths	Stokers*
Ship Wrights	Painters	Seamen*
Machinists	Joiners	Labourers

PREVALENCE OF COMPLAINTS.

The prevalence of rheumatic complaints in each of the twelve industrial

* These were civilians employed on the small harbour craft and also on vessels used to maintain installations such as mooring buoys.

T A B L E XXVI

RHEUMATIC COMPLAINTS IN DIFFERENT OCCUPATIONAL GROUPS

(RATES PER 100 WORKSHOPS)

Occupational Group	Mean Age In Years	RATES PER CENT IN EACH GROUP			Total (100%)
		Positives	Intermediates	Negatives	
Hardware Store	39.6	44.4	5.6	50.0	54
Printing Works	40.4	42.9	14.3	42.9	56
Foundry	48.8	54.5	7.9	37.6	101
Brewery	39.8	42.8	11.9	45.3	437
Coalmine	41.2	46.0	11.1	42.8	402
Electronics Factory	33.0	35.8	11.8	52.4	212
Dockyard Construction	41.5	33.2	12.9	53.8	533
Engineering	41.7	32.6	13.4	54.0	298
Electrical	37.7	33.3	13.2	53.5	159
Harbour Craft	45.2	45.8	12.4	41.8	177
Stores	45.3	48.3	14.2	37.5	176
Maintenance	39.4	36.7	10.1	53.2	79
All Occupational Groups	41.0	40.0	12.1	47.9	2684

SOURCE APPENDIX VIII (a and e)

groups is given in Table XXVI.

T A B L E XXVI

There was an overall rate of 40 percent of positives in the industrial groups in this study. The rate ranged from 54 percent for foundry workers down to 33 percent for those in the engineering departments of the dockyard. The importance of age as a factor in the prevalence of complaints and in the amount of absence caused by ill-health has been stressed in Chapter IV. It is therefore important to make allowances for differences in the age distribution of the different groups of workers and for similar differences in the separate trades within these groups.

One method of assessing differences in age structure would be to consider the mean values for each group. These means have been included in Table XXVI. In the survey of foundry workers the management only agreed to allow those over 35 years of age to be examined, so that the mean age is naturally higher in the group of workers than in others. At the other end of the age scale are the electrical workers where there were many young apprentices and this is reflected in the mean age of that sample. Thus the differences in prevalence rate between these two stems to some extent from the difference in the ages of the workers.

In order to make allowance for these variations in age a method of standardisation has been used along the lines of the Standardised Patient Consulting Ratio which was used by the General Register Office (See Table VII). By similar methods to those employed by Logan ⁽⁵⁰⁾ it is possible to calculate the Standardised Complaint Ratio (SCR) from the formula

$$\frac{\text{Observed Number of Positives}}{\text{Expected Number of Positives}} \times 100.$$

T A B L E XXVII

STANDARDISED COMPLAINT RATIOS FOR OCCUPATIONAL GROUPS.

	<u>Number of Positives</u>		S.C.R.
	OBSERVED	EXPECTED	
Hardware Store	24	21.17	113.4
Printing Works	24	21.70	110.6
Foundry	55	49.47	111.2
Brewery	187	169.09	110.6
Coalmine	185	161.34	114.7
Electronics Factory	76	72.13	105.4
<u>Dockyard:</u>			
Construction	177	213.05	83.1
Engineering	97	120.03	80.8
Electrical	53	56.99	93.0
Harbour Craft	81	78.05	103.8
Stores	85	78.90	107.7
Maintenance	29	31.06	93.4
All Groups	1073	1072.98	100

SOURCE APPENDIX VII (a)
VIII (a and e)

It would also be possible to calculate such a ratio by using the observed and expected numbers of Positives and Intermediates but the capacity of an individual to remember his medical history beyond the immediate past year is very variable. Furthermore this capacity to remember is likely to be affected considerably by the age of the individual. It was therefore felt that ratios based on complaints during the past year (i.e. the Positives) would be more accurate.

The expected number of positives has been calculated by applying the complaint rates for the specific age groups already recorded in Table XII to the numbers in each industry using the appropriate age distribution. These S.C.R.s are given in Table XXVII.

T A B L E XXVII

In general the departments of the dockyard have lower standardised ratios than those of the other industrial groups. One reason for this may be that in the dockyard the three departments with the highest ratios (Harbour Craft, Stores and Maintenance) have few craftsmen on their strengths and each has a relatively high proportion of semi skilled and unskilled workers. Of the industrial groups outside the dockyard the workers in the coalmine have the highest standardised rate but most of the others are above 110. The workers in the electronic factory have a slightly lower rate, but this occupation is associated with some of the lowest physical demands of all the occupations.

There are clearly many shortcomings in trying to study industrial groups as a whole since there are men engaged in many different occupations working in each industry. To illustrate the point the different occupations of the dockyard have been examined separately.

T A B L E XXVIII

STANDARDISED COMPLAINT RATIOS FOR DIFFERENT OCCUPATIONS IN DOCKYARD

(Mean for all Dockyard Workers = 100)

OCCUPATION	NUMBER INTERVIEWED	S.C.R.
Coppersmiths	115	132.8
Storehousemen	77	129.0
Stokers	63	128.4
Electrical Fitters	104	116.0
Seamen	112	112.1
Drivers	79	111.4
Blacksmiths	63	110.7
Miscellaneous Workers	65	108.0
Painters	88	97.9
Boilermakers	73	93.3
Shipwrights	74	92.2
Labourers	193	86.6
Machinists	71	78.3
Engine Fitters	101	71.2
Shipfitters	71	70.4
Joiners	73	63.8
TOTAL	1422	100

SOURCE APPENDIX VII (a)

APPENDIX VIII (d and f)

T A B L E XXVIII

The S.C.R.s for 15 specified occupations and a miscellaneous group are given in Table XVIII. These have been calculated on the basis that the mean ratio for all the occupations in the six departments of the dockyard is 100. There are significant differences between the highest ratios and the lowest, but there is no clear pattern to suggest that similar types of occupation have a higher ratio than others. Thus coppersmiths have the highest ratio while boilermakers engaged in very similar work have a ratio below the mean; stokers and seamen, working as labourers afloat, have high ratios while labourers doing similar work around the keysides have a low ratio; electrical fitters have a high ratio while engine fitters have a low one.

Similar ratios for positives and intermediates combined have been worked out in respect of these occupations and have been listed by Anderson,⁽⁵⁸⁾ Duthie and Moody. There is however little difference in the order of the occupations when this is done and none changes from above to below the mean or vice versa.

In each of the occupations listed there are some men who work mainly indoors in the numerous workshops of the yard and there are others who work mainly outside or on the unheated ships lying in the docks. The S.C.R.s for the 731 indoor and 691 outdoor workers are 98.5 and 101.5 respectively; the ratios for the same workers calculated for positives and intermediates combined are 99.2 and 100.8. This question of the effect of outdoor conditions will be considered in greater detail in the next chapter, but as far as workers in the dockyard are concerned it appears to make little difference to the number of complaints.

T A B L E XXIX

RHEUMATIC COMPLAINTS IN SKILLED AND UNSKILLED DOCKYARD WORKERS

(Positives per 100 interviewed in each age group)

	A G E I N Y E A R S					
	15-	25-	35-	45-	55+	All 15+
Skilled Workers	10.8	29.6	39.8	50.8	44.3	33.3
Unskilled Workers	17.2	31.3	31.5	53.6	45.0	40.8
All Dockyard Workers	11.5	29.9	37.4	51.6	44.5	36.6

SOURCE APPENDIX VIII (g)

Another way of considering the men doing manual work in a large industry such as the dockyard is to divide them into those who have had training (skilled) on the one hand and those without formal training (unskilled) on the other. In the dockyard there were 1054 (74 percent) who were skilled and 368 (26 percent) who were unskilled out of the total of 1422 interviewed. The unskilled workers were those classified under the heading of labourers, seamen and stokers, and many were very skilful at their own particular jobs even though they were classed in this way. The S.C.R.s for these two groups are 99.8 and 100.2 respectively taking the mean for the whole dockyard to be 100. This would suggest there is little difference between the skilled and unskilled workers at the dockyard as far as thrumatic complaints are concerned. If however the rates for each of the five decades of working life are compared separately (See Table XXIX) then it is apparent that the skilled workers have slightly lower rates in four age groups while the reverse is the case only for those aged between 35 and 44 years.

T A B L E XXIX

None of the differences between the rates in any particular age group is significant statistically so that caution is needed before drawing conclusions. The picture presented however is one which might occur if 'skilled' workers with rheumatism were attracted to the dockyard in the middle period of their working lives because of easier working conditions or shorter hours than those which are found in more competitive employment elsewhere.

Unfortunately the workers who had comparable jobs outside the dockyard and who were included in this study of rheumatic complaints is so small that comparisons of prevalence rates for age groups is not possible. It

T A B L E X X X

STANDARDISED COMPLAINT RATIOS IN COALMINE

(Positives only)

OCCUPATION	Number with complaints		S. C. R.
	OBSERVED	EXPECTED	
Face Workers	80	80.3	99.6
Other Underground Workers	28	33.3	84.1
Surface Workers	57	52.3	109.0
Craftsmen	20	19.0	105.3
All Colliery Workers	185	185.1	100

SOURCE APPENDIX VIII (c and h)

is however possible to divide those in the coalmining industry into those who are coalminers and those who were craftsmen (electrical fitters, engine fitters, plumbers etc.) working in the colliery. The S.C.R.s. can then be calculated for each of the four different groups of colliery workers; three of these are essentially 'unskilled' and are designated by their place of work and the fourth is composed of the craftsmen mentioned above.

T A B L E X X X

The S.C.R.s for these groups are shown in Table XXX in which the mean value 100 refers to colliery workers only. As was the case for workers at the dockyard there is no obvious relationship between jobs requiring greater effort and rheumatic complaints. Face workers as a group have the heaviest jobs, but they do not have the highest rate which is found in those working on the surface. Other underground workers have the lowest ratio while the craftsmen who are working at their trades in all parts of the colliery both above and below ground have a ratio above the mean for all those in the industry.

T A B L E X X I

The fact remains however that the S.C.R.s for each department of the dockyard is lower than that for workers in the coalmining industry. This picture is constant even when the 'unskilled' workers at the dockyard are compared with the unskilled workers at the colliery. Table XXII shows the number of positives percent in each of five age groups for the unskilled workers of both industries. There/relatively more positives among 'unskilled' colliery workers of all ages than there are among 'unskilled' are

T A B L E X X X I

RHEUMATIC COMPLAINTS IN UNSKILLED WORKERS IN DOCKYARD
AND COALMINE

(Positives per 100 interviewed in each age group)

OCCUPATION	A G E I N Y E A R S					
	15-	25-	35-	45-	55+	All 15+
Dockyard	17.2	31.3	31.5	53.2	45.0	40.8
Coalmine	17.9	38.0	50.7	56.3	58.5	46.3

SOURCE APPENDIX VIII (g and i)

dockyard workers. The difference is most marked between 35 years and 44 years, and the overall difference between the two industries is significant at the two percent level.

DIAGNOSIS.

There were 1399 men who had had symptoms at some time during their lives and 1396 of these were examined. Table XXXII shows how the different rheumatic diagnoses were distributed throughout the industries. The ratios are expressed as percentages of the total number of men who were interviewed in each of the industries but in each of three departments of the dockyard (Construction, Engineering and Harbour Craft) one man had to be omitted as examination was refused.

T A B L E XXXII

Local osteoarthritis has a high prevalence in coalminers (10.7 percent compared with 5.3 percent for all other industries combined). The next highest prevalence rate for local osteoarthritis is in foundry workers (8.9 percent) but it must be remembered that in the samples being studied the average age of foundry workers (48.8 years, S.D. 7.7) is higher than that for the workers in all the industries combined (41.0 years S.D. 14.1) and this may account to some extent for the high prevalence.

General osteoarthritis has a high prevalence rate among those in the printing works (10.7 percent). There the mean age (40.4 years, S.D. 14.9) is quite close the mean of all the workers. The prevalence rate of general osteoarthritis among men from all the other industries is 53 out of 2625 or 2.0 percent. The standard error of the difference between the

T A B L E XXXII

RHEUMATIC DISEASES BY OCCUPATION.

(Rates per 100 men employed)

	Rheumatic Arthritis	Osteoarthritis GENERAL	LOCAL	Disk Disease	Indeterminate Pains	Other Rheumatic Diseases	Number of men (100%)
Hardware Store	1.9	3.7	5.6	5.6	35.2	5.6	54
Printing Works	0	10.7	3.6	12.5	23.2	3.6	56
Foundry	0	5.0	8.9	20.8	24.8	5.0	101
Brewery	1.1	2.1	6.0	15.6	28.8	4.6	437
Coalmine	0.5	3.0	10.7	13.7	25.9	5.2	402
Electronics Factory	1.0	0.5	4.7	12.3	29.3	2.4	212
Dockyard:							
Construction	1.1	1.9	4.0	11.7	26.5	1.3	532
Engineering	1.0	1.4	5.4	7.1	30.0	1.7	297
Electrical	1.9	1.3	7.6	6.9	28.9	1.3	159
Harbour Craft	2.3	2.3	5.7	8.5	37.5	4.5	176
Stores	2.3	1.7	4.5	15.3	35.2	5.7	176
Maintenance	1.3	1.3	5.1	11.4	29.1	1.3	79
All industries	1.2	2.2	6.1	12.2	28.8	3.3	2681

SOURCE APPENDIX VIII(j)

proportions (S.E.D.) of 10.71 and 2.02 for these two samples is 4.23 so the difference is significant at the five percent level.

With the small number of men in the sample of printing workers and with such a low level of significance it would be unwise to place too much emphasis on this finding. It is interesting however that many of the operations of the printing works involve repetitive operations with machinery not unlike those of the cotton spinning industry. Repeated minor injuries to the hands occur and the workers have to stand for long periods feeding material into a machine. If these factors contribute to the occurrence of Heberden's Nodes then the high prevalence of general osteoarthritis in printing workers might be related to the findings of Lawrence⁽²⁹⁾ that cotton operatives have a high prevalence of these lesions.

The prevalence of disk disease is highest in foundry workers (21 percent) but the high mean age of this group of workers which has already been mentioned must be born in mind when interpreting this result. There were 55 cases (14 percent) of disk disease out of a population of 402 coalminers. This rate is quite close to the mean prevalence of disk disease in all the samples which is 12. This is interesting in view of the findings of Kellgren and Lawrence⁽²⁶⁾ who found that there was a high prevalence of disk disease in coalminers than other workers.

Standardised ratios for the different rheumatic diseases are shown in Table XXXIII. The number of workers in the hardware store and printing works taken separately are rather too small to make presentation in this way a practical proposition. These two industries have therefore been combined in preparing these figures for presentation but differences in the prevalence rates between these two industries for some of the rheumatic

T A B L E X X X I I I

STANDARDISED RATIOS FOR RHEUMATIC DISEASES BY OCCUPATION.

INDUSTRY	RHEUMATOID ARTHRITIS	OSTEOARTHRITIS GENERAL	LOCAL	DISK DISEASE	INDETERMINATE PAINS	OTHER RHEUMATIC DISEASES
Store & Printing	79	372	78	77	102	114
Foundry	0	111	110	137	73	124
Brewery	108	95	102	134	103	142
Coalmine	43	131	173	112	90	158
Electronics Factory	139	75	129	138	107	79
Dockyard (all divisions)	121	70	78	81	103	69

SOURCE APPENDIX VII (b)

Appendix VIII (a and j)

diseases have been shown in the previous table and these must be born in mind when considering the combined ratios. The calculations of the ratios have been done in the manner described for S.C.R.

T A B L E X X X I I I

The ratios for rheumatoid arthritis are based on only 31 cases in the whole population in the survey. Those for the heavy industries (coalmine and foundry) would be expected to be low since men with the disease would be likely to leave these industries or possibly never enter them. The ratios for generalised osteoarthritis are based on a total of 59 cases; in the combined store and printing group the ratio is high and this is a reflection of the high prevalence of this disease in men of the printing industry which has already been discussed. With such small numbers of cases the ratios for these two diseases have a wide span and are somewhat unrealistic.

Local osteoarthritis has a high prevalence in coalminers with their liability to trauma resulting in secondary osteoarthritis. Disk disease on the other hand is more prevalent in workers in the foundry, the brewery and the electronics factory than it is in those working in the coalmine. Indeterminate pains are rather rare in the foundry workers while other diagnoses (mainly chronic bursitis and tenosynovitis) are common in coalminers.

The ratios for those diseases which are sometimes associated with trauma (osteoarthritis, disk disease and "others") are all low in dockyard workers and all high in coalminers and a more detailed study of these particular industries has been made.

T A B L E XXXIV

RHEUMATIC DISEASES IN DOCKYARD AND COALMINE - ALL EMPLOYEES

(Rates percent for each age group)

	A G E I N Y E A R S					
	15-	25-	35-	45-	55+	All 15+
(a) Rheumatoid Arthritis						
Dockyard	0	0.9	1.2	2.8	1.8	1.5
Coalmine	0	0	1.1	-	1.1	0.5
(b) Osteoarthritis (general & local)						
Dockyard	0.4	2.7	3.1	9.8	13.6	6.7
Coalmine	2.6	3.2	7.1	17.2	33.3	13.7
(c) Disk Disease						
Dockyard	1.1	4.5	7.1	17.4	15.8	10.2
Coalmine	2.6	12.7	16.5	18.4	16.7	13.2
(d) Undetermined Pains						
Dockyard	12.3	27.9	35.8	36.5	33.4	29.9
Coalmine	16.9	19.0	34.1	33.3	23.3	25.9
(e) Other Rheumatic Diseases						
Dockyard	0.4	2.7	1.6	3.4	3.0	2.3
Coalmine	2.6	4.8	5.8	5.7	6.7	5.2
Totals on which rates are based.						
Dockyard	261	219*	254	356*	329*	1419
Coalmine	77	63	85	87	90	402

* 3 men who refused examination have been omitted.

T A B L E X X X I V

The age specific rates for 5 rheumatic diseases affecting workers in the dockyard and the coalmine have been considered. These rates for all workers in each of the two industries are given in Table XXXV (a - e). In the case of rheumatoid arthritis the numbers are too small to draw conclusions. The rates for osteoarthritis (general or local combined) are higher among coalminers than they are among dockyard workers in all age groups. Similarly the rates for disk disease and for "other" rheumatic diseases are both higher for coalminers of all ages than for dockyard workers. In the case of pains of undetermined origin the dockyard workers tend to have the higher prevalence rates.

These tables confirm that ^{the} reason why the S.C.R. for coalminers is higher than that for those at the dockyard is to be found in a higher prevalence of osteoarthritis, disk disease and "other" rheumatic diseases.

Since there are widely differing occupations among dockyard workers and since furthermore the proportion of 'skilled' workers in the dockyard is higher than in the coalmine it would seem prudent to compare the age specific prevalences for skilled and unskilled workers.

It will be recalled (Table XXIX) that the age specific prevalence rates of rheumatic complaints as a whole were closely comparable in skilled and unskilled workers at the dockyard. In Tables XXXV (a-e) it is possible to examine the age specific rates for the same five rheumatic diseases mentioned above. There is no significant differences between the age specific rates of any of the five disease headings.

T A B L E X X V

RHEUMATIC DISEASES IN DOCKYARD WORKERS - SKILLED AND UNSKILLED

(Rates percent for each age group)

	<u>A G E I N Y E A R S</u>					
	15--	25--	35--	45--	55+	All 15+
(a) Rheumatoid Arthritis						
Skilled	0	1.2	1.7	2.0	1.8	1.3
Unskilled	0	0	0	4.6	1.9	1.9
(b) Osteoarthritis (general and local)						
Skilled	0.4	2.9	3.3	9.3	12.7	6.0
Unskilled	0	2.1	2.7	11.0	15.7	8.7
(c) Disk Disease						
Skilled	1.3	4.7	7.7	15.8	15.8	9.4
Unskilled	0	4.2	5.5	21.1	15.7	12.5
(d) Indeterminate Pains						
Skilled	12.1	28.1	36.5	39.3	30.8	29.2
Unskilled	13.8	27.1	34.2	30.3	38.9	31.9
(e) Other Rheumatic Diseases						
Skilled	0	2.3	1.1	2.0	3.6	1.8
Unskilled	3.4	4.2	2.7	6.4	1.9	3.8
Totals on which rates are based						
Skilled	232	171*	181	247*	221	1052
Unskilled	29	48	73	109	108*	367

* 3 men who refused examination have been omitted.

SOURCE APPENDIX VIII (b)

T A B L E X X X V I

RHEUMATIC DISEASES IN DOCKYARD AND COAL MINE - UNSKILLED WORKERS

(Rates percent for each age group)

	A G E I N Y E A R S					
	15-	25-	35-	45-	55+	All 15+
(a) Rheumatoid Arthritis						
Dockyard	0	0	0	4.6	1.9	1.9
Coalmine	0	0	0	0	1.2	0.3
(b) Osteoarthritis (general & local)						
Dockyard	0	2.1	2.7	11.0	15.7	8.7
Coalmine	0	4.0	8.5	18.8	34.9	15.0
(c) Disk Disease						
Dockyard	0	4.2	5.5	21.1	15.7	12.5
Coalmine	3.0	14.0	15.4	18.8	15.1	13.6
(d) Indeterminate Pains						
Dockyard	13.8	27.1	34.2	30.3	38.9	31.9
Coalmine	19.4	20.0	32.4	33.8	22.1	26.0
(e) Other Rheumatic Diseases						
Dockyard	3.4	4.2	2.7	6.4	1.9	3.8
Coalmine	3.0	6.0	7.0	3.8	7.0	5.4
Totals on which rates are based.						
Dockyard	29	48	73	109	108*	367
Coalmine	67	50	71	80	86	354

* One man who refused examination has been omitted.

SOURCE

APPENDIX VIII (k)

T A B L E XXXV

Unfortunately there are not enough 'skilled' workers in the coalmine to make it possible to compare the age specific rates of the separate diseases for these workers with those of the unskilled workers in the same industry. A comparison has been made however of the rates for each of the diagnoses in the five age groups between the 'unskilled' workers in the dockyard and the 'unskilled' workers in the coalmine.

These age specific rates for each of the five different types of rheumatic diseases are shown in TableXXXVI (a - e).

T A B L E XXXVI

Workers at the dockyard suffer from more rheumatoid arthritis which was diagnosed only in those over the age of 45 years; they also have more indeterminate pains though this is not consistent for all age groups.

Osteoarthrosis has a higher prevalence in those at the coalmine than in those at the dockyard in each of the four age groups^{over 25 years}%. There is also a higher prevalence of disk disease in coalminers up to the age of 44; above the age the trend is reversed but not markedly. Other rheumatic diagnoses also tend to be higher in workers at the coalmine than for those at the dockyard but this is not a trend which is consistent for all ages.

SICKNESS ABSENCE.

The amount of sickness absence ascribed to rheumatic complaints during the year before interview varies from industry to industry, and once again allowance must be made for differences in age distribution. Standardised Absence Ratios (S.A.R.) have been used to overcome this difficulty; these have been calculated from the formula:-

$$\text{S.A.R.} = \frac{\text{Observed number of weeks of absence ascribed to rheumatic complaints}}{\text{Expected number of weeks of absence ascribed to rheumatic complaints}} \times 100$$

T A B L E XXXVII

RHEUMATIC ABSENCE IN YEAR PRIOR TO INTERVIEW. STANDARDISED ABSENCE RATIOS

INDUSTRY	Weeks of Absence in past year		S. A. R.
	OBSERVED	EXPECTED	
Hardware Store	10	17.6	56.8
Printing Works	11	18.5	59.5
Foundry	54	42.6	126.8
Brewery	165	145.4	113.5
Coalmine	186	138.4	134.4
Electronics Factory	14	57.4	24.4
Dockyard:			
Construction	210	185.8	113.0
Engineering	116	104.1	111.4
Electrical	44	48.6	90.5
Harbour Craft	60	72.3	83.0
Stores	30	68.5	43.8
Maintenance	22	22.4	98.2
Total of all workers interviewed	922	921.9	100

SOURCE APPENDIX VIII(1)

The expected numbers have been obtained by applying the overall rates for specific age groups to the numbers in each industry using the appropriate age distribution.

T A B L E X X X V I I

The S.A.R.s for each industrial group are shown in Table XXXVII. Coalminers have the highest ratio followed by the foundry workers and then the brewers. All but two of the departments of the dockyard have ratios below the mean but the industries outside the dockyard with low physical demands (hardware store, printing works and electronics factory) also have low ratios. There is therefore a pattern suggesting a correlation between physical effort at work and the amount of sickness absence caused by rheumatic complaints.

This trend can also be observed when the S.A.R.s of the different occupations in the dockyard are calculated individually and compared with those of separate occupations in the brewery and the colliery. Table XXXVIII shows these occupations listed under their respective headings, together with the S.A.R. for each, the composite ratio for each of the three industries have been inserted at appropriate points in the table. The S.A.R.s for the other four industries have been included also for the sake of completeness. Unfortunately there is no suitable method of dividing the workers in these industries into separate occupational groups on the basis of differences in physical requirements.

T A B L E X X X V I I I

The Dockyard workers whose jobs require greatest physical effort, are the ones in whose ratios are comparable with those of the brewery workers

TABLE XXXVIII

STANDARDISED ABSENCE RATIOS FOR TRADES AND OCCUPATIONS

Dockyards (SAR)	Brewery (SAR)	Coalmine (SAR)	Other industries (SAR)
Miscellaneous workers (242)	Bottlers (290)		
Painters (232)		Face workers (151)	
Blacksmiths (203)		Craftsmen (149)	
Coppersmiths (155)	Mashers (147)	All coalmine (1361)	Foundry (127)
	Cellarmen (126)	Others underground (117)	
		Surface workers (116)	
Labourers (113)	All Brewery (114)		
All Dockyard (96)	Washers (104)		
Machinists (94)			
Stokers (84)	Maintenance (81)		
Seamen (78)	Draymen (77)		
	Coopers (62)		
Boiler makers (47)			Printing (60)
Engine fitters (45)			
Storehouse men (45)			Hardware store (57)
Joiners (42)			
Electrical fitters (38)			Electronic factory (24)
Ship fitters (21)			
Shipwrights (20)			
Drivers (12)			

SOURCE APPENDIX VIII (1 and m)

and the coalminers. The group of 65 miscellaneous workers in the yard includes foundry men, glaziers and bricklayers who work in the yard but who are too small in numbers to be treated as separate occupations. The bulk of them work in what are regarded as heavy occupations.

It is interesting that among the brewery workers it is the Bottlers who have the highest S.A.R. indeed the ratio for these men (290) is highest of any of the occupations listed. This phenomenon may be accounted for by the fact that the bottling halls contained many young lads. The mean age of the 50 employees concerned is 28.8 (S.D. 14.4) compared with a mean age of 39.8 (S.D. 14.5) for all workers in that industry. For many of these youngsters this is their first experience of work and all those who aspire to better jobs in the breweries are started in the bottling hall. The managers confirmed that there was a quick turnover of labour in each of the bottling halls in the survey. They also pointed out that many of those working in this part of the brewery stayed off work for fairly trivial complaints. It is interesting that the Standardised Complaint Ratios for bottlers was also higher than the average for other workers in the brewery (S.C.R. 140 when the average for all brewery workers = 100).

Coalminers as a whole have higher Standardised Absence Ratios than those of brewery workers, but in the mine it is the craftsmen who have the highest ratio, which is only a little higher than the rate for face workers. Both craftsmen and face workers have to do heavy work at the coal face though the former only do this intermittently.

CONCLUSIONS.

The general impressions gained from this study of the different industries and of the occupations within these industries are twofold.

While there may be a higher prevalence rate for some rheumatic diseases among workers engaged in heavy manual tasks, the evidence supporting this is inconclusive. Workers in the coalmine certainly have a higher complaint ratio than dockers who work in a more sheltered industry. This higher rate in coalminers stems from higher prevalences for osteoarthritis disk disease and "other" rheumatic diseases. Against this however the complaint ratios for different workers within the dockyard are not consistently higher for those engaged in heavy jobs.

In contrast to these rather vague findings there seems little doubt that among the industries studied and in the different occupations within these industries the rate of absence from rheumatic diseases is higher in those jobs associated with heavy physical effort.

CHAPTER VI

RHEUMATIC COMPLAINTS AND JOB ANALYSIS

INTRODUCTION

The method of studying jobs and the system of allocating numerical values to each of six variables has been described in Chapter III. By this method a rating is placed on those factors which might influence the prevalence of rheumatic diseases and the rates of sickness absence resulting from these diseases. The system is designed to be applied to any type of occupation but most of the men who were the subject of this study were in occupations which come in the two grades at the more stringent end of each scale. Table XXXIX shows the way in which the jobs of the 2,684 men were assessed in the five grades under each of the six headings.

TABLE XXXIX

In the heaviest grading (V) under the headings of Back, Arms, Hands and Legs there are from 865 (32 percent) to 1075 (40 percent) jobs, while in the next heaviest grading there are between 1392 (52 percent) and 665 (25 percent). These two gradings between them account for from 1488 (55 percent) jobs in the case of assessment for the Back to 2453 (91 percent) jobs in the case of assessment of the Arms. Since the jobs which were studied were all manual ones it is not surprising that only 217 (8 percent) of them have been placed in the lowest three gradings of the assessment for Arms. In the equivalent categories of the assessment for Hands the number is 454 (17 percent). The number of men in jobs which require little physical effort (grades I-III) by either the Back or Legs is higher (1236 - 46 percent - for the former, and 1082 - 40

TABLE XXXIX

Grade	Assessment Factors					
	Back	Arms	Hands	Legs	Posture	Site
I	10	8	0	0	28	46
II	232	46	12	762	442	484
III	994	163	442	320	970	1441
IV	565	1392	1296	737	928	527
V	883	1075	954	865	316	186
Total Number of men interviewed	2684	2684	2684	2684	2684	2684

percent - for the latter) than is the case for jobs requiring little effort by Arms or Hands. Under the heading of Posture there were 470 (18 percent) men in jobs which have been classed as mainly or entirely sedentary, 970 (36 percent) in those at which the men were standing most of the time, and 1244 (46 percent) in which the men had to stand all the time. This last category includes 316 (12 percent) in which long walks ($\frac{1}{4}$ mile +) comprised an integral part of the work; many of these were face workers at the coalmine.

The Sites in which 1441 (54 percent) of the men worked were large workshops where attempts to control atmospheric conditions were not always satisfactory. Even when these were adequate they were geared to the needs of the majority rather than the individual. Many of these men (884 or 61 percent of those working in these workshops) remained indoors to do their work but the remainder (557 or 39 percent) had to work outside for part of the time. A further 713 (27 percent of all those interviewed) had to work mainly out of doors and 186 of these (26 percent of the outdoor workers and 7 percent of all the workers seen) were outside in all weathers. The remaining 530 men (20 percent of the total in the survey) were in small workshops; ¹⁵⁵ (i.e. 29 percent of these) had to go outside occasionally.

RHEUMATIC COMPLAINTS AND MUSCULAR EFFORT

The assessments made on the Back, Arms and Hands and Legs will be considered together in the first instance. In table XL the men have been divided into four groups :

- A. Those with assessments of either grades I, II or III in each category.
- B. Those with a maximum assessment of grade IV in any category apart from those in Category A.

- C. Those with assessments of grade V in each of the four categories.
- D. Those with mixed assessments.

TABIE XL

The number of men in each of these groups together with the number of positivies and the prevalence rates and S.C.Rs. are shown in the table. The prevalence rates of positives is highest in those engaged in the lightest tasks while those doing the heaviest work taking second place though the difference between the two is not significant. When allowance is made for age by calculating the S.C.R. the workers who had the heaviest jobs are found to have one of the lower ratios of the groups. The difference between any of the four groups is however very small and could well have arisen by chance.

The information gained from this broad appraisal is that there is little difference in the prevalence of rheumatic complaints currently affecting men working in the four different categories of employment (Heavy, Medium, Light or Mixed). It does not follow from this however that the prevalences of positives will be so closely similar when they are considered in relation to the effort required by each part of the body separately.

There is only a small number of workers in the jobs of grade I under each of the four assessments (Back, Arms, Hands, Legs). Because of this men with jobs in grade I have been considered along with those in grade II in each case and the combined group (I + II) is referred to by the designation "minimal effort" in the relevant tables.

BACK

The numbers of positives among men working in each of the four grades of job assessed under the heading of Back are given in Table XII

TABIE XII

TABLE XL

RHEUMATIC COMPLAINTS AND EFFORT IN GENERAL

(Back, Arms, Hands, Legs Aggregated)

Demands of job * Back, Arms, Hands, Legs.	Positives (%)	S.C.R.	Total in Category
A Little Physical Effort	198 (44)	102	448
B Moderate Physical Effort	314 (39)	101	809
C Maximum Physical Effort	198 (43)	99	462
D Mixed Categories	363 (38)	98	965
All Workers Interviewed	1073 (40.0)	100	2684

* FOR DEFINITIONS SEE TEXT

TABLE XLI

RHEUMATIC COMPLAINTS AND EFFORT BY BACK

(Prevalence rates for Positives and S.C.Rs.
in 5 grades)

Grade	Effort	Positives		S.C.R.	Number in grade (100%)
		Number	%		
I+II	Minimum	102	42	97	242
III	Slight	344	35	93	994
IV	Moderate	224	40	101	565
V	Maximum	403	46	93	883
All Grades		1073	40	100	2684

SOURCE APPENDIX IX (b)

Men in those jobs requiring a minimum of effort by the Back numbered 242, and 102 (42 percent) of them had had symptoms during the previous year. This prevalence rate is higher than that found in men doing jobs requiring slight effort by the back (344 out of 994 or 35 percent). The difference between these two rates is significant statistically (S.E.D. = 3.3) When allowance is made for age and the expected number of positives is calculated for each of these groups then the S.C.Rs. obtained for them are 96.8 and 92.7 respectively. Even after making this allowance for age therefore the men in jobs requiring minimal effort of the Back have a higher prevalence rate than those in jobs requiring slight effort but the difference is less and is not significant statistically. It seems likely that the men in the easiest job may well be in these jobs because they have rheumatic complaints but no information is available on this point.

The prevalence rates and S.C.Rs. of the three heaviest gradings in Table XII show an increase with the severity of the demands made by the jobs. Within each of these three categories however the prevalence rate of positives is higher among those whose job require sustained effort than among those when the effort is intermittent. This is shown in table XIII. The number in grade IVb are too small to have any weight attached to them but they have been included for the sake of completeness.

TABLE XLII

The only instance in which the difference is a significant one is that between the rates for men engaged in the two subdivisions of grade V where the prevalence rates for positives are 43 for those with intermittently

TABLE XLII

INTERMITTENT SUSTAINED EFFORT BY BACK

(Prevalence of Positives and S.C.R.s)

Grade	Effort		Positives %	S.C.R.	Number in Grade (100 %)
III	Slight	(a) intermittent	33	86.0	601
		(b) sustained	37	103.5	393
IV	Moderate	(a) intermittent	39	101.5	553
		(b) sustained	(50)	(105.3)	12
V	Maximum	(a) intermittent	43	102.8	623
		(b) sustained	52	117.1	260

SOURCE APPENDIX IX (b)

heavy demands, and 52 for those engaged in work requiring sustained effort by the Back (S.E.D. 317). These differences can also be found in the S.C.Rs. for each pair of observations ; the difference between ratios being most marked for jobs with the two heaviest gradings.

From the above tables there seems little doubt that men engaged in jobs putting a heavy strain in the back have the highest prevalence of recent rheumatic complaints and that the prevalence of these complaints increases as the strain increases.

Men with jobs requiring sustained and maximum muscular effort by the Back have a much higher prevalence rate than all other workers (52 percent compared with 39 percent). Even when allowance is made for age then the difference between the prevalence of complaints for men in the heaviest grade and for those doing other manual work is statistically significant ($X^2 = 5.8$ $p < 0.02 > 0.01$)

The different rheumatic diseases which affected men in the different grades of effort by the Back can now be considered in the light of the figures for rheumatism as a whole. In order to take account of the difference in the prevalence of some rheumatic diseases which are known to occur with increasing age comparisons have been made by means of Standardised Disease Ratios (S.D.R) calculated from the formula :

$$\text{S.D.R.} = \frac{\text{Observed number of men with the disease}}{\text{expected number of men with the disease}} \times 100$$

The standardised ratios for the diagnosis of disk disease, local osteo-arthritis, indeterminate pains and for all other rheumatic diseases are listed in table XLIII.

TABLE XLIII

TABLE XLIII

RHEUMATIC DISEASES AND EFFORT BY BACK

(S.D.Rs. for different grades)

Grade	Effort	Rheumatic Diseases			
		Disk Disease	Local osteoarthrosis	Indeterminate pains	Other diagnoses
I,II	Minimum	94.3	113.2	99.5	102.2
III	Slight	90.3	85.4	101.0	90.8
IV	Moderate	98.4	114.2	101.4	92.7
V	Maximum	113.5	104.2	98.5	108.4

SOURCE APPENDIX IX (c)

The prevalence of disk disease increases with an increase in the effort by the Back which is associated with the job. The ratio for disk disease among workers in the heaviest jobs (grade 5) is higher than that for those in any of the other grades. There were 132 (14.9 percent) men with disk disease in grade V out of a total of 883 workers in this grade. In the subdivisions of the grade the prevalences were 87 (14.0 percent) out of 623 for those in Va and 45 (17.3 percent) out of 260 for those in Vb, and the standardised ratios were 108.1 and 125.7 respectively.

The closeness of the ratios to the mean in the case of indeterminate pains for each of the grades suggests that these occur regardless of effort at least so far as the Back is concerned. The range of values for S.D.R. is widest between the different grades in these for local osteoarthrosis but there is no steady trend through the grades. This absence of trend applies also in the case of other rheumatic diseases, under which heading are included the small number of men with rheumatoid arthritis and also those with general osteoarthrosis.

ARIS

The prevalence of positives in men working in different jobs assessed under this heading show a somewhat different picture to that found in the previous section. The numbers of positives together with the prevalence rates and S.C.Rs. for each grade are as shown in table XLIV

TABLE XLIV

There are 21 positives among the 54 men in the combined group of grades I and II, and there are 79 positives out of 163 men in grade III. The prevalence rates of positives in these two groups therefore are

TABLE XLIV

RHEUMATIC COMPLAINTS AND EFFORT BY ARMS

(Prevalence rates for positives and S.C.Rs)

Grade	Effort	Positives %	S.C.R.	Number of men in grade (100 %)
I & II	Minimum	39	86.8	52
III	Slight	49	114.4	163
IV	Moderate	36	95.6	1392
Va	Maximum (intermittent)	42	99.3	738
Vb	Maximum (sustained)	50	112.2	337
All grades		40	100	2684

SOURCE APPENDIX X (b)

39 and 49 percent respectively. These rates are both higher than that for men with jobs in the next most strenuous group (those in which moderate effort is required by the Arms). In this group of 1392 workers there are 497 men (36 percent) who were classed as positive, while the expected number of positives after allowance for age is 520. The S.C.R. for this group of workers (96) is thus lower than that for grade III and rather similar to that for men in grade IV.

Men with jobs which required intermittently heavy effort by the arms had a prevalence rate of 42 percent positives while the rate for those doing work where the effort by the arms was continued for long spells was 50 percent. The difference between these rates is significant (S.E.D. = 3.4)

The relationship between effort made by the Arms and the prevalence of rheumatic complaints is not^{as} clear as it is in the case of the effort required by the back. Those in the heaviest grade who have to sustain the maximum effort for a prolonged period have a higher proportion of positives than do the men in all the other grades combined (50 percent compared with 39 percent). This difference is found even when allowance is made for age ; the difference between the observed and expected prevalences is such that the proportion of men with rheumatic complaints during the past year in grade V (b) is significantly higher than the proportion for all other manual workers who were observed grouped together ($X^2=4.5$ $p < 0.05 > 0.02$). This finding is similar to that which has already been described in connection with assessment of jobs in grade Vb of the assessments made for the effort required by the Back.

TABLE XIV

TABLE XLV

RHEUMATIC DISEASES AND EFFORT BY ARMS

(S.D.Rs. for different grades)

Grade	Effort	Rheumatic Diseases			
		Disk Disease	Local osteoarthrosis	Indeterminate pains	Other diagnoses
I-IV	Minimum-Moderate	92.5	103.1	101.0	97.1
Va	Maximum (intermittent)	101.4	102.3	104.6	86.7
Vb	Maximum (sustained)	126.3	124.5	86.4	140.6

SOURCE APPENDIX X (c)

The S.D.Rs. of the different rheumatic diseases which were observed when men in the different grades were examined are given in table XLV. The number of men with any specified rheumatic disease in the grades from I to III inclusive is rather small to work out ratios reliably so these grades have been combined with grade IV in this presentation. There are high ratios for both disk disease and osteoarthritis in men doing jobs which have the highest classification (grade Vb). This is also the case for the diseases grouped under the heading of all other diagnoses but not for those with indeterminate pains, where men in the heaviest jobs have the lowest ratio.

HANDS

There were relatively few men examined who are classified as working in jobs of grades I or II. These have been combined in Table XLVI with grade III but in each of the other grades those making intermittent effort are shown separately from those in whom the effort by the hands was continued over a long period.

TABLE XLVI

There were 454 men in jobs in which relatively little effort by the Hands was required (grades I - III); of these there were 183 (40 percent) who were positives. The prevalence rates for positives are nearly the same (41 percent) for workers in jobs with both the grading s IVa and IVb. After allowance is made for age the ratio is slightly higher in grade IVa than IVb. There are proportionately fewer men with jobs in the highest grade in the assessment of effort made by the hands who stated that they had rheumatic complaints. Furthermore the standardised complaint ratios for each subsection of grade V. are both

TABLE XLVI

RHEUMATIC COMPLAINTS AND EFFORT BY HANDS
(Prevalence rates for positives and S.C.Rs).

Grade	Effort	Positives %	S.C.R.	Number of men in grade (100%)
I-III	Minimum- Slight	40	102.4	454
IVa	Moderate (intermittent)	41	107.1	522
IVb	Moderate (sustained)	41	100.4	754
Va	Maximum (intermittent)	39	87.4	297
Vb	Maximum (sustained)	36	94.5	657
All Grades		40	100	2684

below the average.

Neither the prevalence rate nor the S.C.R. of the workers in any particular grade stand out significantly from any other or from the others as a whole. In this respect the picture gained by assessing jobs from the point of view of effort by the Hands is quite different which has been discussed under the headings of either Back or Arms.

As was the case when the prevalence ^{of} individual rheumatic diseases were being considered in connection with the assessment of effort by Arms, there are rather few cases of specific rheumatic diseases in any of the grades from I - III inclusive to enable the technique of using S.D.Rs. for comparative purposes to be used satisfactorily. The ratios for separate rheumatic diseases observed in men with jobs in the two subdivisions of grade V and for men with jobs in all the combined ratio for the other grades combined are shown in table XLVII.

TABLE XLVII

The ratio for men with disk disease in grade Vb is much higher than that for those graded Va, but is not as high as the ratio for workers in grade I - IV inclusive. No significance can be attached to these differences as the numbers are so small that they might have occurred by chance.

It has already been shown that maximum physical effort by the hands is not related to a high prevalence of rheumatic complaints as a whole, and this would seem to be true also for any of the different types of rheumatism which have been listed here. It also appears to be true for the small numbers of cases of general osteoarthritis; the observed and expected prevalences of this disorder for men working in jobs classed as grade V are 16 and 21 respectively giving a standardised ratio of 75.

TABLE XLVII

RHEUMATIC DISEASES AND EFFORT BY HANDS

(S.D.Rs. for different grades)

Grade	Effort	Rheumatic Diseases			
		Disk Disease	Local osteoarthritis	Indeterminate Pains	Other Diagnoses
I-IV	Minimum-Moderate	104.5	107.0	102.4	103.8
Va	Maximum (intermittent)	74.7	82.2	100.3	96.2
Vb	Maximum (sustained)	102.0	90.9	92.1	91.3

SOURCE APPENDIX XI (c)

LEGS

The pattern of the prevalence of rheumatic complaints observed under this heading is similar to that already observed under the heading of Back.

TABLE XLVIII

In table XLVIII the prevalence rates of positives among men working in jobs assessed from the point of view of different grades of muscular effort by the legs are presented. In these jobs in which the effort can be regarded as being minimal (grade II) the number of positives is 285 giving a prevalence rate of 37 percent out of a total of 762 men assessed in this way. The jobs placed in this category are mainly those at which men stand at machines without operating pedals.

The prevalence rate is higher for men assessed as making some slight demands of their legs (grade III), among whom there were 111 positives (35 percent) out of a total of 320 workers. From this point increase in the amount of effort made by the legs in performing the job was associated with an increase in the prevalence of positives in the men working in these jobs.

This picture of a relatively high prevalence in the lightest grade and an increasing prevalence of positives in the next 3 grades is also shown in the standardised complaint ratios which are given in table XLVII. The ratio was 97.3 for those doing the lightest jobs, but fell to 84.9 for those jobs requiring minimal effort and thereafter the ratio rose progressively through 101.1 to 103.9 for those in the heaviest jobs.

When each of the three heavier grades is subdivided on the basis of whether the effort required was occasional or continued over a period then a pattern similar to that noticed when the assessments of effort by

TABIE XLVIII

RHEUMATIC COMPLAINTS AND EFFORT BY LEGS

(Prevalence rates for Positives and S.C.Rs)

Grade	Effort	Positives %	S.C.R.	Number of men in grade (100%)
I-II	Minimum	37	97.3	762
III	Slight	35	84.9	320
IV	Moderate	40	101.1	737
V	Maximum	44	103.9	865
All Grades		40	100	2684

SOURCE APPENDIX XII (b)

TABLE XLIX

INTERMITTENT AND SUSTAINED EFFORT BY LEGS

(Prevalence of Positives and S.C.R.s)

Grade	Effort	Positives %	S.C.R.	Number in grade (100%)	
III	Slight	(a)intermittent	33	81.7	258
		(b)sustained	42	97.2	62
IV	Moderate	(a)intermittent	37	100.2	660
		(b)sustained	51	107.6	77
V	Maximum	(a)intermittent	43	103.1	618
		(b)sustained	51	115.1	247

SOURCE APPENDIX XII (b)

the Back were being considered. This is shown in table XLIX in which the prevalence rates and S.C.Rs. are given for workers engaged in occupations in each of these six subdivisions.

TABIE XLIX

For each of the 3 grades the prevalence rate and S.C.R. for men in the jobs requiring intermittent effort were lower than those for men in jobs requiring prolonged or continuous effort. Men working in jobs in which maximum and prolonged effort (Vb) by the Legs was needed had the highest S.C.R. and when this figure is considered in relation to those for all other grades combined then the number of positives is significantly higher than might have occurred by chance when allowance is made for the ages of the men concerned (X^2 4.9 $p < 0.05 > 0.02$).

The position as far as individual rheumatic diseases is concerned is very similar to that found when considering the Back; the ratios are given in table L. The relationship between disk disease and effort by the legs is demonstrated but there is no very clear pattern demonstrable in specific ratios for the other diseases.

TABIE L

SUMMARY OF THE EFFECTS OF EFFORT

The prevalence of rheumatic complaints and diseases have been considered in relation to the effort needed by different parts of the body to carry out the operations of particular jobs. It has been suggested that jobs which make the heaviest demands on the Back, Arms and Legs are associated with the highest complaint rates. This association is especially noticeable when these maximum demands are continued for long periods of time (i.e. those in grade Vb). Statistical evidence supports this in that

TABLE L**RHEUMATIC DISEASES AND EFFORT BY LEGS**

(S.D.Rs. for different grades)

Grade	Effort	Rheumatic Disease			
		Disk Disease	Local osteoarthritis	Indeterminate pains	Other diagnoses
I-II	Minimum	91.8	106.0	91.8	104.8
III	Slight	95.3	60.3	95.2	88.4
IV	Moderate	95.1	109.1	105.2	91.8
V	Maximum	112.4	102.8	98.3	107.5

SOURCE APPENDIX XII (c)

men who work in jobs with the highest classification in any of these three assessments have a significantly higher prevalence of complaints than those in all the other jobs which were assessed as part of this study. These high prevalence rates are reflected in the higher rates of disk disease, local osteoarthritis and other specified rheumatic diagnoses which were observed on examining men whose jobs were graded Vb under any of these three assessments. The prevalence of indeterminate pains on the other hand is relatively low among men engaged in these heavy occupations.

In the case of assessments made in respect of the effort made by the hands there is no evidence to suggest that complaints as a whole or particular diseases individually are related to physical demands.

TABLE II

In further support of these observations the prevalence rates of complaints in different sites of the body are given in table II. These rates have been expressed as percentages of the number of workers whose jobs were graded in the appropriate grades under the respective headings of Back, Arms, Hands and Legs. The rates for complaints in the limbs are based on the mean prevalences for the right and left sides.

Complaints sited in the Back, Arms and Legs occur most frequently in those men whose jobs are graded V for each of the appropriate assessments. This, however, is not the case for complaints sited in the hands. There were 125 men who said they had had complaints of the right hand and 112 who had had them in the left hand at some time during their lives. The mean prevalence of complaints affecting the right and left hands for those graded I - III under the heading of Hand is 5.7 percent, while the

TABLE II

RHEUMATIC COMPLAINTS IN DIFFERENT SITES

(Prevalence of Positives and Intermediates
per 100 workers in appropriate grades)

Grade (for Back, Arms, Hands or Legs)	Effort	Prevalence of Complaints (Positives and Intermediate)			
		Back	Arms	Hands	Legs
I - II	Minimum	7.1	5.1	5.0	4.9
III	Slight	6.8	3.3	6.2	6.6
IV	Moderate	10.1	3.7	3.9	6.5
V	Severe	11.5	7.2	3.4	9.2
All Grades		8.2	4.0	4.4	6.2

SOURCE APPENDIX XV

equivalent rate for those in grades IV and V together is 3.7. The difference between these proportions is significant (S.E.D. = 0.9), thus it would appear that rheumatic complaints in the Hands are found more commonly among men with jobs which do not require much effort by the Hands.

RHEUMATIC COMPLAINTS AND POSTURE

TABLE LII

The prevalence of rheumatic complaints of any kind for the different grades under this heading are given in table LII together with the S.C.Rs. The prevalence rate is highest for men with jobs which are mainly sedentary. There were only 10 positives (36 percent) out of 28 men whose occupations were entirely sedentary. Second highest prevalence rate (41 percent) was observed in the 316 men with jobs in grade V. The S.C.R. values follow the same pattern as the prevalence rates, and when this allowance is made for age the difference between the ratios for sedentary workers in grades I and II and those in the other 3 grades combined is not statistically significant.

TABLE LIII

When disk disease is considered on its own however, then a higher prevalence can be demonstrated among men engaged in sedentary occupations. Table LIII shows the prevalence and standardised ratio for disk disease in the men working in jobs with different grades of Posture. Those in sedentary occupations have a higher prevalence of disk disease than men in any of the other grades. The difference between these prevalence rates is not statistically significant (S.E.D. = 1.8) but when allowance is made for age then the 69 cases of disk disease which were observed in the 470 men working in sedentary jobs (S.D.R. 122.7) is a significantly higher proportion than the 258 cases which were observed in the 2214 men

T A B L E L I I

RHEUMATIC COMPLAINTS AND POSTURE AT WORK.

(PREVALENCE OF POSITIVES AND S. C. Rs.)

GRADE	POSTURE	NUMBER OF POSITIVES (%)		S. C. R.	NUMBER OF MEN IN GRADE (100%)
I + II	Sedentary	206	43.8	109.9	470
III	Mainly Standing	392	40.4	98.4	970
IV	All Standing	346	37.3	94.0	928
V	Walking $\frac{1}{2}$ mile +	129	40.8	101.1	316
ALL GRADES		1073	40.0	100	2684

Source Appendix XIII (b)

T A B L E L I I I

DISK DISEASE AND POSTURE AT WORK.

(PREVALENCE OF DISK DISEASE AND S.D.Rs.)

GRADE	POSTURE	PREVALENCE OF DISK DISEASE (%)	S.D.R.	NUMBER OF MEN IN GRADE (100%)
I + II	Sedentary	14.7	122.7	470
III	Mainly Standing	11.5	91.3	970
IV	All Standing	11.7	99.0	928
V	Walking $\frac{1}{4}$ mile +	11.7	97.6	316
ALL GRADES		12.2	100	2684

Source Appendix XIII (e)

working in other jobs with higher gradings ($\chi^2 = 3.89$ $p < 0.05 > 0.02$).

TABIE LIV

The prevalence of local osteoarthritis was found to increase progressively in men with jobs in high gradings. This trend is shown in Table LIV and the gradual increase in prevalence rates can also be observed in the standardised ratios for the different grades. In contrast to these trends for men with local osteoarthritis the opposite occurs in men suffering from indeterminate pains. There is a gradual fall in the prevalence rates and standardised ratios as the grades increase in severity.

TABIE LV

The tendency for osteoarthritis to increase and for indeterminate pains to decrease can also be seen in those workers in grades where some movement was necessary as part of the job. The prevalence rates and standardised ratios for the two diseases affecting men in each of four grades is shown in table LV. The prevalence of osteoarthritis gradually increases from 4.7 percent in those in jobs where the worker has some standing and moving about to 7.6 percent for those walking long distances. In view of the small numbers of cases seen it is not possible to say that this increase could not have occurred by chance, but the trend is supported by the figures for the standardised ratios which also show a continuous increase from 65.4 for men in grade II b up to 130.4 in grade V. This suggests that the trend is not due to an artefact caused by differences in age structure of the four grades.

The reversal of this falling trend is seen in the figures for indeterminate pains in the grades associated with movement and these are also in table LV. The prevalence rate falls from 38.5 percent for men in grade IIb to 30.4 percent for men in grade IIIb, which is a significant

T A B L E L I V

RHEUMATIC DISEASES AND POSTURE AT WORK

(PREVALENCES OF L.O.A. AND INDETERMINATE PAINS, AND S.D.Rs.)

GRADE	POSTURE	L. O. A.	A.	INDETERMINATE PAINS		NUMBER OF MEN IN GRADE (100%)
		Cases %	S.D.R.	Cases %	S.D.R.	
I + II	Sedentary	4.5	85.3	33.6	113.5	470
III	Mainly Standing	6.2	95.5	29.5	101.0	970
IV	All Standing	6.4	104.4	26.5	95.2	928
V	Walking $\frac{1}{2}$ mile +	7.6	130.4	26.3	89.8	316
ALL GRADES		6.1	100	28.8	100	2684

Source Appendix XIII (c)

T A B L E I V

RHEUMATIC DISEASES AND POSTURE AT WORK - MOVEMENT.

(PREVALENCE RATES FOR LOA AND INDETERMINATE PAINS AND S.D.R.)

GRADE	POSTURE	L. O. A.		INDETERMINATE PAINS		NUMBER OF MEN IN GRADE (100%)
		Cases %	S.D.R.	Cases %	S.D.R.	
IIb	Some Standing	4.7	65.4	38.5	120.3	234
IIIb	Mainly Standing	6.5	98.0	30.4	102.5	875
IVb	All Standing	6.7	115.9	27.3	100.9	564
V	Walk $\frac{1}{2}$ mile	7.6	130.4	26.7	89.8	316
I IIa	STATIC	4.9	88.0	26.0	93.0	695
IIIa IVa	(All grades)					
ALL	GRADES	6.1	100	28.8	100	2684

Source Appendix XIII (c)

difference of proportions (S.E.D. = 3.7). This trend continues through grade IVb and falls to 26.7 for men in grade V, the differences between these proportions are not statistically significant. This trend is also followed by a fall in the standardised ratios from 120.3 down to 89.8. This is again an indication that the fall in the prevalence rate of indeterminate pains in these grades is not attributable merely to differences in the age composition of the groups.

SITE

TABLE LVI

The prevalences of rheumatic complaints for men working in different grades under this heading are given in table LVI together with the standardised complaint ratios; neither of these show a decided trend.

The 713 men who worked mainly or entirely out of doors (grades IV,V) can be contrasted with the 1971 who worked mainly or entirely indoors (grades I, II,III). There are 263 positives (37 percent) among the outdoor workers and 810 positives (41 percent) among the indoor workers; this difference is significant (S.E.D. = 2.1). The S.C.Rs. for the outdoor and indoor workers are 90.2 and 100.4 respectively. Thus when expected rates based on the age distributions of these two groups of workers are taken into account the difference in the prevalence of rheumatic complaints is statistically significant ($\chi^2 = 6.1 < 0.02 > 0.01$).

TABLE LVII

This difference between indoor and outdoor workers becomes less marked when the prevalence rates for the different types of rheumatic diseases are considered (See table LVII). The S.D.Rs., which take the age distribution into account, show that there are differences between the two sets of workers. The ratio for the indoor workers is slightly higher than for the outdoor workers for each of the two diseases mentioned specifically (disk disease and local osteoarthritis) and also for

TABLE LVI

RHEUMATIC COMPLAINTS AND SITE OF WORK

(PREVALENCE OF POSITIVES AND S.C.Rs.)

GRADE	SITE	POSITIVES	(%)	S.C.R.	NUMBER OF MEN IN GRADE (100%)
I	Office	18	39.1	113.2	46
II	Temperate Workshops	183	37.8	100.7	484
III	Intemperate Workshops	609	42.3	104.3	1441
IV	Mainly Outdoor	188	35.7	86.9	527
V	Outdoor All weather	75	40.3	99.8	186
ALL GRADES		1073	40.0	100	2684

Source Appendix XIV (b)

T A B L E LVII

RHEUMATIC DISEASES AND SITE OF WORK

(PREVALENCE OF CASES AND S.D.R.s FOR INDOOR AND OUTDOOR WORKERS)

GRADE	SITE	DISK DISEASE		LOCAL OSTEO-ARTHRITIS		INDETERMINATE PAINS		OTHER DIAGNOSES		NUMBERS OF MEN IN GRADE (100%)
		Cases %	SDR	Cases %	SDR	Cases %	SDR	Cases %	SDR	
I - III	Indoor workers	12.6	104.8	6.5	107.7	28.8	100.6	7.0	100.6	1971
IV & V	Outdoor workers	10.9	87.2	3.6	79.8	28.7	98.4	5.8	98.4	713
ALL GRADES		12.2	100	6.1	100	28.8	100	6.7	100	2684

Source Appendix XIV (e)

indeterminate pains and for the combined group of other rheumatic complaints.

SICKNESS ABSENCE

It has already been shown that those occupations which are commonly regarded as heavy in their physical demands are associated with a high rate of sickness absence. The four separate measures of physical effort in the system of job analysis (Back, Arms, Hands and Legs) can each be considered separately with regard to sickness absence.

BACK

T A B L E LVIII

Table LVIII shows the number of weeks lost per 100 workers and the average number of weeks lost by each man who had to stay away from work because of rheumatic disease, and the Standardised Absence Ratios (S.A.R) for the different grades of this classification.

Workers doing jobs which are classified as light as far as effort by the Back is concerned (grades I and II combined) have the heaviest average loss. The loss in this grade averages 60.3 weeks per 100 men, and every spell in which a man has to stay away from work because of rheumatism lasts an average of 9.1 weeks. The S.A.R. (150.5) is also higher for workers in these lighter jobs than for those in any of the other grades.

Men in grade III have a relatively low absence rate (20.3 weeks per 100 men) and the spells of absence last for an average of 4.1 weeks. The amount of absence reckoned in weeks per 100 workers increases from this low level in grade III up to an average of 50.8 in grade Vb, while the S.A.Rs show a similar increase from 64.7 in grade III to 135.7 in grade Vb. The average durations of spells of sickness in the four higher grades shown in table LVIII do not alter so much from grade to grade as do the other two indices of the effects of sickness absence from rheumatism in the workers who made up the material for this study.

T A B L E LVIII

SICKNESS ABSENCE AND EFFORT AT WORK - BACK

(WEEKS LOST, DURATION AND S. A. R. IN DIFFERENT GRADES)

GRADE	EFFORT	WEEKS LOST PER 100 WORKERS	AVERAGE DURATION OF SPELL (WEEKS)	S. A. R.	NUMBER OF MEN IN GRADE
I + II	Minimum	60.3	9.1	150.5	242
III	Slight	20.3	4.1	64.7	994
IV	Moderate	32.6	5.3	97.5	565
V(a)	Maximum:- intermittent	41.4	5.1	113.2	623
V(b)	sustained	50.8	4.9	135.7	260
ALL GRADES		34.4	5.2	100	2684

Source Appendix IX(d)

ARMS

TABLE LIX

Table LIX shows the rates of sickness absence for the different grades under this heading. The four grades shown in the Table are the equivalent ones to those which were used when discussing sickness absence related to effort by the Back. Once again it is those in the grades requiring least effort (grades I and II) who lose the greatest number of weeks per 100 men (66.7). These workers also have the highest standardised absence ratio (161.4).

The average duration of a spell of illness is also at its highest for men doing jobs in grades I and II. This observation must be viewed with caution however since the number of men in these grades who had to be absent during the year prior to interview was only three. The average number of weeks lost per 100 men (4 percent) and the S.A.R. (38.1) are lowest for men in grade III, and both these measures of sickness shown a gradual increase through ^{grade IV and} both subdivisions of grade V.

HANDS

TABLE IX

When sickness absence is considered from the point of view of effort by the Hands only men in grades III IV and V can be discussed since there were only 12 men in grades I and II. Table IX shows the rates of sickness absence with jobs in the higher grades. The number of weeks lost per 100 workers shows very little alteration between the different grades of this assessment. Men who were called upon to make the maximum effort with their hands intermittently (grade Va) have the lowest S.A.R. (80.4) and also the 25 men in this grade, who had to stay away from work, only lost an average of 3.8 weeks during the year. This is rather lower than that for men in the other grades, but the difference is not significant statistically.

T A B L E L I X

SICKNESS ABSENCE AND EFFORT AT WORK - ARMS.

(WEEKS LOST, DURATION AND S. A. R. IN DIFFERENT GRADES)

GRADE	EFFORT	WEEKS LOST PER 100 WORKERS	AVERAGE DURATION OF SPELL (WEEKS)	S. A. R.	NUMBER OF MEN IN GRADE
I + II	Minimum	66.7	12.0	161.4	54
III	Slight	13.5	3.7	38.1	163
IV	Moderate	30.0	5.6	94.4	1392
V(a)	Maximum:- intermittent	36.2	4.4	98.3	738
V(b)	sustained	53.1	5.4	140.5	337
ALL GRADES		34.4	5.2	100	2684

Source Appendix X(d)

T A B L E L X

SICKNESS ABSENCE AND EFFORT AT WORK - HANDS

(WEEKS LOST, DURATION AND S.A.R. IN DIFFERENT GRADES)

GRADE	EFFORT	WEEKS LOST PER 100 workers	AVERAGE DURATION OF SPELL (WEEKS)	S.A.R.	NUMBER OF MEN IN GRADE
I + II	Minimum	0	-	-	12
III	Slight	35.5	5.6	106.7	442
IV	Moderate	34.8	5.2	101.1	1276
V(A)	Maximum:- intermittent	31.6	3.8	80.4	297
V(B)	sustained	34.6	5.7	106.1	657
ALL GRADES		34.4	5.2	100	2684

Source Appendix XI(d)

T A B L E L X I

SICKNESS ABSENCE AND EFFORT AT WORK - LEGS

(WEEKS LOST, DURATION AND S.A.R. IN DIFFERENT GRADES)

GRADE	EFFORT	WEEKS LOST PER 100 WORKERS	AVERAGE DURATION OF SPELL(WEEKS)	S.A.R.	NUMBER OF MEN IN GRADE
I + II	Minimum	22.7	4.7	69.9	762
III	Slight	38.1	6.1	109.7	320
IV	Moderate	31.6	5.4	94.6	737
V (a)	Maximum:- intermittent	42.2	5.1	116.5	613
V (b)	sustained	53.8	4.9	143.3	247
ALL GRADES		34.4	5.2	100	2684

Source Appendix XII (d)

LEGS

TABLE LXI

Table LXI shows the equivalent findings for sickness absence in different grades of assessment under this heading. When jobs are considered from the point of view of the amount of effort required by the legs then men in jobs which require maximum physical effort for a prolonged period have the highest S.A.R. (143.3); also the average number of weeks lost per 100 workers is highest in the grade (53.8). The average duration of the spells of rheumatic illness (4.9) is not the highest but there is little difference in this duration from grade to grade. The general picture is that an increase in the physical demands made of the legs is associated with an increase in the amount of absence due to rheumatism.

TABLE LXII

A summary of the relationship between heavy physical work and absence from rheumatic illness is given in table LXII. The S.A.Rs. for the heaviest grades of each of the four measures of physical effort (Back, Arms, Hands, Legs) have been compared with the S.A.Rs. for all workers in the other grades.

This shows fairly conclusively that men involved in heavy manual work making prolonged use of their limbs and back have a high rate of absence due to rheumatic disease. The observations made in connection with table LVIII-LXI inclusive however indicate that in the less arduous grades of work other factors may play a part in leading to sickness absence. Since men with jobs in grades I and II in the assessment of Back and Arms had higher ratios than did workers who were in the grade III, while those in grade III in the assessment of Legs had a higher ratio than men in grade IV.

T A B L E L X I I

SICKNESS ABSENCE AND EFFORT AT WORK - BACK AND LIMBS

(S.A.R. FOR GRADE Vb COMPARED WITH OTHER GRADES)

EFFORT BY	STANDARDISED ABSENCE RATIOS	
	GRADE Vb MAXIMUM EFFORT (SUSTAINED)	ALL OTHER GRADES
Back	138.7	95.8
Arms	140.5	93.4
Hands	106.1	96.7
Legs	143.3	95.1

Source Appendix IX (d)
X (d)
XI (d)
XII (d)

T A B L E L I I I

POSTURE

There were 21 men (4.5 percent) out of a total of 470 in sedentary occupations who had had to stay off work because of rheumatic disease during the previous year . Among 1898 men who had to stand to do their work there were 133 (7.0 percent) who had been absent, while there were 24 (7.6 percent) out of the 365 men who had to walk long distances in the course of their work.

The time lost is shown in table LXIII along with the average duration of the spells of illness in each of the three groups and the S.A.Rs. The spells of those in the jobs which required the man to stand all or most of the time were associated with a slightly longer spell of absence (5.3 weeks) than those in the sedentary occupations (4.7 weeks). More striking than this however is the difference between the men in sedentary occupations and those in the other two groups when their absence patterns are compared by means of the S.A.Rs. The total amount of sickness absence is lower than the expected total for men in sedentary occupations, giving a ratio of 59.4.

SITE

T A B L E L X I V

When sickness absence from rheumatic causes is considered from the point of view of the site where men have to work then it is found that those in the more comfortable environment are again more fortunate. There were 23 (4.3 percent) out of 530 men working in reasonably comfortable workshops who had to stay off work. Out of 1441 men working in open sheds or places where there was poor temperature control there were 109 (7.6 percent) who had been absent, while a spell of absence was reported by 46 men (6.4 percent) from among the 713 men whose work was either wholly or mainly out of doors. The time lost is shown in table LXIV together with the average duration of sickness in each group and also the S.A.Rs. It is the men in the intemperate workshops who stay off work longer and also it is they who

T A B L E L X I I I

SICKNESS ABSENCE AND POSTURE AT WORK

(WEEKS LOST, DURATION AND S.A.R. IN DIFFERENT GRADES)

GRADE	POSTURE	WEEKS LOST PER 100 WORKERS	AVERAGE DURATION OF SPELL (WEEKS)	S. A. R.	NUMBER OF MEN IN GRADE
I + II	Sedentary	19.8	4.7	59.4	470
III + IV	Standing	37.5	5.3	108.2	1898
V	Walking distances	37.6	4.9	109.8	316
ALL GRADES		34.4	5.2	100	2684

Source Appendix XIII (d)

T A B L E L X I V

SICKNESS ABSENCE AND SITE OF WORK.

(WEEKS LOST, DURATION AND S.A.R. IN DIFFERENT GRADES)

GRADE	SITE	WEEKS LOST PER 100 WORKERS	AVERAGE DURATION OF SPELL (WEEKS)	S.A.R.	NUMBER OF MEN IN GRADE
I + II	Temperate workshops	19.6	4.5	63.2	530
III	Intemperate workshops	42.7	5.7	122.1	1441
IV + V	Mainly outdoor	28.3	4.4	79.8	713
ALL GRADES		34.4	5.2	100	2684

Source Appendix XIV (a)

who have the highest S.A.R; these men have a ratio of 122.1 which is much higher than that for either the indoor workers (63.2) or the outdoor workers (79.8).

CHAPTER VII

SPECIAL STUDIES IN SELECTED INDUSTRIES

In previous chapters it has been shown that rheumatic diseases lead to sickness absence and that in the industries which have been studied the loss for every hundred affected men ranges from 66 weeks a year between the ages of 15 to 24 to 105 weeks for those over 55. This amount of sickness absence is likely to lead to financial hardship in many cases especially when there is any question of hire purchase commitments.

In the dockyard this financial loss was less marked than elsewhere because men in this industry, who were ill, were given their wages for a period of 13 weeks in every year providing the cause of the illness was confirmed by a medical certificate. In practice the insurance benefit was claimed by any man who was absent because of ill health and the dockyard augmented this allowance by a sum sufficient to increase it to the level of his basic wage. Many men were receiving bonuses or doing "piece work" however, and these all suffered financially when they were off work. In spite of this the hardship did not appear to be nearly so great as it was in the case of those working elsewhere.

In order to find out if rheumatic diseases lend to social hardship in men who are protected to some extent financially a special study has been made using information obtained from men who were employed at the dockyard.

The cards of all the Negatives were first arranged in age groups and random samples of the cards in each age group were taken so that the proportion in each corresponded with the proportion in the corresponding age group for the Positives. Table LXV shows the numbers of the proportions in each age group of the Positives and for the sample of the Negatives which was selected in this way.

TABLE LXV

(163)

T A B L E L X V

AGE DISTRIBUTION OF POSITIVES AND SELECTED NEGATIVES.

(DOCKYARD WORKERS ONLY)

AGE IN YEARS	POSITIVES		SELECTED NEGATIVES	
	NUMBERS OF MEN	%	NUMBERS OF MEN	%
15-	8	1.53	5	1.52
20-	22	4.21	14	4.26
25-	66	12.64	42	12.76
35-	95	18.20	60	18.24
45-	184	35.25	116	35.25
55-	140	26.81	88	26.74
65+	7	1.34	4	1.22
ALL AGES ON WHICH PERCENTAGES ARE BASED	522	100	329	100

It was not possible to match each Positive individually with a Negative since there were proportionately more Positives than Negatives in the older age groups. All the Negatives from among those aged 45-54 (116) were used and the total size of the sample of selected Negatives who were in this age group corresponded as closely as possible with the percentage of all the Positives who were of equivalent age. This method gave the largest possible sample of Negatives matched by age with the Positives. The samples were selected by using random numbers after the cards in each age group had first been arranged in order of their number of registration.

Because of the number of apprentices in the dockyard the lowest age group was divided into two five year periods. Furthermore it was felt that men over 65 who stay on at work might be more likely to be the healthier members of their generation so they too were treated separately when the sample was being selected.

OPINIONS ABOUT WORKING CONDITIONS

The answers which were given by men classed as Positives and by those in the selected sample of negatives to questions about their working conditions have been compared and the results are given in tables LWI (a, b, c).

TABLE LXVI

There were 179 Positives (34 percent) who stated that they were working in cold conditions as opposed to 115 out of 329 Negatives (35 percent) who made similar claims. There were also 75 Positives (14 percent) who said they worked in conditions which changed from hot to cold, while 30 (9 percent) of the Negatives stated that worked in changing conditions of temperature.

There was therefore a slightly larger proportion of Negatives (51 percent) who said that they worked in average surroundings compared with 48 percent of Positives. This difference is not however significant on statistical testing.

T A B L E L X V I

WORKING CONDITIONS - POSITIVES AND SELECTED NEGATIVES

(OPINIONS OF DOCKYARD WORKERS)

(a) TEMPERATURE

	WORKING CONDITIONS					NUMBER OF WORKERS (100%)
	HOT	COLD	TEMPERATE	CHANGING	UNCERTAIN	
Positives (%)	3.8	34.3	47.5	14.4	0	522
Selected Negatives (%)	4.3	35.0	51.4	9.1	0.3	329

(b) HUMIDITY

	WORKING CONDITIONS				NUMBER OF WORKERS (100%)
	WET	DRY	CHANGING	UNCERTAIN	
Positives (%)	23.0	68.8	7.3	1.0	522
Selected Negatives (%)	19.8	72.6	7.0	0.6	329

(c) EFFORT

	WORKING CONDITIONS					NUMBER OF WORKERS (100%)
	SEDENTARY	LIGHT	MODERATE	HEAVY	VERY HEAVY	
Positives (%)	1.7	33.5	43.3	16.1	5.4	522
Selected Negatives (%)	2.4	32.5	46.8	12.2	6.1	329

Turning to the opinion expressed by the workers on the humidity of their working conditions (table LXVb) the figures are again seen to be closely comparable. Twenty three percent of Positives claimed that they were working in wet conditions, and a further 7 percent worked in conditions where they were liable to get wet from time to time. The corresponding rates for the Negatives are 20 percent and 7 percent respectively.

The third aspect of their work about which the men were asked was the grading which they themselves put on the job as far as physical effort was concerned. There were 112 Positives (21 percent) who said that the work they did was either heavy or very heavy, and the equivalent figure for those without symptoms was 60 (18 percent). Here again there is no significant difference.

The opinions expressed by men from the two groups of workers are thus very similar in respect of the temperature and humidity of their places of work and of the physical demands of their jobs. In each of these assessments there was a slight but insignificant increase in the proportion of Positives who claimed that the conditions under which they worked were more rigorous than those endured by their Negative counterparts.

CHANGE OF OCCUPATION

Each man was asked about any changes in job (i.e. from one place of work to another) which he had made and which he attributed to ill health. A summary of the answers for both Positives and for the selected sample of Negatives among dockyard employees is shown in Table LXVII.

TABLE LXVII

There were 59 (11 percent) out of a total of 522 positives who stated that they had changed jobs because of ill health. Of these 28 (5 percent of all positives) had made this change within the dockyard, while 31 (6 percent) had changed from some other place of employment. The number of men from the sample of 329 Negatives who had changed jobs because

T A B L E L X V I I

CHANGE OF JOB BECAUSE OF ILL HEALTH - POSITIVES AND SELECTED NEGATIVES.

(OPINIONS OF DOCKYARD WORKERS)

CHANGE OF JOB	POSITIVES (%)	SELECTED NEGATIVES (%)
<u>WITHIN THE DOCKYARD</u>		
Rheumatic Disease	4.0	-
Other Disease	5.4	6.1
<u>FROM ANOTHER EMPLOYER</u>		
Rheumatic Disease	1.7	-
Other Disease	5.9	4.0
UNCERTAIN	0	0.3
NO CHANGE OF JOB BECAUSE OF ILL HEALTH	83.0	89.7
TOTAL WORKERS (ON WHICH PERCENTAGES ARE BASED)	522	329

of ill health was 33 (10 percent) of whom 20 (6 percent of the sample) had made this change within the dockyard and the remainder (4 percent) had moved from elsewhere. These figures are closely comparable, and indicate that changes from one job to another brought about by diseases other than rheumatism occur equally in those with and those without rheumatic diseases.

In addition to the changes in employment for diseases other than rheumatism there were a further 30 men with one of the rheumatic diseases (6 percent) who had made changes. These men claimed that the changes of employment were attributable to the effects of rheumatism; twenty one (4 percent) had changed within the dockyard and 9 (2 percent) had changed from another industry because of rheumatic disease. ^{None of those changing within the yard} suffered financial loss as a result of the change, but 4 men (0.8 percent of the positives) who had changed from another industry said they had suffered financially because of the change.

OTHER SOCIAL FACTORS

A count was kept of all men who had been absent from work during the previous year because of rheumatic disease. To these were added all men who had had a spell of absence of three weeks or more at any time and also any man who said he had changed his job because of rheumatism. There were 201 of these men in the dockyard and each one was matched with a man who had always been symptom free (Negative), who was in the same age group, and who was in the same occupation.

Certain answers, which were received from all the workers interviewed, have been made the subject of a special study for those men who formed one or other of these closely matched samples. These particular questions concerned details about family, affairs and finance.

The standards of housing as judged by hot water supply, are identical in the two groups. Thus there are 16 (8 percent) of both Positives and Negatives who live in houses without baths and of these 7 (3 percent) in each group had only a cold water tap in their houses. The number of Positives who were married at the time of interview was 172 (86 percent) whereas the equivalent figure for the Negatives was 154 (77 percent). This difference is statistically significant ($\chi^2 = 4.67$ $p < 0.05 > 0.02$), but there were 12 Negatives who were either widowed or separated as opposed to 8 from among the Positives.

There were thus 172 wives of the men classed as Positives who were selected for this special study, and of these 41 (24 percent) were working. In the control group of Negatives there were 39 (25 percent) out of 154 wives who went out to work. This small difference is not significant, but at least there is apparently no suggestion that the wives of those who are fairly severely affected by rheumatism are being forced to seek employment to bolster up the family income.

Only 4 (2 percent) of these men who were selected because of the severity of their rheumatic disease were currently registered as a disabled person because of rheumatism and a further one had be so registered in the past. In both samples there were 9 men (4 percent) who were currently registered or who had been registered in the past for some other disability.

The whole picture presented by this particular aspect of the study is that, among those employed at the dockyard, the fact that the breadwinner suffers from one of the rheumatic diseases does not affect the social position of the family. There may well be social effects of some other type which are brought about or aggravated as a consequence of the disease. These might arise among those who lose earnings through absence on account of rheumatism. If these effects occur then investigation at a deeper level

T A B L E L X V I I I

RHEUMATIC COMPLAINTS IN MALES AND FEMALES

(POSITIVES PER 100 WORKERS IN ELECTRONICS FACTORY)

	A G E I N Y E A R S				
	15-	25-	35-	45 - 54	All 15-54
Positives %	18.8	32.6	49.0	66.6	305
MALES (Number interviewed)	(48)	(92)	(45)	(15)	(200)
Positives %	25.7	18.9	41.5	53.4	31.3
FEMALES (Number interviewed)	(74)	(37)	(53)	(15)	(179)

will be necessary to expose them than was possible in the ten minutes available during these interviews.

RHEUMATIC COMPLAINTS IN FEMALE WORKERS

T A B L E LXVIII

The electronics factory was the only industry from among those which were studied in which comparable work in similar conditions was done by both male and female workers. Accordingly when this part of the project was being undertaken 179 female employees were interviewed. These comprised 96.2 percent of a total of 186 females working in the same departments of the factory as were male workers in the survey.

There were no females in the sample over the age of 55 years so comparison between the sexes is only possible for those under this age. The numbers of those with recent symptoms in males and females for each of four decades of working life are compared in Table LXVIII.

There were 19 women (26 percent) out of a total of 74 interviewed between the ages of 15 and 24 years who had rheumatic complaints. This figure contrasts with that of 9 men (19 percent) out of a total of 48 male employees of the same age.

Above the age of 25 years the prevalence of positives in each of the three decades under consideration is higher in males than in females, a finding which is in marked contrast to the relative prevalences observed in those under 25 years of age. This reversal in prevalence rates lends support to the view that married women who do not feel well are less inclined to seek employment so that the complaint rate for those who are in employment is likely to be considerably lower than that for the female population as a whole. In fact 62 (59 percent) out of the 105 women over the age of 25 years in this survey were married.

Definition of rheumatism

This study has been conducted in an attempt to clarify some of the uncertainties about the epidemiology of rheumatic diseases and the economic and social effects which these diseases cause among the working population.

The definition of rheumatism has presented difficulties ever since the word was first used. One of the difficulties is that the term is used to include a broad group of diseases. Some of these are the result of degenerative processes, some result from systemic or metabolic dysfunction, and some merely consist of vague aches and pains without obvious pathological lesions to account for them. All these diseases lead to pain and limitation of function of the locomotor system ; it is therefore tempting to try and regard them as a composite group.

The observations of Kellgren, Lawrence and other workers in Manchester have been described in Chapter I. In their study in Leigh they found that it was possible to breakdown the conditions which shelter under the umbrella of the term rheumatism into several diagnostic groups, most of which could be limited fairly well by careful definition. Our own experiences in Edinburgh confirmed this, though the overall prevalence rate of rheumatic complaints among workers was found to be higher in the Edinburgh area than in Leigh. This increase appears to be caused by the high prevalence of indeterminate pains and disk disease.

The findings of both teams of workers in Britain, and of other observers in Europe, America and Australia which have also been described in Chapter I indicate that rheumatic diseases can be treated as a group providing a broad screening definition is used. It is also important that the effects of different types of rheumatic disease are

not assumed to be identical, or even similar.

The preliminary findings mentioned in Chapter II suggest that the confusion in the minds of doctors about the definition of rheumatism is also present in the minds of their patients, and that terms such as neuritis, arthritis, disk disease, and fibrositis are not universally accepted as being rheumatic in origin.

Most people accept that vague pains of the trunk and limbs, known colloquially as lumbago, siatica or fibrositis, are members of the rheumatic group. It would seem logical therefore to include disk disease with its secondary effects from irritation of the nerve routes, since many cases of so called fibrositis may turn out in subsequent years to be cases of disk disease.

The definition of rheumatic disease given in Chapter III has been used throughout the present study and its use by a single observer should have gone some way towards achieving consistency. The definition embraces all pains of the locomotor system except those which can be attributed to recent trauma with the result that all the accepted syndromes and also vague pains of undetermined origin are included.

Among the rheumatic diseases there are two which are relatively easy to define (disk disease and osteoarthritis) and which occur with sufficient frequency to enable them to be treated as separate subdivisions of the rheumatic group. References to the literature made in Chapter I suggest that both of these conditions have been suspected of being caused by industrial trauma. The evidence is, however, conflicting in some instances; particularly is this so in the cases of the syndrome known as generalised osteoarthritis. This syndrome is comparatively rare in men. In view of the possibility of it being a systemic disease, the local type of osteoarthritis has been separated from the general type

in that part of the study which seeks to relate jobs to the different rheumatic diseases.

Men with disk disease and local osteoarthritis have been studied as separate groups where this seemed warranted and so too have the men with indeterminate pains, leaving a fourth subgroup made up of men with such diseases as rheumatoid arthritis, general osteoarthritis, chronic bursitis, chronic tenosynovitis and other diseases. These conditions are not unimportant to those who are afflicted but they play a relatively small part numerically in the epidemiology of rheumatic diseases.

Description of jobs.

The morbidity tables which are available from statutory sources, in which disease is related to occupation, classify workers in broad groups and the use of such tables implies that work being done by any occupational group is of a constant standard. This is an erroneous assumption since many men working in occupations which would be classified as those which require great physical effort are in fact doing quite light tasks.

In the present study a technique has been devised to overcome this by observation of the physical effort required. The overall posture adopted and the environmental conditions in which each man was expected to work have also been taken into account. The classification is simple and does not include assessments of the demands on the special senses since it seems unlikely that these would be related either to the prevalence of rheumatic diseases or to the rate of sickness resulting from these diseases.

It is possible that an analysis of physical stresses at work of the kind included in this study would have been more properly done by an expert in ergonomics than by a medical practitioner. The important thing is in using a single observer however, and by adhering to the definitions laid down in Appendix V it has been possible to achieve a reasonable degree

TABIE LXIX

PHYSICAL EFFORT AT WORK

(Opinion of workers and job analysis)

Opinion of Workers	Category* on Analysis				All grades
	A	B	C	D	
Sedentary (percent)	10 (2.2)	49 (6.1)	1 (0.2)	12 (1.2)	72 (2.7)
Light (percent)	188 (42.0)	365 (45.1)	70 (15.2)	197 (20.4)	820 (30.6)
Moderate (percent)	190 (42.4)	290 (35.8)	192 (41.6)	448 (46.4)	1120 (41.7)
Heavy (percent)	48 (10.7)	83 (10.3)	119 (25.8)	193 (20.0)	443 (16.5)
Very Heavy (percent)	10 (2.2)	20 (2.5)	80 (17.3)	115 (11.9)	225 (8.4)
Uncertain (percent)	2 (0.4)	2 (0.2)	0 (-)	0 (-)	4 (0.1)
Total in Category (on which percentages are based)	448	809	462	965	2684

Columns 12-15 x 38

* Categories (see Chapter VI) - based on assessments of Back, Arms, Hands, Legs.

A Little physical effort : grades I, II or III on each assessment.

B Moderate physical effort : No higher than IV (excluding Category A) on each assessment.

C Maximum physical effort : grade V on each assessment.

D Mixed Categories not in A, B or C.

of consistency. Furthermore in the early experiments with the method and in the pilot study it was possible to make cross-checks between different jobs.

The relationship between the opinions of the workers themselves about physical demands of their respective jobs and the independent observations made during the survey are shown in table LXIX. The four groups of workers are those used in table XL (Chapter VI) and the definitions are repeated underneath the table for convenience.

TABIE LXIX

Thus 43 percent of workers in jobs classified as grade V under each of the four headings (Back, Arms, Hands, Legs) said that their jobs were either heavy or very heavy. Workers in very light jobs (grades I - III under each heading) and those in jobs which had a maximum grade of IV under any of the four headings said that they thought their jobs were heavy or very heavy in only 13 percent and 12 percent of interviews. There is therefore some relationship between the opinions of the men themselves and the grading of their jobs by an independent observer.

The fact that any men in jobs with low physical demands should think that the work they have to do should be classed as being heavy is interesting. It suggests that there is a place for some kind of independent assessment (such as has been done in this study) if the prevalence of a disease is to be considered in relationship to occupation. The need for such an independent assessment is likely to be particularly marked if the morbidity which is being studied consists of a group of different diseases rather than a clearly defined clinical entity.

Measurement of Prevalence and Effect of Rheumatism

One finding which has been common to all observers in this field

and which has been confirmed by the findings described in Chapter IV is that the prevalence of rheumatic complaints increases with advancing age. For this reason it has been necessary to use some method of standardisation when considering the prevalence of complaints in general, and those of specific rheumatic diseases in particular. It is also apparent from Chapter IV that the amount of sickness resulting from rheumatic complaints is affected by the age of the individual concerned. Therefore the same procedure of standardisation has been used in considering the amount of absence.

There are well recognised disadvantages in relying on the history given by a worker at an interview in order to assess morbidity. Some men may paint an exaggerated picture, others may tend to minimise their symptoms through fear that they may lose their jobs if the severity of their disease becomes known to the management.

There is as yet no more satisfactory screening technique available. Radiological examination though useful in advanced cases of the arthritides has not yet been shown to be reliable as a screening process in the early diagnosis of these diseases. Furthermore other techniques such as serological tests can only be used to detect early cases of some of the rarer rheumatic diseases.

The study of sickness absence based on certificates issued for insurance purposes is also unsatisfactory since different practitioners use different diagnostic labels on these certificates. By means of enquiring about sickness absence caused by all diseases and injuries it has been possible to show that rheumatic complaints cause absence over and above what caused by other diseases. It does however appear that there is some substitution taking place in older people. These are probably men in whom the diagnosis of one of the rheumatic diseases is well established.

Another difficulty in assessing the reliability of the information

is the foreshortening of the memory for periods of sickness absence even during recent periods of time. Because of the possibility of seasonal variations in sickness absence, detailed information has been obtained of the amount of time lost during the twelve months immediately prior to interview. Thus men with similar experience of winter illness may give different histories of absence depending on whether they are asked about these events in the Spring or in the Autumn.

In the case of dockyard workers the interviews were spread over a period of nearly six months. Unfortunately however the men who were interviewed at the end of this period contained a high proportion of those who had been absent from work ; this absence being the reason why they were not seen in the first instance. It has not been possible therefore to contrast the rates of sickness for dockyard workers interviewed in January with the rates for those seen in May.

This particular study however is not only concerned with comparing the findings in one occupational group with those of another. It is also concerned with comparing the findings of men working in both light and heavy jobs within the same occupation. Accordingly it has been assumed that the history of absence is equally reliable when given by men in different grades of occupation.

INTERPRETATION OF RESULTS

The prevalences of rheumatic complaints recorded in different industrial workers by Kellgren, Lawrence and others in Manchester have been discussed in Chapter I. The evidence suggests that the prevalence of complaints is little if at all affected by the type of work being done. The observations recorded in this Thesis confirm this finding up to a point.

The analysis of the S.C.Rs. of designated jobs within the industries included in this survey fails to show any pattern. Differences have

been found between one occupation and another, but the ratios for men in certain jobs (e.g. coppermiths) are significantly higher than those for men engaged in jobs (bearing different descriptive titles (e.g. boilermakers), in spite of the fact that many men in both groups are doing very similar work.

There is also a marked difference between the prevalence of complaints in coalminers as a whole and the prevalence in dockyard workers as a whole. When unskilled workers are considered separately this difference persists; on the other hand when the skilled and unskilled workers in the dockyard are compared there is little difference in the prevalences of complaints, of the two types of worker.

One interpretation of this phenomenon could be that the prevalence of complaints is related more to the psychological attitudes of the men than to the physical demands of the jobs they are doing. This point of view is rendered more attractive when it is remembered that many of the coalfields in the Lothians have either been closed already or are threatened with closure. Rosyth dockyard on the other hand has recently been given a new lease of life by being selected as the yard to be responsible for maintenance and repair of some of the newest atomic vessels.

Psychological factors are known to influence the threshold of pain and also the effect of such pain on individuals, and there is no evidence to suggest that the pains of rheumatic disease are any different in this respect. In spite of this it is unlikely that the only explanation for the difference in complaint rates between dockyard workers and coalminers is a psychological one. An argument in favour of an alternative explanation is the fact that the rates for indeterminate pains are higher for dockyard workers than for coalminers in all age groups over 25 years. It would seem likely that most of the complaints caused primarily by psychological factors would be found in this category. In contrast the prevalence rates of osteoarthritis and of disk disease are both higher at all ages in coalminers than they are in dockyard workers.

When the prevalence of complaints is related (as in Chapter VI) to the effort involved in doing particular jobs then it is apparent that men doing work which makes maximum and continuous demands on the Back, Arms and Legs have more rheumatic complaints than those engaged in less arduous tasks. This relationship between effort and rheumatic disease is also found in men with disk disease and to a lesser extent in those with local osteoarthritis ; though no correlation can be demonstrated between effort by the Legs and the prevalence of local osteoarthritis.

In contrast to the observation that the prevalences^{of}/disk disease and of local osteoarthritis increase with muscular effort, the prevalence of indeterminate pains decreases with effort. This would tend to confirm the view that many of these vague pains are but the precursors of definitive rheumatic disease. Further confirmation of this is to be found in the relative prevalences of disk disease and indeterminate pains of the trunk on the one hand and those of local osteoarthritis and indeterminate pains of the limbs on the other. The rates for those forms of rheumatic disease are considered in the different age groups in Chapter IV, where it has been shown that the increase in both disk disease and local osteoarthritis with advancing age is offset to a certain extent by reductions in the prevalences of indeterminate pains of both the trunk and the limbs.

In conclusion therefore it can be said that the prevalences of rheumatic complaints is related to the physical demands of the job, but only when these demands are heavy and prolonged. Furthermore disk disease and local osteoarthritis account for much of the increase in the overall prevalence of complaints. These conclusions based as they are on standardised ratios, take into account the observed tendency for both rheumatic complaints and for the two specified diseases to increase in prevalence with advancing age.

This takes matters a stage further than the findings of Kellgren and Lawrence (see Table V). These observers indicated that there was no significant difference between the prevalence rates of rheumatic complaints in coalminers and in other workers. It is suggested therefore that the difference can only be demonstrated clearly when jobs are considered individually rather than when they are grouped under occupational headings.

The findings of the present enquiry confirm that the increased prevalence of rheumatic complaints arises from an increase in the prevalences of osteoarthrosis and disk disease, and that these increases are associated with a fall in the prevalence of indeterminate pains. This is not entirely a matter of substitution however, and it is claimed, on the basis of what has been present here, that there is a real increase in the amount of rheumatic complaints among men engaged in heavy manual work.

As far as Posture at work is concerned it has been shown that disk disease is common among men in jobs which are mainly or entirely sedentary. This observation must be taken in conjunction with what has been said about the correlation between disk disease and maximum effort by the Back. It seems possible that disk disease occurring in those with sedentary occupation is caused by faulty posture and flabbiness of the spinal muscles. When the condition occurs in those engaged in manual work of the heaviest type on the other hand it is more probably due to associated trauma. It is not possible to say at this stage however, whether this trauma is acute or chronic.

It has also been shown that the prevalence of osteoarthrosis increases with the need to stand at work or to move about. A corresponding fall in the prevalence of indeterminate pains in the higher grades suggests that standing and or movement may lead to a more premature onset of degenerative

changes which can be diagnosed clinically.

The environmental conditions (Site) in which the work is conducted suggest that rheumatic diseases as a whole and also disk disease and osteoarthritis in particular are more common among indoor workers. This apparent anomaly has probably arisen because coalminers working underground were classed as indoor workers since they were under cover; furthermore in the colliery which was selected, the men were not exposed to wet conditions.

When absence caused by rheumatic disease in the different industries is considered then the S.A.Rs. have been shown to increase in the following order :- Electronics factory, Hardware Store, Printing Works, Dockyard, Brewery, Foundry, Coalmine. This suggests that there is more absence among workers in jobs with heavy physical demands than there is among those in lighter jobs.

The S.A.Rs. for different occupations within the three industries with the largest samples (Brewery, Coalmine and Dockyard) show that there is considerable overlap of the ratios for the occupational groups of one industry compared with another. It is suggested that the overall picture presented is one of men in heavier occupations having higher ratios than those in jobs of a less arduous nature; there are exceptions to this generalisation however the most noticeable being the amount of time lost by bottlers at the brewery.

When sickness absence is considered in relation to the detailed assessment of the jobs on which men were engaged it can be shown that heavy physical effort by the Back, Arms and Legs in particular is associated with a high rate of sickness absence.

It has also been shown that sickness absence is less common and of shorter duration for men working in sedentary occupations than it is for those in jobs where prolonged standing and walking are necessary. In addition it has been shown that absence from rheumatic causes is high among

men who work in intemperate workshops.

These findings are in accord with those of other observers and need little further comment. It is not surprising that workers who need to make great physical effort or who work in draughty environments should return to work less quickly than their colleagues in jobs with less physical demands.

Sickness absence is one of the most obvious social effects of a disease and it is also relatively easy to measure. The difficulties presented by foreshortening of memory for spells of sickness can be overcome by carrying out a prospective study. In such an enquiry a group of workers would be followed up for a year and their spells of sickness recorded in detail from the certificates submitted by medical practitioners. If these certificates described the illness as one of these in Appendix I then a check could be made with the practitioner as to the exact diagnosis.

Such a prospective study is being carried out as part of the main project, but since other observers are involved it has not been included in the findings recorded in this thesis. Records of sickness absence in respect of the dockyard workers have now been kept for two years. In the first of these years the recorded absence was rather less than that which had been attributed to the men on the basis of their memories ; in the second year the recorded figures approximated quite closely to those which had been obtained by taking histories (66).

Other social effects of rheumatic diseases are to be found in the demands which men with these diseases make of the medical services. Among those who are affected by rheumatic complaints, the men with disk disease or rheumatoid arthritis are outstanding in their demands for care. It has already been shown in the discussion that a lot of time lost from work by men with these two diseases. They are also associated with a higher rate of hospital referral and of hospital admission ; men with disk disease have the higher rate in each case. Men with disk disease also have

the highest rate of self medication and of consultation with general practitioners during twelve months prior to interview.

Disk disease was observed more than ten times as frequently as rheumatoid arthritis among the workers who were examined. Thus the importance of this condition numerically together with the high rate of sickness absence and use of medical services makes it an obvious problem for further study. This need is made more pressing by the fact that evidence has been submitted that disk disease is one of the rheumatic diseases which have been shown to be associated with heavy physical effort.

Other social factors which were touched on briefly during the enquiry were housing, marital status, children, and whether or not wives were working. No important differences were observed between Positives and Negatives in respect of these factors. This is hardly surprising; if a man is able to work it is unlikely that the disease from which he suffers will affect any of these issues. If however he is so crippled by his disease that he cannot work then it might be possible to demonstrate changes in social conditions of the kind mentioned above.

The bulk of rheumatic diseases affecting working men are relatively trivial. Their importance stems from the fact that they occur extensively particularly in later life. Their occurrence appears to bear some relationship to the amount of effort involved in the work which a man has to do, and the duration of absence attributed to these diseases is also related to effort. Other factors clearly play a part both in the prevalence and in the amount of absence, and this group of diseases will continue to present a challenge to clinicians, epidemiologists, industrialists and sociologists for many years.

SUMMARY

(1) 2684 manual workers from 7 different industries have been interviewed and examined in order to discover the prevalence of rheumatic complaints.

(2) 1073 (40%) had symptoms during the previous year and the prevalence has been shown to increase with advancing years.

(3) The commonest definitive condition was disk disease of which 327 cases were observed (12% of those interviewed) and there were 773 (29%) who had indeterminate pains to which no other diagnostic label could be attached.

(4) 291 (21%) of the 1396 men who had ever had rheumatic symptoms were found to have some functional impairment on examination but only 26 (3%) out of 773 with indeterminate pains had such impairment.

(5) Men with rheumatic disease aged between 25 and 34 years had an unduly high amount of sickness absence (83 weeks / 100 affected men/ year. Men of this age also made heavy demands for medical care. Men with disk disease in particular had a high rate of absence (167 weeks per 100/ ^{affected}men /year) and made heavy demands for care.

(6) The labels of rheumatic diseases were not merely used instead of another disease when workers were absent because of illhealth, though a certain amount of substitution occurred in the older age groups.

(7) Right handed men had similar prevalence rate for rheumatic complaints to that found in left handed men; deformities from rheumatic diseases were more commonly found in right limbs than in left.

(8) The prevalence of complaints were significantly higher in coalminers than in dockyard workers; furthermore this difference was still observed when only unskilled workers were considered. There was no difference

in the prevalence of complaints when skilled and unskilled dockyard workers were compared.

(9) A method was evolved by which individual jobs were analysed to assess the physical effort used by Back, Arms, Hands and Legs. The Posture at work and the Site at which the work was performed were also analysed.

(10) The prevalence of complaints was higher in men working in jobs requiring prolonged and maximum effort by the Back, Arms and Legs than in men working in less arduous jobs.

(11) Disk disease and Local osteoarthrosis had high prevalence rates in men in jobs associated with maximum effort. These diseases also increased in prevalence with advancing age while indeterminate pains of the trunk and limbs showed corresponding reductions in prevalence rates.

(12) Sickness absence was greatest in men working in jobs in which maximum effort was required for prolonged periods. Absence was also high among men working in intemperate workshops.

(13) The correlations between physical effort and both the prevalence of complaints and the rate of sickness absence have been discussed in the light of previous reports.

(14) A correlation has been demonstrated between the opinions of workers about the physical demands of their jobs and the assessments of these jobs by an independent observer. In spite of this some workers in what appeared to be very light jobs claimed that they were doing heavy work.

(15) No differences could be demonstrated in social factors such as housing or family arrangements between those with rheumatic complaints and those who were symptom free; opinions of both groups of workers about their working environments were closely similar.

APPENDIX I

LIST OF DISEASES AND SYNDROMES WHICH COULD BE INCLUDED UNDER THE HEADING
OF RHEUMATIC COMPLAINTS

International Classification Number	Name of Disease	International Classification Number	Name of Disease
288	Gout	731	Osteitis Deformans
361	Trigeminal Neuralgia	732	Osteochondritis
362	Brachial Neuritis	733	Other disease of bone
363	Sciatica	735	Disc displacement
366	Neuralgia and Neuritis N.O.S.	736	Sacro-iliac strain
720*	Acute Arthritis Pyogenic	737	Ankylosing spondylitis
721*	Acute Arthritis Non- Pyogenic	738	Other disease of Joints
722.0*	Rheumatoid Arthritis	741	Synovitis and Bursitis N.O.S.
722.1*	Spondylitis	742	Occupational Synovitis and Bursitis
722.2*	Chronic Rheumatoid Nodular	744.2	Other disease of Muscle Tendons and Fascia
723.0*	Osteoarthritis	754	Curvature of Spine
723.1*	Spondylosis	783.7	Pleurodynia. Not epidemic.
723.2*	Adult Osteochondrosis	787.1	Pain in limb N.O.S.
724*	Other Specified Arthrides	787.2	Swelling of limb N.O.S.
725*	Arthritis unspecified	787.3	Pain in joint N.O.S.
726.0*	Lumbago	787.4	Swelling of joint N.O.S.
726.1*	Scapular Myofibrositis	787.5	Pain in Back N.O.S.
726.2*	Torticollis (non Congenital)	N840.9) N848.9)	Late effects of sprains and strains
726.3*	Other Muscular Rheumatism		
727*	Rheumatism N.O.S.		

* These diseases are included under the heading "Arthritis and Rheumatism excluding Rheumatic Fever".

SOURCE INTERNATIONAL CLASSIFICATION OF DISEASES WHO (9)

A P P E N D I X IIa

AMOUNT OF TIME LOST FROM RHEUMATIC DISEASES - MALE WORKERS.

(1000 DAYS)

OCCUPATIONS	ORDER & SUB ORDER	ARTHRITIS & RHEUMATISM 720-727(C40)	OTHER LOC. DISEASES 730-749(C47)	SCIATICA 363 (Part of C49)	TOTAL RHEUMATIC DISEASES
Fishermen	I	21.7	11.4	2.8	35.9
Agricultural & Horticultural Occups.	II I	765.7	282.0	92.3	1140.0
ancillary to agricul. Foresters and	2	20.2	11.2	4.5	35.9
Woodmen	3	34.9	12.2	6.6	52.7
In coal mines	III 1	1313.5	254.7	106.0	1674.2
In other mines, Quarries & Workings	2	78.6	15.7	6.0	100.3
Makers of Bricks, Tiles Pottery and Fireclay Goods	IV 1	30.8	5.8	2.3	38.9
Makers of glass and glassware	2	16.3	3.6	1.0	20.9
Makers of other non metalliferous mining products	3	7.2	0.8	0.4	8.4
Makers of Coal, Gas & Coke	V 1	15.2	1.8	3.2	20.2
Workers in Chemical allied trades	2	105.9	17.1	10.6	133.6
Foreman and overlookers	VI 1	49.8	14.3	5.3	69.4
Furnacemen (not annealing or Foundry)	2	17.3	13.2	1.9	32.4
Rolling & Tube workers	3	13.8	5.1	2.0	20.9
Wire drawers					
Foundry Workers(excl. Pattern makers)	4	140.0	46.1	15.5	201.6
Smiths and Forgemen	5	41.5	16.4	3.8	61.7
Annealers,	6	4.4	0.2	0.1	4.7
Temperers & Pickers					
Coppersmiths, Sheer	7	62.1	8.0	4.7	74.8
Metal Workers, Metal Spinner					
Platers, Rivetters,	8	69.9	10.4	10.4	90.7
Shipwrights					
Metal Machinists	9	119.9	35.5	11.9	167.3
Fitters	10	497.2	215.0	48.7	760.9
Metal Finishers	11	19.9	4.7	2.0	26.6
Plumbers, Pipe Fitter	12	89.3	30.6	7.1	127.0
Vehicle Mks & Repairers (not elsewhere specified)	13	8.8	2.6	2.0	13.4
Watch, Clock & scientific surgical instr. makers (not elsewhere specified)	14	11.6	5.5	0.7	17.8

OCCUPATIONS	ORDER & SUB ORDER	ARTHRITIS & RHEUMATISM 720-727(040)	OTHER LOC. DISEASES 730-749(047)	SCIATICA 363 (Part of 049)	TOTAL RHEUMATIC DISEASES
Workers in precious metals. Gem setters	15	0.3	0.1	0.2	0.6
Electrical Apparatus makers, fitters(not elsewhere specified & electricians)	16	163.2	60.1	0.1	232.4
Inspectors, Viewers, Testers	17	74.4	24.1	6.9	105.4
Other skilled workers	18	109.9	35.7	15.5	161.1
Openers, sorters, benders, drawers	VII 1	24.6	9.6	0.4	34.6
Spinners, Doublers	2	19.0	12.8	1.3	32.1
Winders, Warpors, Singers, Drawers-in	3	7.0	2.4	1.3	10.7
Weavers	4	35.4	1.2	2.1	38.7
Knitters	5	8.0	1.7	3.1	12.8
Bleachers, Dyers, Finishers	6	42.9	3.0	3.9	49.8
Other skilled workers	7	27.5	10.6	1.6	39.7
Leather tanners & dressers, fur dressers	VIII 1	15.1	-	0.2	15.3
Boot & shoe mks.	2	60.1	14.5	4.9	81.5
Makers of leather or subst. goods(not clothing)	3	2.0	6.0	0.4	8.4
Garment workers	IX 1	33.1	12.5	0.7	46.3
Hat & cap mks milliners (makers)	2	4.9	0.2	-	5.1
Upholsterers, Coach trimmers, Bedding & Mattress Makers	3	10.0	5.5	0.2	15.7
Other makers	4	1.5	1.4	0.9	3.8
Makers of food	X 1	99.4	26.1	9.5	135.0
Makers of alcoholic Drinks	2	10.1	3.2	0.5	13.8
Makers of non alcoholic drinks	3	-	-	-	-
Makers of tobacco, cigars, cigarettes, snuff	4	8.0	3.5	2.0	13.5
Workers in cane wood & cork	XI	285.2	100.1	19.9	305.2
Makers of Paper, Paperboard	XII 1	7.6	2.4	2.3	12.3
Mks. of stationary, bags, boxes, workers in paper	2	7.8	3.1	-	10.9
Printers and Bookbinders	3	74.2	22.3	7.6	104.1

OCCUPATIONS%	ORDER & SUB ORDER	ARTHRITIS & RHEUMATISM 720-727 (CL6)	OTHER LOC. DISEASES 730-749 (CL7)	SCIATICA 363 (Part of CL9)	TOTAL RHEUMATIC DISEASES
Wks. in Rubber	XIII 1	37.8	3.7	10.4	51.9
Workers in plastics moulding, manipulating	2	6.4	5.0	0.3	10.7
Mks. of musical instruments (not piano case maker)	3	2.4	0.1	0.4	2.9
Mks. of other products	4	16.8	3.8	1.0	21.6
Wks. in Building and contracting	XIV	1132.9	250.8	121.5	1505.2
Painters and Decorators	XV	343.0	95.1	28.0	461.1
Administrators, Directors, Mangrs. (not elsewhere spec- ified)	XVI	69.5	34.2	8.0	111.7
Railway Transpt. Workers	XVII 1	230.6	60.6	40.2	331.4
Road Transport Workers	2	594.8	254.4	66.9	916.1
Water Transport Workers	3	212.2	58.9	25.0	296.1
Air Transport Workers	4	1.4	8.0	-	9.4
Other wks. in Transport and Communications	5	182.1	55.9	14.7	252.7
Commercial Occups. Persons employed in Finance & Insurance	XVIII 1	519.0	158.5	36.4	713.9
Proff. Technical Occups. (Ex clerical)	2	40.0	26.3	8.1	74.4
Armed Forces Civil Defence Services	XIX	195.1	103.6	12.4	311.1
Persons Prof. engaged in entert. & sport	XX 1	1.5	-	-	-
Persons engaged in personal services incl Inst. Clubs, Hotels etc	2	207.6	34.6	25.6	267.8
Clerks, typists etc. Warehousemen, Store- keepers	XXI	33.4	21.6	4.2	59.2
Packers, Bottlers Stationary Engine Drivers, Tractor Drivers etc.	XXII	446.9	122.9	34.6	604.4
	XXIII	422.4	181.5	37.1	641.0
	XXIV	325.8	98.9	35.8	460.5
	XXV	206.7	95.2	29.0	330.9

OCCUPATIONS	ORDER & SUB ORDER	ARTHRITIS & RHEUMATISM 720-727(C46)	OTHER LOC. DISEASES 730-749(C47)	SCIATICA 363(Part of C49)	TOTAL RHEUMATIC DISEASES
Wks. in distribution of Gas, Water, Elect- ricity (not else- where specified)	XXVII	46.0	8.6	4.8	59.4
Other workers (students)	XXXX 2	152.1	39.6	4.3	196.0
Not gainfully employed or occupation un- known	U.K.	989.6	185.7	14.8	1190.0
ALL OCCUPATIONS MALE	-	12917.9	3694.5	1185.3	17797.7

Source Ministry of Pensions and National Insurance Digest of
(52)
Statistics 1955-56 .

A P P E N D I X I I b

SICKNESS ABSENCE RATES IN MALES FOR RHEUMATIC DISEASES

(BY OCCUPATION)

OCCUPATION	TOTAL "RHEUMATIC DISEASES" (1000 DAYS)	NUMBER OF WORKERS AT RISK x 1000 (1951 Census)	DAYS OFF IN YEARS PER WORKER AT RISK
Fishermen	35.9	29.3	1.22
Agricultural & Horticultural Occupations	1140.0	973.8	1.17
Occupations ancillary to Agriculture	35.9	100.6	0.38
Foresters and Woodmen	52.7	30.6	1.74
In Coal Mines	1674.2	635.4	2.63
In other mines, Quarries, and Workings	100.3	48.6	2.06
Makers of Bricks, Tiles, Pottery & Fireclay Goods	38.9	48.3	0.81
Makers of Glass & glassware	20.9	27.7	0.75
Makers of other non metalliferous mining products	8.4	12.6	0.67
Makers of Coal Gas & Coke	20.2	18.5	1.09
Workers in Chemical allied trades	133.6	86.6	1.54
Foreman and overlookers	69.4	130.7	0.51
Furnacemen(not annealing or Foundry	32.4	29.7	1.09
Rolling & Tube workers	20.9	28.7	0.73
Wire drawers	20.9	28.7	0.73
Foundry Workers (excl. Pattern makers)	201.6	141.6	1.43
Smiths and Forgemen	61.7	76.0	0.81
Annealers, Temperers & Pickers	4.7	14.2	0.30
Coppersmiths, Sheet Metal Workers, Metal Spinner	74.8	83.6	0.89
Platers Rivetters, Ship- wrights	90.7	95.1	0.95
Metal Machinists	167.3	233.0	0.72
Pitters	760.9	812.8	0.94
Metal Finishers	26.6	42.9	0.62
Plumbers, Pipe Fitters ETC.	127.0	160.1	0.79
Vehicle Makers & Repairers (not elsewhere specified)	13.4	22.2	0.60
Watch, Clock & scientific surgical instr. makers (not elsewhere specified)	17.8	42.0	0.42

OCCUPATION	TOTAL "RHEUMATIC DISEASES" (1000 DAYS)	NUMBER OF WORKERS AT RISK x 1000 (1951 Census)	DAYS OFF IN YEAR PER WORKER AT RISK
Workers in precious metals. Gem setters	0.6	8.0	0.08
Electrical Apparatus, Makers, Fitters(not elsewhere specified) and electricians	232.4	8.2	0.65
Inspectors, Viewers, Testers	105.4	77.0	1.37
Other skilled workers	161.1	171.4	0.94
Openers, sorters, benders drawers	34.6	29.5	1.17
Spinners, Doublers	32.1	37.4	0.86
Winders, Warpers, Singers, Drawers-in	10.7	17.3	0.62
Weavers	38.7	29.7	1.30
Knitters	12.8	16.8	0.76
Bleachers, Dyers, Finishers	49.8	60.1	0.83
Other skilled workers	39.7	35.2	1.13
Leathertanners and dressers			
Fur Dressers	15.3	18.5	0.83
Boot and Shoe Makers	81.5	87.8	0.93
Makers of leather or subst. goods (not clothing)	8.4	13.2	0.64
Garment Workers	46.3	81.8	0.57
Hat & cap makers milliners (makers)	5.1	5.2	0.98
Upholsterers, Coachtrimmers, Bedding and Mattress Makers	15.7	36.5	0.44
Other Makers	3.8	11.3	0.34
Makers of Foods	135.0	143.2	0.94
Makers of Alcoholic Drinks	13.8	20.2	0.68
Makers of non-alcoholic drinks	-	1.5	-
Makers of tobacco, cigars, cigarettes, snuff	13.5	7.3	1.85
Workers in cane, wood and cork	305.2	491.1	0.62
Makers of Paper & Paper-board	12.3	20.6	0.60
Makers of Stationary, bags and boxes, workers in paper	10.9	15.7	0.69
Printers and Book-binders	104.1	146.8	0.71
Workers in Rubber	51.9	38.2	0.74
Workers in plastics, moulding manipulating etc.	10.7	11.6	0.92

OCCUPATION	TOTAL "RHEUMATIC DISEASE" (1000 DAYS)	NUMBER OF WORKERS AT RISK x 1000 (1951 Census)	DAYS OFF IN YEAR PER WORKER AT RISK
Makers of musical instruments (not piano case makers)	2.9	8.4	0.35
Makers of other products	21.6	35.0	0.62
Workers in Building and Contracting	1505.2	914.0	1.65
Painters and Decorators	461.1	335.5	1.38
Administrators, Directors			
Managers (not elsewhere specif)	111.7	451.7	0.25
Railway Transport workers	331.4	315.4	1.05
Road Transport workers	916.1	785.7	1.17
Water Transport workers	296.1	216.7	1.43
Air Transport workers	9.4	6.8	1.38
Other workers in Transp. and Communications	252.7	247.0	1.02
Commercial Occupations	713.9	1225.0	0.58
Persons employed in Finance and Insurance	74.4	146.7	0.51
Professional Technical Occupations (exc. clerical)	311.1	799.5	0.39
Armed forces	1.5	558.6	-
Civil Defence Services	267.8	179.5	1.49
Persons professionally engaged in entertainment and sport	59.2	89.9	0.66
Service incl. Inst. Clubs Hotels etc.	604.4	511.8	1.18
Clerks, typists etc.			
Storekeepers	641.0	916.5	0.70
Packers and Bottlers	460.5	370.3	1.24
Stationary engine drivers			
Crane Driver, Tractor drivers	330.9	263.0	1.26
Workers in unskilled occupation (not elsewhere specif)	2506.4	1259.9	1.99
Workers in distribution of Gas, Water & Electricity (not elsewhere specified)	59.4	39.0	1.51
Other workers (students)	196.0	73.6	2.66
Not gainfully occupied or occupation unknown	1190.1	2155.1	0.55
ALL OCCUPATIONS MALE	17797.7	15662.2	1.14

SOURCES Ministry of Pensions and National Insurance Digest of Statistics 1955-56, (52)
Supplement of 1951 Census General Register Office. (53)

APPENDIX III

SCREENING QUESTIONNAIRE USED IN PILOT STUDY

(TO BE COMPLETED BY WORKERS THEMSELVES)

NAME

AGE

OCCUPATION

Questions

1. Have you got any rheumatic pains today?
2. Have you had what you believe to be rheumatic pains any time in the past year?
3. Have you ever had rheumatic pains since you started work?

Answers

	<u>'YES'</u>	<u>'NO'</u>

APPENDIX IV

CRITERIA FOR DIAGNOSING RHEUMATOID ARTHRITIS

1. Morning Stiffness.
2. Pain on motion or tenderness in at least one joint.
3. Swelling (soft tissue thickening or fluid - not bony overgrowth alone) in at least one joint continuously for not less than six weeks.
4. Swelling of at least one other joint (any interval free of joint symptoms between the two joint involvements may not be more than three months).
5. Symmetrical joint swelling with simultaneous involvement of the same joint on both sides of the body (bilateral involvement of proximal interphalangeal, metacarpophalangeal or metatarsophalangeal joints is acceptable without absolute symmetry). Distal interphalangeal joint involvement will not satisfy this criterion.
6. Subcutaneous nodules over bony prominences, on extensor surfaces or in juxta-articular regions.
7. X-ray changes typical of rheumatoid arthritis (which must include at least bony decalcification localized to or greatest around the involved joints and not just degenerative changes). However, degenerative changes do not exclude the diagnosis of rheumatoid arthritis.
8. Positive sheep cell agglutination test. (Any modification will suffice that does not give more than 5 percent of positive results in non-rheumatoid control subjects.)
9. Poor mucin precipitate from synovial fluid (with shreds and cloudy solution).

10. Characteristic histologic changes in synovial membrane with three or more of the following; marked villous hypertrophy; proliferation of superficial synovial cells often with palisading; marked infiltration of chronic inflammatory cells (lymphocytes or plasma cells predominating) with tendency to form "lymphoid nodules," deposition of compact fibrin, either on the surface or interstitially; foci of cell necrosis.
11. Characteristic histologic changes in nodules; "showing granulomatous foci with central zones of cell necrosis, surrounded by proliferated fixed cells, and peripheral fibrosis and chronic inflammatory cell infiltration, predominately perivascular".

Criteria 1 - 6 inclusive are clinical; 7 - 11 require special investigations.

APPENDIX V

DEFINITIONS OF GRADES IN CLASSIFICATION OF JOBS

(BAHIPS)

BACK: Assessment under this heading is deemed to be an estimate of the effort made by the supporting muscles of the axial skeleton in lifting bracing and supporting the body to enable effort to be made by the muscles of the limbs. The grades involved are defined as follows.

I No muscular effort or movements of the spine are required. The job can be done by a patient with advanced ankylosing spondylitis or severe poliomyelitis affecting the back. This would have to be a sedentary job involving light hand, arm or pedal movements only.

II Normal back movements which would be used in every day social contacts are required for this grade. A little rotation and flexion are accepted but the bracing action is not such as would be involved in lifting objects which are heavier than those requiring the use of the forearm only. Also excluded from this grade are jobs where the back has to be held in a constant set position for long periods (15 minutes).

IIIa Occasional bracing of the back is necessary to lift or handle light (under 8lb) but awkward objects which cannot be lifted or carried by the forearms alone. This effort is of short duration lasting less than 15 minutes.

IIIb This requires the same physical effort as grade IIIa but the effort is sustained or repeated frequently for periods of at least 15 minutes. Also included here are jobs which involve prolonged sitting or standing at a machine, where one position of the spine has to be maintained. Standing as such is classified under the heading of posture.

IVa Intermittent bracing of the back involved in lifting moderately heavy objects (up to 16 lbs.) is necessary except where they are so compact that they can be lifted with the forearms only. Similarly where the back has to be braced to operate heavy pedals against resistance.

IVb The same effort is required as in IVa except that it is prolonged or repeated for 15 minutes at a time.

Va Maximum intermittent effort is required by back to brace, strain or support the limbs in lifting or heaving.

Vb This is similar to Va but the effort is prolonged or repeated frequently.

ARMS.

Assessment made under this heading applies to effort made by the muscles of the upper limbs and shoulder girdles in lifting, reaching and heaving.

I This grade is reserved for those doing work which could be done by a man with arthrodesis of his shoulders and elbows. Simple wrist and finger movements are the only ones admissible.

II The job requires no effort by the arm in the way of lifting or carrying. Movements of the arms are necessary to operate simple switches and levers at normal level. Lifting and carrying light objects such as a small book, light tools and cartons not filled with heavy objects, are classified here.

IIIa This grade is used when there is some lifting of packages, equipment and objects up to 8lb. in weight; reaching with the arms is also included here. The work involved is intermittent.

IIIb The same criteria are applied here as for IIIa but the effort is continuous or repeated frequently for spells of at least 15 minutes.

IVa Work in this grade involves lifting objects of moderate weight (up to 16 lb.) pushing light barrows or equipment on castors, light shovelling is also classed here. The effort is intermittent in nature.

IVb This is similar to IVa but the effort is prolonged for at least 15 minutes.

Va Work allocated to this grade involves lifting heavy objects (16lbs +) machinery or equipment either alone or as part of a team. Heavy shovelling is also included here. The effort involved is of short duration.

Vb This is similar to Va but the heavy lifting or repeated effort is prolonged for more than 15 minutes.

HANDS.

Assessments here are confined to that part of the job concerned with gripping with the fingers and finger movements. The grades are as follows:-

I Work can be done by a man with two false hands. Simple lever operations which did not involve gripping may be involved.

II No effort by muscles of fingers or wrist is involved but simple lifting and carrying of objects which do not involve squeezing movements can be included. Writing odd notes or marking crates and digital control of switches at any level but not requiring effort are also placed in this category.

IIIa The job involves gripping or grasping objects of easy dimensions also moving levers which have to be gripped or squeezed as opposed to being merely being pushed. Also included here are clerical work and light tool work.

IIIb This category is applied to gripping, grasping, squeezing and light tool work prolonged for at least 15 minutes.

IVa The work is heavier than III involving household tools (pliers, screwdrivers, spanners etc.) also handling stiff switches and guiding and gripping implements required for heavy arm lifting.

IVb This is similar to IVa but the period of gripping is prolonged or repeated frequently for long periods of 15 minutes. It includes gripping steering wheels.

Va This category is used to indicate a job where maximum effort by the finger and hands is necessary. It includes the use of (as opposed to merely lifting) heavy industrial tools for short spells.

Vb This is similar to Va but the action is prolonged or repeated frequently for 15 minutes.

LEGS.

In this group the assessment is based on the physical effort made by the thighs and legs in performing the work. This is over and above the effort required to maintain the posture of the body which is assessed separately. The following categories are used:-

I The work can be done by a man in a wheelchair.

II There is no treading action necessary nor any pedal operation.

IIIa Pedals are operated occasionally or there is other treading action associated with little resistance or range of movement.

IIIb This is similar to IIIa but the effort is repeated or prolonged for over 15 minutes.

IVa This category is used to indicate a job involving the

operation of heavy pedals etc. or lighter pedals through an extensive range at intervals. It also includes shovelling and lifting medium weights or awkward shapes where the legs take some of the strain as well as the back.

IVb This is similar to IVa but the effort is repeated or prolonged for over 15 minutes.

Va The job required heavy bracing effort by the legs as in lifting very heavy or bulky objects or heavy shovelling.

Vb This is similar to Va but the effort is repeated or prolonged for over 15 minutes.

From the foregoing description it will be seen that the use of grades I and II mean that the part of the body concerned is either unnecessary for the job or that the use is minimal. Thereafter categories IIIa, IVa, and Va are used to indicate the need for progressively greater effort while IIIb, IVb, Vb indicate prolonged or frequently repeated effort of the same three grades. The remaining two variables which are studied in this system of analysis relate to the posture adopted while at work and the place or site of employment.

POSTURE.

This applies to the overall position of the body while the job is being done and is graded as follows:

I The job is entirely sedentary.

IIa The job is mainly sedentary with some standing but no walking apart from movement within the precincts of an office or within a small radius (10 yards) of the place of work.

IIb This is similar to IIa but walking from office to office or from one part of a factory floor to another constitutes an essential

part of the job.

IIIa The job is performed mainly in a standing position, but some sitting is possible (apart from recognised 'tea-breaks'). Movement, however, is restricted to the criteria laid down in IIa.

IIIb This is a job performed mainly in a standing position with movement to other parts of the factory as in IIb.

IVa In this category the job is performed without any chance of sitting down but in a constant position as in IIa.

IVb This is similar to IVa but there is movement away from the immediate place of work as in IIb.

V When walking for distances of over $\frac{1}{4}$ mile at a time forms an essential part of the work the job is placed in this category.

When alterations of posture are necessary for bracing the body, lifting or shovelling etc., this is classified under the heading of back or legs, whichever is appropriate.

SITE.

This relates to the place where the person works and again there are 8 possibilities:-

Ia The place of work is mainly in an office or small workroom where heating and ventilation are largely under the control of the individual; occasional visits to a large workshop may sometimes be made by those placed in this category but no outside work is undertaken.

Ib The principal workplace is the same as Ia but some outdoor work is also undertaken.

IIa Work is performed entirely in large closed workshops where some temperature control is possible even though the conditions may not be ideal for everyone.

IIb The principal workplace is the same as IIa but some outdoor work is also undertaken .

IIIa The factory or other place of work is covered but temperature control is dependent to a large extent on the weather. Draughty sheds underground workings and ships without steam up are included here.

IIIb The principal workplace is the same as IIIa but some outdoor work is also undertaken .

IV When the majority of the day is spent out of doors unless the weather was very inclement then the job is placed in this grade. This applies even though some of the day may be spent in a well heated office.

V The work is performed out of doors in all weathers though some modification may be possible on a few occasions.

APPENDIX VI (a)MEDICAL QUESTIONNAIRE

x = not applicable y = no information (except column 11)

Year of Birth	6	7	Type	
			1. Continuous deteriorating	
			2. Continuous static	
<u>Sex</u>			3. Continuous improving	
1. Males 2. Females		8	4. Episodic deteriorating	
			5. Episodic static	
			6. Episodic improving	
			7. Undetermined	19
<u>Occupation:</u>				
I.S.U. Code No.	9	10	Duration in years (0-9+)	
				20
<u>Social Class</u>			<u>Age of Onset</u>	
1. I Professional				21 22
2. II Intermediate				
3. IIIa Mine workers				
4. IIIb Transport				
5. IIIc Clerical				
6. IIId Armed Forces				
7. IIIe Others			<u>Hospital Referral</u>	
8. IVa Agriculture			1. Yes I.P.	
9. IVb Others		11	2. Yes O.P.	
10. Va Building			3. Never	23
x. Vb Others				
y. Unclassified				
<u>Job Assessment</u>			<u>Treatment in past year</u>	
(12-17)	B	A	1. Self only	
			2. Self & G.P.	
			3. G.P. only	
			4. None	24
<u>History of Rheumatic Symptoms</u>				
2. Now			<u>Weeks off work with rheumatism before past year</u>	
3. Past Year			1. Rarely	
4. Since starting work			2. For a spell of 3/52	
5. Negative (error)			3. Never	25
6. Negative				
7. Positive (error)		18		

Rheumatism in past year -weeks off

(0 - 9+) 26

Spells & Reasons (rheumatism)

1 - 8 No. of spells
Add 9 if absence was due to travel
only 27

Other illnesses - not be coded
(Specify) (a) Acute in past year
(b) Chronic in past year

Other Acute - weeks off in past year
(0 - 9+) 28

Spells & Reasons (other acute)

1 - 8 No. of spells
Add 9 if absence was due to travel
only 29

Other Chronic - weeks off in past year
(0 - 9+) 30

Spells & Reasons (other chronic)

1 - 7 No. of spells
Add 9 if absence is due to travel
only 31

Last Change of Job because of ill-health
Within the same firm

- 1. Rheumatism (work)
- 2. Rheumatism (travel)
- 3. Rheumatism (non-specific)
- 4. Other ill-health

Changed firm

- 5. Rheumatism (work)
- 6. Rheumatism (travel)
- 7. Rheumatism (non-specific)
- 8. Other ill-health
- 0. No change of work because of
ill-health 32

Wants Change of Job now

- 1. Rheumatism (work)
 - 2. Rheumatism (travel)
 - 3. Rheumatism (non-specific)
 - 4. Other health reasons
 - 5. Other reasons (not health)
 - 0. No change wanted
- Add 9 if more than one change in
past two years (for any reason) 33

Previous Job (relative to new one)

- 1. Lighter Job - more money
 - 2. Lighter Job - same money
 - 3. Lighter Job - less money
 - 4. Similar Job - more money
 - 5. Similar Job - same money
 - 6. Similar Job - less money
 - 7. Heavier Job - more money
 - 8. Heavier Job - same money
 - 0. Heavier Job - less money
- Add 9 if higher social grade 34

Last Change of Job for ill-health

Years ago (0 - 8+)
Add 9 if more than one change of
job for ill-health 35

Patient's Description of present job

- 1. Hot
- 2. Cold
- 3. Temperate 36
- 4. Changing

Humidity

- 1. Wet
- 2. Dry
- 3. Changing 38

Grading

- 1. Sedentary
- 2. Light
- 3. Moderate
- 4. Heavy
- 5. Very Heavy 39

Work History - not to be coded

<u>Hours per week</u> (Average for past year)		39	40	Neck		
					47	
<u>Overtime Commitments</u>				Back		
1. Yes, regularly					48	
2. Yes, sometimes						
3. Never (though O.T. possible)						
4. Never (O.T. not possible)		41				
<u>Average weekly wage</u>		42	43	Right		
				Arm	49	
<u>Years in Present Occupation</u>				Hand	50	
0-5 Number of years				Leg		
6. 6-9 years					51	
7. 10-14 years						
8. 15-24 years						
9. 25 + years		44				
<u>Method of Travel</u>				Left		
1. Walk ($\frac{1}{2}$ mile)				Arm	52	
2. Cycle						
3. Bus/Tram/Train				Hand	53	
4. Motor Cycle						
5. Car				Leg	54	
6. Other		45				
<u>Duration of a single journey</u>						
1. -0				<u>Overall Grading at present examination</u>		
2. $\frac{1}{2}$ hour				1. No Rheumatism		
3. $\frac{1}{2}$ hour				2. Minimal symptoms no functional limit.		
4. 1 hour				3. Slight functional limit - manages work.		
5. 2 hours +		46		4. Moderate limitation. Impaired efficiency or hours.		
				5. Severely crippled. Working by courtesy of colleagues etc.		
<u>EXAMINATION</u>					55	
0. No deformity or rheumatism						
1. Site of rheumatism but no symptoms present.						
2. Rheumatism without deformity or functional limitation.						
3. Rheumatism with deformity and/or functional limitation.						
4. Gross deformity and/or limitation from rheumatism.						
5. Deformity etc., from other causes Add 9 for dominant hand						

Clinical Diagnosis

- 1. No Rheumatism
 - 2. R.A.
 - 3. G.O.A.
 - 4. L.O.A.
 - 5. Disk disease
 - 6. Other diagnosis
 - 7. Indeterminate pain
- Add 8 if other disease is contributing to rheumatism.
Add 9 if multiple diagnosis

56

Type of Home

- 1. House with stairs
- 2. House with no stairs
- 3. Flat - basement
- 4. Flat - ground
- 5. Flat - 1st floor
- 6. Flat - 2nd floor
- 7. Flat - 3rd floor
- 8. Caravan
- 9. Hostel
- 0. Other dwelling

57

Ownership of Home

- 1. You - mortgage
 - 2. You
 - 3. Council
 - 4. Employer
 - 5. Landlord
 - 6. Relative
 - 7. Hostel
 - 8. Digs
- Add 9 if rent is paid by another

58

Change of house in past 5 years

- 1. Change - rheumatism
- 2. Change - other illness
- 3. Change - other reasons
- 4. Wants change - rheumatism
- 5. Wants change - other illness
- 6. Wants change - other reasons
- 7. No change wanted

59

Dependent Children

(0 - 9+)

60

Water

- 1. Outdoor
- 2. Indoor Cold
- 3. Indoor Hot
- 4. Bath

61

Marital Status

- 1. Married
- 2. Single
- 3. Widowed
- 4. Divorced
- 5. Separated

62

Finance in the Home - Wages

- 1. Self only
- 2. Self principal
- 3. Self subsid. } M.P.
- 4. Spouse F.T. }
- 5. Spouse P.T. }
- 6. Children }
- 7. Parents }
- 8. Others }

63

Sickness Pay

- 1. Full pay
- 2. Basic Pay only
- 3. N.H.I. and private insurance
- 4. N.H.I. only
- 5. N.H.I. and N.A.B.
- 6. N.A.B. only
- 7. Don't know
- 8. Industrial injury (married women

64

Social Questionnaire - Cols. 65-79)

not applicable y-refused
If 9 do not code but refer to Quest.
65-79

D.P. Register 0 Never been on Register

- 1. On Now - other ill-health
- 2. Been on in past - other ill-health
- 3. On Now - rheumatism
- 4. Been on in the past - rheumatism

80

APPENDIX VI (b)

MEDICAL QUESTIONNAIRE.

Form of setting questions: Main (M) and subsidiary (S) questions. Notes
on coding and definitions

Columns

- 1 - 5 Identification number first two digits "factory" last three for "employee".
- 6 - 11 Precoded from information supplied by Personal Manager.
Year of birth and occupation checked at interview.
- 9 - 17 M. "What is your job?" "Where do you work" (See Appendix V)
- 18 M. "Have you any aches and pains in your limbs or back?"
S. If "yes" "what do you think these pains are caused by?"
S. If "no" "have you ever had any rheumatic pains?"
S. If "no" "have you ever had arthritis, lumbago, sciatica or disc trouble?"
S. If "yes" "have they troubled you during the past year?"
S. If "yes" "are they troubling you now?"

NOTES

- (2) Symptoms at the time of questioning)
(3) Symptoms during past year) Positives
- (4) Symptoms since starting work but not in past year -
intermediates
- (5) If a man remembers he has rheumatic disease subsequently or if he shows some physical defect to the doctor which is clearly a rheumatic disease then "6" will be changed to "5" - Negative

error. The record will subsequently be treated as an intermediate.

- (6) Never had symptoms
 - (7) Positive Errors - See Note (1) Column 56
-) Negatives.

19-27 Negatives Code "X"

The word 'rheumatism' is replaced by whatever designation has been used.

19 M. "Is the rheumatism there the whole time or does it come and go?"

M. "Is it getting better, staying the same or getting worse?"

20,21,22 M. "When did it first start?"

23 M. "Have you ever been sent to hospital for it?"

24 M. "Have you consulted your own G.P. during the past year?"

S. If "yes" "was this because of the rheumatism?"

M. "Have you done anything yourself to try to help it - apart from your own doctor's treatment?"

S. If "yes" was this during the past year?"

*25,26,27 M. "Have you ever had to stay off work because of rheumatism?"

S. If "no" "not even for a day?"

S. If "yes" 1. "what was the longest spell off?"

2. "when was that?"

3. "how many days work have you missed during the past 12 months because of rheumatism?"

4. "how many spells were involved in this absence?"

S. If not understood "was it all at one time or did you go back to work in between?"

28,29,30

31 M. "Have you been off work for any other medical reason during the past 12 months?"

- S. If "yes" "what for?"
- S. (For each disease) "How many days and how often?"
- S. If "no" "do you suffer from any other chronic disability such as Bronchitis, Ulcers, Heart failure or Tuberculosis?"

* In questions 20, 26, 28, 30, if the answer is more than nine then the exact number will be recorded: Coding "9".

- 32 M. "Have you ever changed your job because of ill-health?"
 - S. If "yes" "why"
 - S. If vague answer "was it because of rheumatism?"
 - S. If "no" "when did you last change your job?"
- 34 M. "Did this change mean a drop in income at that time?"
 - (If "yes" to 32)
 - S. "Were you better off or just the same?"
 - M. "Was the previous job heavier or lighter than the subsequent one?"
 - M. "What was the previous job?"
- 35 M. "When did this change of job take place?"
 - M. "Have you had to change jobs for ill-health more than once in your life?"
- 33 M. "Would you like to change your job now?"
 - S. If "yes" "why?"
- 36 M. "Would you say that your present job was hot or cold or just average?"
 - S. If vague answer "does the temperature alter from hot to cold?"
- 37 M. "Is it wet or dry or does it vary?"
- 38 M. "Is the work light, medium or heavy?"
 - S. If "light", "is it sitting down work?"
 - S. If "heavy" "is it very heavy?"

- 39, 40 M. "How many hours a week do you normally work?"
- 41 M. "Do you ever do any overtime?"
- S. If "yes" "is that included in last answer?"
- S. If "no" "is this because there is no overtime being worked in the factory?"
- 42, 43 M. "What is your average weekly wage (including regular overtime) before tax and insurance are deducted?"
- 44 M. "Have you always been a *.....?" (*broad occup. group)
- S. "If "no" "when did you start in this work?"
- 45 M. "How do you normally travel to work?"
- 46 M. "How long does the whole journey take?"
- S. If vague answer - "from the door of your home to the factory gate?"

QUESTIONS FOR CLINICAL EXAMINATION

- 47 - 57 M. "Have you ever had any rheumatic pains in R/L arms, R/L hands R/L leg?"
- M. "Have you ever had any pain in back, lumbago or sciatica?"
- S. If "yes" "show me where. May I examine you?"
- Also M. "are you left or right handed?"
- S. If both, "which hand do you write with?"

NOTES: x to all columns for negatives

- Cols. 47 - 54 0. Positives but who have never had aches or pains
1. Positives without symptoms at this site at present but who admit (on questioning) to having had symptoms in this site.

2. Symptoms at the time of examination but no localising signs detectable.
 3. Signs present at examination: Tenderness, stiffness slight limitation of movement, minimal swelling (any or all).
 4. More marked version of above: definite functional limitation present.
 5. Over code positives with physical defect in this site which is not primarily rheumatic E.G. Polio, wasting, amputation, congenital deformity.
- N.B. Rheumatism (primary or secondary) may be present in addition.

NOTES FOR 55

Negatives will be coded "x"

Other codes:

1. Minimal symptoms in the past, but not at present; no functional limitation.
2. Minimal symptoms now: No functional limitation
- 3.) A total assessment of functional impairment independent of
- 4.)
- 5.) answers to questions 47-54 (but not unrelated to the localising signs etc.)

NOTES FOR 56

Negatives will be coded "x"

1. The patient has not got rheumatism in spite of having based his 'history' on being a positive.

Column 18 will be changed to positive (error) i.e. coded '7'

No other changes will be made.

2. R.A. rheumatoid arthritis (See Appendix IV) (62)
3. G.O.A. general osteoarthrosis - See Reference
4. L.O.A. local osteoarthrosis.
5. Disk disease - either prolapse or degenerative changes of intervertebral discs.
6. Other diagnosis - other named and specific disease.
7. Undetermined pains - complaints to which no firm diagnostic label could be attached.

GENERAL NOTE

2-7 The provisional diagnosis is made by the doctor even though symptoms may not be present at the time of examination. It is expected that the diagnosis will be more accurate for Positives than for Intermediates.

8 When another deformity is believed to be contributing to the diagnosis or rheumatism (e.g. T.B. spine with secondary O.A.) overcode '8' will be included here.

Where the disease is itself a form of rheumatism (e.g. Tenosynovitis, Gout etc.) then code '6' will be used on its own.

Multiple diagnosis will be avoided as far as possible but when it occurs overcode '9' will be used in addition to multiple coding.

57

- M. "Do you live in a flat?"
- S. If "yes" "which flat, ground first, second etc?"
- S. If "no" "is it a house or what?"
- S. If "yes" to house "does it have stairs?"

58 M. "Is it a corporation house?" (Council house'outside Edinburgh)

S. If "no" "who does it belong to?"

S. If "self" "have you finished paying for it?"

S. If "other than self" "who is the tenant?" ("Do you live with your parents?")

S. "Do you live in digs?"

NOTE ON YOUNG PEOPLE - Unless father (or mother etc.) owns property 'relative' (6) will not be coded but overcode 9 will be used.

59 M. "When did you move into this house?"

S. If within 5 years, "did you change because of ill-health or just social reasons?"

M. "Do you want to change your house just now?"

S. If "yes" "why?"

60 M. "How many children have you?"

S. Unless None - "are they working yet?"

61 M. "Is it a modern house, have you got hot water?"

S. If "yes" "has it got a bath?"

62 M. "Are you married?"

S. If "yes" "are you widowed or divorced?"

S. If "no" "have you ever been married?"

When subject has children(see 60) main question will be "is your wife alive?"

Second marriages take precedence over first ones

63 M. "Is there anyone else at home earning money?"

S. If "yes" "who"

64. M. "Does the firm make up your wages when you are ill?"
S. If "yes" "does this include your overtime money?"
(where overtime had been admitted)
S. If "no" "do you have any private insurance or Union money when you are sick?"
S. If "no" "just National Health?"

65 - 79 Qualifying Positives (i.e. '2' in Column 25, 1 - 7 in Column 27, Not '0' in Column 32)

"We are particularly interested in people like you who have been off work because of rheumatism (or changed jobs because of rheumatism depending which is more applicable). Would you mind having a word or two with our Medical Social Worker?"

- 80 M. "Have you ever been registered as a disabled person by the Ministry of Labour?"
S. If "no" or uncertain "Have you ever had a green card?"
S. If "yes" "are you still on the register?"
"What disability led to you being registered?"
"If uncertain "May I see your green card?"

APPENDIX VI(c)

CODES FOR SIX DIFFERENT INDUSTRIES IN SURVEY

	COLUMNS	
	<u>1</u>	<u>2</u>
Hardware Store	0	1
Foundry	0	2
Printing Works	0	3
Brewery	0	4
Coalmine	0	5
Electronics Factory	0	9

Dockyard:-

Engineering	1	7/8
Electrical	2	7/8
Stores	3	7/8
Construction	4	7/8
Maintenance	6	7/8
Harbour Craft	9	7/8

APPENDIX VII (a)

PREVALENCE OF RHEUMATIC COMPLAINTS BY AGE

	Row	15-	25-	35-	45-	55+	All 15+
Symptoms at interview. percent	(A)	18 3.57	35 7.28	87 16.63	127 20.99	130 22.77	397 14.79
Symptoms during previous year. percent	(B)	55 10.91	127 26.40	150 28.68	182 30.08	162 28.37	676 25.19
Positives percent	(A+B)	73 14.48	162 33.68	237 45.32	309 51.07	292 51.14	1073 39.98
Symptoms before previous year. percent	(C)	16 3.17	40 8.32	60 11.47	86 14.21	107 18.74	309 11.51
Unrecognised symptoms (False Negatives) percent	(D)	1 0.20	-	3 0.57	4 0.66	9 1.58	17 0.63
Intermediates percent	(C+D)	17 3.37	40 8.32	63 12.05	90 14.88	116 20.32	326 12.15
No symptoms percent	(E)	414 84.14	279 58.00	222 42.45	205 33.88	162 28.37	1282 47.77
Erroneous symptoms (false positives) percent	(F)	-	-	1 0.19	1 0.17	1 0.18	3 0.11
Negatives percent	(E+F)	414 82.14	279 58.00	223 42.64	206 34.05	163 28.55	1285 47.88
Total interviewed on which percentages are based		504	481	523	605	571	2684

COLUMNS 6,7 x 18

APPENDIX VII (b)

DIAGNOSIS MADE ON EXAMINATION BY AGE

DIAGNOSIS	COL	Age in years					All 15+
		15-	25-	35-	45-	55+	
Rheumatoid Arthritis percent	A	0 -	2 0.42	6 1.15	14 2.31	9 1.58	31 1.16
Generalised Osteoarthritis percent	B	0 -	0 -	1 0.19	9 1.49	49 8.58	59 2.20
Local Osteoarthritis percent	C	5 0.99	12 2.49	26 4.97	51 8.43	70 13.26	164 6.11
All Osteoarthritis percent	B+C	5 0.99	12 2.49	27 5.16	60 9.92	119 20.84	223 8.31
Disk Disease percent	D	11 2.18	38 7.90	67 12.81	103 17.02	108 18.91	327 12.18
Vague pains in back and neck percent	E	46 9.13	86 17.88	115 21.99	122 20.17	109 19.09	478 17.81
All Axial pains percent	D+E	57 11.31	124 25.78	182 34.80	225 37.19	217 38.00	805 30.00
Vague pains of limbs percent	F	24 4.76	51 10.60	72 13.77	90 14.88	58 10.16	295 10.99
All vague pain percent	E+F	70 13.89	137 28.58	187 35.76	212 35.04	167 29.25	773 28.80
Other Rheumatic diseases percent	G	4 0.79	17 3.53	18 3.44	27 4.46	23 4.03	89 3.32
Unknown (not examined) percent	H	0 -	0 -	1 0.9	1 0.17	1 0.18	3 0.11
Negatives (including 3 false positives) percent	J	414 82.14	279 58.00	223 42.64	205 33.88	162 28.37	1285 57.88
Patients with Multiple diagnoses percent	Z	0 -	5 1.04	5 0.96	17 2.81	17 2.81	44 1.60
Total with symptoms on which percentages are based		504	481	523	605	571	2684

COLUMNS 6,7 x 56 (modified) for 2-5 on Column 18.

* Vague Pains first sorted on Columns 47 and 48 code 0.

APPENDIX VII (c)

SEVERITY OF RHEUMATIC DISABILITY AT THE TIME OF EXAMINATION

(Positives and Intermediates)

	Age in years					All 15+
	15-	25-	35-	45-	55+	
No physical signs percent	64 71.11	128 63.68	182 60.67	206 51.76	180 44.23	760 54.44
Minimal signs no functional impairment percent	17 18.89	45 22.39	71 23.67	106 26.63	106 26.04	345 24.71
Slight impairment percent	6 6.67	17 8.46	33 11.00	60 15.08	67 16.46	183 13.11
Moderate impairment percent	3 3.33	11 5.47	14 4.66	23 5.78	46 11.30	97 6.95
Severe impairment percent	-	.	-	3 0.75	8 1.97	11 0.79
Total with symptoms on which percentages are based	90	* 201	300	* 398	* 407	1396

*
3 men with symptoms who were not examined have been omitted.

COLUMNS 6, 7 x 55 for 2-5 on Column 18.

APPENDIX VII (a)

DIAGNOSES OF 1396 PATIENTS* WITH RHEUMATIC COMPLAINTS AND THEIR DEGREES OF
FUNCTIONAL IMPAIRMENT

DEGREE OF IMPAIRMENT	RHEUMATOID ARTHRITIS	OSTEOARTROSIS		DISK DISEASE		INDETERMINATE PAIN	OTHER RHEUMATIC DISEASES
		GENERAL	LOCAL				
NIL	13	30	89	190		747	57
Percent	41.94	50.85	54.27	58.10		96.64	64.04
SLIGHT	10	16	46	82		21	26
Percent	32.26	27.12	28.05	25.08		2.72	29.21
MODERATE	7	13	25	50		4	5
Percent	22.58	22.03	15.24	15.29		0.52	5.62
SEVERE	1	0	4	5		1	1
Percent	3.23	-	2.44	1.53		0.13	1.12
Total with Rheumatic Disease (100%)	31	59	164	327		773	89

* 3 men with complaints who were not examined have been excluded.

Cols 55 x 56 for 2 - 5 on Col 18.

APPENDIX VII (e)

MEDICAL CARE IN THE PAST YEAR BECAUSE OF RHEUMATISM

(POSITIVES ONLY)

AGE IN YEARS

MEDICAL CARE	15-	25-	35-	45-	55+	All 15+
Self treatment	10	49	97	142	136	434
Percent	13.70	30.25	40.93	45.95	46.58	40.45
Consultation with G.P.	24	62	71	113	120	390
Percent	32.88	38.27	29.96	36.57	41.10	36.35
Men off work	14	29	34	50	51	178
Percent	19.18	17.90	14.35	16.18	17.47	16.59
Weeks off work	48	134	162	270	308	922
Weeks / 100 men	65.75	82.72	68.35	87.38	105.48	85.93
Total Positives on which percentages are based.	73	162	237	309	292	1073

Cols 6,7 x 24)
 x 26) for 2, 3 on Col 18.

APPENDIX VII (f)

(POSITIVES CONTRASTED WITH NEGATIVES)

WEEKS ABSENCE FROM CAUSES OTHER THAN RHEUMATISM DURING THE YEAR PRIOR TO INTERVIEW

	15-	25-	35-	45-	55+	All 15 +
<u>POSITIVES</u>						
Men absent	35	76	89	116	122	438
Percent	47.95	46.91	37.55	37.54	41.78	40.82
Weeks of absence	129	260	378	614	658	2039
Weeks / 100 men in age group	176.71	160.49	159.49	198.71	225.34	190.03
Total Positives (on which rates are based)	73	162	237	309	292	1073
<u>NEGATIVES</u>						
Men absent	162	124	85	81	67	519
Percent	39.13	44.44	38.12	39.32	41.10	40.39
Weeks of absence	544	460	359	428	385	2176
Weeks / 100 men in age group	131.40	164.87	160.99	207.77	236.20	169.34
Total Negatives (on which rates are based)	414	279	223	206	163	1285

Cols 6,7 x (28 + 30) for 2,3 on Col 18

6,7 x (28 + 30) for 6,7 on Col 18

APPENDIX VII (g)

MEDICAL CARE FOR RHEUMATIC COMPLAINTS SINCE STARTING WORK.

(POSITIVES AND INTERMEDIATES)

MEDICAL CARE	15-	25-	35-	45-	55+	All 15+
Hospital Referral	16	46	65	130	110	367
Percent	17.78	22.77	21.67	32.58	26.96	26.23
Hospital Admission	2	11	20	29	20	82
Percent	2.22	5.45	6.67	7.27	4.90	5.86
Prolonged Absence (3/52 +)	9	40	58	101	109	317
Percent	10.00	19.80	19.33	25.31	26.72	22.66
Total Positives and Intermediates on which percentages are based	90	202	300	399	408	1399

Cols 6,7 x 23)
 x (25 + 26 for all 1,3 on 25)) for 2 - 5 on Col 18

APPENDIX VII (h)

MEDICAL CARE FOR RHEUMATIC DISEASES

(POSITIVES)

MEDICAL CARE	RHEUMATOID	OSTEOARTHRITIS	DISK	INDETERMINATE	OTHER		
	ARTHRITIS	GENERAL LOCAL	DISEASE	BACK	LIMBS	DIAGNOSIS	
Self Treatment	8	19	6	156	109	68	28
Percent	28.57	43.18	4.03	55.71	33.44	31.63	38.89
Consultation with G.P.	12	17	58	140	109	40	27
Percent	42.86	38.64	38.93	50.00	33.44	18.60	37.50
Absent from work	7	6	28	81	43	8	11
Percent	25.00	13.64	18.79	28.93	13.19	3.72	15.28
Weeks absence	91	19	157	467	137	31	58
Weeks / 100 men	325.00	43.18	105.37	166.78	42.02	14.42	80.56
Total number of men with each disease (on which percentages are based)	28	44	149	280	326	215	72

Number with 1 Diagnosis 1035
 Number with 2 Diagnoses 35
 Number with 3 Diagnoses 3

Total Number of Positives 1073

Cols 56 (modified*) x 24)
 x 26) for 2,3 on Col 18

* See footnote Appendix VII (b)

APPENDIX VII (j)

AGE DISTRIBUTION OF THOSE WITH MILD AND SEVERE DEFORMITIES ON EXAMINATION OF 8 SITES
(POSITIVES AND INTERMEDIATES)

S I T E	A G E I N Y E A R S					
	15-	25-	35-	45-	55-	All 15 +
Arms R	0	2	8	19	33	62
Percent	-	0.10	2.67	4.77	8.11	4.44
Arms L	0	2	4	10	27	43
Percent	-	0.10	1.33	2.51	6.63	3.08
Hands R	1	3	12	21	66	103
Percent	1.11	1.49	4.00	5.28	16.22	7.38
Hands L	1	3	9	23	61	97
Percent	1.11	1.49	3.00	5.78	14.99	6.95
Legs R	3	7	17	39	55	121
Percent	3.33	3.48	5.67	9.80	13.51	8.67
Legs L	8	7	15	34	51	115
Percent	8.89	3.48	5.00	8.54	12.53	8.24
Back	4	23	17	45	52	141
Percent	4.44	11.44	5.67	11.31	12.78	10.10
Neck	0	4	12	25	18	59
Percent	-	1.99	4.00	6.28	4.42	4.23
Total Positives and Intermediates in each age group (100%)	90	201*	300	398*	407*	1396

*3 men who were not examined have been omitted.

Cols 6,7 x 47-54 (Codes 3 + 4)

APPENDIX VII (k)

EXAMINATION OF THE NECK

(Clinical findings)

A G E I N Y E A R S

CLINICAL STATE	15-	25-	35-	45-	55+	All 15+
Never had symptoms (including Negatives)	454	380	385	405	353	1977
Percent	90.08	79.17	73.61	67.05	61.93	73.74
No symptoms at present	41	66	99	132	148	486
Percent	8.13	13.75	18.93	21.85	25.96	18.13
Symptoms but no signs	5	11	22	22	17	77
Percent	0.99	2.29	4.21	3.64	2.98	2.87
Limitation) Mild and) Percent	4 0.79	20 4.17	14 2.68	39 6.46	42 7.37	119 4.44
Deformity) Severe) Percent	0 0	3 0.63	3 0.57	6 0.99	10 1.75	22 0.82
Major Deformity other than Rheumatism	0	2	2	4	6	14
Percent	0	0.42	0.38	0.66	1.05	0.52
Total Interviewed on which percentages are based	504	480*	523	604*	570*	2681

* 3 men who had symptoms but who were not examined have been excluded

Cols 6,7 x 48

A P P E N D I X VIII (a)

AGE DISTRIBUTION OF INDUSTRIAL GROUPS

(INCLUDING MEANS AND STANDARD DEVIATIONS OF EACH GROUP)

A G E I N Y E A R S

Occupational Group	15-	25-	35-	45-	55+	Mean	S.D.	Total Aet 15+
Hardware Store	12	8	11	16	7	39.63	13.6	54
Printing Works	14	6	13	10	13	40.36	14.9	56
Foundry	0	0	37	39	25	48.81	7.7	101
Brewery	92	92	78	81	94	39.84	14.5	437
Coalmine	77	63	85	87	90	41.24	13.9	402
Electronics Factory	48	92	45	15	12	32.97	10.7	212
<u>Dockyard :</u>								
Construction	108	85	86	126	128	41.52	14.1	533
Engineering	58	45	55	69	71	41.68	14.2	298
Electrical	51	24	24	30	30	37.74	15.2	159
Harbour Craft	19	20	34	58	46	45.19	12.8	177
Stores	11	26	43	51	45	45.28	12.4	176
Maintenance	14	20	12	23	10	39.37	13.2	79
All Occupational Groups	504	481	523	605	571	40.96	14.1	2684

COLUMNS 6,7 x 1,2

APPENDIX VIII(b)

AGE DISTRIBUTION OF BREWERY WORKERS

Occupation	15-	25-	35-	45-	55+	All 15+
Washers	5	12	6	21	20	64
Cellarismen	19	17	11	6	12	65
Bottlers	33	6	1	4	6	50
Mashers	14	12	11	9	13	59
Draymen	2	24	22	13	12	73
Coopers	5	4	6	14	9	38
Others (Maintenance etc)	14	17	21	14	22	88
Total interviewed	92	92	78	81	94	437

COLUMNS 6,7 x 9,10 for 4 in Column 2 only

A P P E N D I X VIII (c)

AGE DISTRIBUTION OF COALMINERS

Occupation	Age in Years					All
	15-	25-	35-	45-	55+	15+
Strippers	6	15	27	14	12	74
Brushers	5	17	18	19	10	69
Other Face Workers	2	5	8	6	3	24
All Face Workers	13	37	53	39	25	167
Other Workers Underground	12	6	8	15	22	63
Surface Workers	42	7	12	26	39	126
All Unskilled Workers	67	50	73	80	86	356
Craftsmen (skilled workers)	10	13	12	7	4	46
Total Interviewed in Coalmine	77	63	85	87	90	402

COLUMNS 6,7 x 9,10 for 5 on Column 2 only

A P P E N D I X VIII (d)

AGE DISTRIBUTION OF DOCKYARD WORKERS

Occupation	Age in Years					All 15+
	15-	25-	35-	45-	55+	
Coppersmiths	33	23	22	22	15	115
Storehousemen	16	11	13	20	17	77
Stokers	4	3	22	14	20	63
Electrical Fitters	44	19	14	18	9	104
Seamen	7	23	19	38	25	112
Drivers	0	6	19	29	25	79
Blacksmiths	1	4	13	26	19	63
Miscellaneous Workers	9	10	7	14	25	65
Painters	6	28	21	16	17	88
Boilermakers	12	14	14	19	14	73
Shipwrights	34	8	8	9	15	74
Labourers	18	22	31	56	66	193
Machinists	8	8	14	18	23	71
Engine Fitters	27	19	18	24	13	101
Ship Fitters	33	7	6	9	16	71
Joiners	9	15	13	25	11	73
Total	261	220	254	357	330	1422

COLUMNS 6,7 x 9,10 for 7,8 in Column 2 only

A P P E N D I X VIII (e)

RHEUMATIC COMPLAINTS BY OCCUPATIONS

	Positives (%)		Intermediates (%)		Negatives (%)		Total (100%)
Hardware Store	24	44.44	3	5.56	27	50.00	54
Printing Works	24	42.86	8	14.29	24	42.86	56
Foundry	55	54.46	8	7.92	38	37.62	101
Brewery	187	42.79	52	11.90	198	45.31	437
Coalmine	185	46.02	45	11.12	172	42.79	402
Electronics Factory	76	35.85	25	11.79	111	52.36	212
<u>Dockyard</u> : Construction	177	33.21	69	12.95	287	53.85	533
Engineering	97	32.55	40	13.42	161	54.03	298
Electrical	53	33.33	21	13.21	85	53.46	159
Harbour Craft	81	45.76	22	12.43	74	41.81	177
Stores	85	48.30	25	14.20	66	37.50	176
Maintenance	29	36.71	8	10.13	42	53.16	79
All Occupations in Survey	1073	39.98	326	12.15	1285	47.88	2684

COLUMNS 18 x 1,2

A P P E N D I X VIII (f)

PREVALENCE OF COMPLAINTS IN DOCKYARD WORKERS

Occupation	Positives	Intermediates	Negatives	Total
Coppersmiths	49	9	57	115
Storehousemen	36	6	35	77
Stokers	33	8	22	63
Electrical Fitters	34	10	60	104
Seamen	51	19	42	112
Drivers	39	14	26	79
Blacksmiths	31	11	21	63
Miscellaneous Workers	27	12	26	65
Painters	32	10	46	88
Boilermakers	25	9	39	73
Shipwrights	19	8	47	74
Labourers	68	30	95	193
Machinists	22	12	37	71
Engine Fitters	24	9	68	101
Ship Fitters	14	10	47	71
Joiners	18	8	47	73
Total	522	185	715	1422

COLUMNS 18 x 9,10 for 7,8 in Column 2 only

A P P E N D I X VIII (g)

RHEUMATIC COMPLAINTS IN SKILLED AND UNSKILLED WORKERS

(Dockyard only)

Skilled Workers

Grading	Age in Years					All 15+
	15-	25-	35-	45-	55+	
Positives	25	51	72	126	98	372
Intermediates	7	16	17	42	46	128
Negatives	200	105	92	80	77	554
Total Interviewed	232	172	181	248	221	1054

Unskilled Workers

Grading	Age in Years					All 15+
	15-	25-	35-	45-	55+	
Positives	5	15	23	58	49	150
Intermediates	-	3	12	15	27	57
Negatives	24	30	38	36	33	161
Total Interviewed	29	48	73	109	109	368

COLUMNS 6,7 (modified*) x 18

* 7,8 on Column 2, sorted by Columns 9,10

A P P E N D I X VIII (h)

RHEUMATIC COMPLAINTS IN COALMINERS

Occupation	Grading			Total Interviewed
	Positive	Intermediate	Negative	
Strippers	38	5	31	74
Brushers	34	8	27	69
Other Face Workers	8	3	13	24
All Face Workers	80	16	71	167
Other Underground Workers	28	9	26	63
Surface Workers	57	17	52	126
All Unskilled Workers	165	42	149	356
Craftsmen (skilled workers)	20	3	23	46
Total in each grade	185	45	172	402

COLUMNS 18 x 9,10 for 5 in Column 2 only

A P P E N D I X VIII (i)

RHEUMATIC COMPLAINTS IN UNSKILLED COALMINERS

	Age in Years					All
	15-	25-	35-	45-	55+	15+
Positives	12	19	36	45	48	164.
Percent	17.91	38.00	50.70	56.25	58.54	46.33
Intermediates	5	3	8	12	14	42
Percent	7.46	6.00	11.27	15.00	17.07	11.86
Negatives	50	28	27	23	20	148
Percent	74.63	56.00	38.03	28.75	24.39	41.81
Totals in each Age Group (100%)	67	50	71	80	82	354

COLUMNS 6,7 x 18 (after sorting on Columns 9,10) for 5 on Column 2 only

A P P E N D I X VIII (j)

PREVALENCE OF RHEUMATIC DISEASES BY OCCUPATION

	Nega- tives	Rheumatoid Arthritis	Osteoarthrosis General	Disk Local Disease	Indeter. Pains	Other Rheumatic Diseases	Total on which percentages are based	
Hardware Store percent	27 50.00	1 1.85	2 3.70	3 5.56	3 5.56	19 35.19	3 5.56	54
Printing Works percent	24 42.86	0 0	6 10.71	2 3.57	7 12.50	13 23.21	2 3.57	56
Foundry percent	38 37.62	0 0	5 4.95	9 8.91	23 22.77	25 24.75	5 4.95	101
Brewery percent	198 45.31	5 1.14	9 2.06	26 5.95	68 15.56	126 28.83	20 4.58	437
Coal Mine percent	172 42.79	2 0.50	12 2.99	43 10.70	55 13.68	104 25.87	21 5.22	402
Electronics Factory percent	111 52.36	2 0.94	1 0.47	10 4.72	26 12.26	62 29.25	5 2.36	212
<u>Dockyard</u>								
Construction* percent	287 53.95	6 1.13	10 1.88	21 3.95	62 11.65	141 26.50	7 1.32	532
Engineering* percent	161 54.21	3 1.01	4 1.35	16 5.39	21 7.07	89 29.97	5 1.68	297
Electrical percent	85 53.46	3 1.89	2 1.26	12 7.55	11 6.92	46 28.93	2 1.26	159
Harbour Craft* percent	74 42.05	4 2.27	4 2.27	10 5.68	15 8.52	66 37.50	8 4.55	176
Stores percent	66 37.50	4 2.27	3 1.70	8 4.55	27 15.34	59 33.52	10 5.68	176
Maintenance percent	42 53.16	1 1.27	1 1.27	4 5.06	9 11.39	23 29.11	1 1.27	79
Total in all Industries	1285 47.92	31 1.16	59 2.20	164 6.12	327 12.20	773 28.83	89 3.32	2681

* 3 men who refused examination have been omitted.

COLUMNS 56 x 1,2

A P P E N D I X VIII (k)

RHEUMATIC COMPLAINTS BY AGE

Skilled and Unskilled Workers in Dockyard and Coalmine

	Skilled						Unskilled					
	Age in Years						Age in Years					
	15-	25-	35-	45-	55+	All 15+	15-	25-	35-	45-	55+	All 15+
<u>DOCKYARD</u>												
Rheumatoid arthritis	0	2	3	5	4	14	0	0	0	5	2	7
Osteoarthritis	1	5	6	23	28	63	0	1	2	12	17	32
Disk Disease	3	8	14	39	35	99	0	2	4	23	17	46
Indeterminate pains	28	48	66	97	68	307	4	13	25	33	42	117
Other rheumatic diseases	0	4	2	5	8	19	1	2	2	7	2	14
Number of Dockers	232	171*	181	247*	221	1052	29	48	73	109	108*	367
<u>COALMINE</u>												
Rheumatoid arthritis	0	0	1	0	0	1	0	0	0	0	1	1
Osteoarthritis	2	0	0	0	0	2	0	2	6	15	30	53
Disk Disease	0	1	3	1	2	7	2	7	11	15	13	48
Indeterminate pains	0	2	6	2	2	12	13	10	23	27	19	92
Other rheumatic diseases	0	0	0	2	0	2	2	3	5	3	6	19
Number of Miners	10	13	14	7	4	48	67	50	71	80	86	354

* 3 men who refused examination have been omitted.

COLUMNS 6,7 x 56 (after sorting on Columns 9,10) for 5 and 7,8 on Column 2 only

APPENDIX VIII (1)

ABSENCE DUE TO RHEUMATIC DISEASES

Industries and selected occupations

Number interviewed	Industry / Occupation	Men absent in past year	Weeks of Absence in past year.		S.A.R.
			Observed	Expected	
56	Hardware Store	4	10	17.6	56.8
62	Printing Works	4	11	18.5	59.5
112	Foundry	10	54	42.6	126.8
	Brewery				
64	Washers	5	27	25.9	104.2
65	Cellarmen	4	24	19.0	126.3
50	Bottlers	7	33	11.4	289.5
59	Mashers	4	28	19.1	146.6
73	Draymen	4	20	26.0	76.9
57	Coopers	2	9	14.5	62.1
88	Maintenance etc.	6	24	29.5	81.4
<u>456</u>		<u>32</u>	<u>165</u>	<u>145.4</u>	<u>113.5</u>
	Coalmine				
167	Face workers	16	89	58.9	151.1
63	Other underground	4	28	23.9	117.2
126	Surface	9	49	42.2	116.1
46	Craftsmen	4	20	13.4	149.3
<u>424</u>		<u>33</u>	<u>186</u>	<u>138.4</u>	<u>134.4</u>
212	Electronic Factory	8	14	57.4	24.4
	Dockyard				
558	Construction	32	210	185.8	113.0
312	Engineering	21	116	104.1	111.4
167	Electrical	7	44	48.6	90.5
186	Harbour craft	14	60	72.3	83.0
185	Stores	10	30	68.5	43.8
82	Maintenance	3	22	22.4	96.2
<u>1422</u>		<u>87</u>	<u>482</u>	<u>501.7</u>	<u>96.1</u>
	Total for all workers interviewed	176	922	921.6	100

OBSERVED : COLUMNS 26 x 1,2 and 9, 10. EXPECTED APPENDIX VII (e)
VIII (a-d)

A P P E N D I X VIII (m)

ABSENCE DUE TO RHEUMATIC DISEASES

OCCUPATIONS IN DOCKYARD

Number Interviewed	Occupations	Men Absent in past year	Weeks of absence in past year		S A R
			Observed	Expected	
115	Coppersmiths	8	53	34.2	155.0
71	Storehousemen	5	12	26.7	44.9
63	Stokers	7	21	25.0	84.0
104	Electrical Fitters	3	10	26.7	37.5
112	Seamen	6	34	43.4	78.3
79	Drivers	1	4	34.0	11.8
63	Blacksmiths	5	55	27.1	203.0
65	Miscellaneous Workers	4	62	25.6	242.2
88	Painters	6	72	31.0	232.3
73	Boilermakers	6	12	25.6	46.9
74	Shipwrights	1	4	19.9	20.1
193	Labourers	20	88	78.0	112.8
71	Machinists	6	26	27.8	93.5
101	Engine Fitters	4	14	31.1	45.0
71	Ship Fitters	2	4	19.5	20.5
73	Joiners	3	11	26.1	42.1
1422	All Occupations Dockyard	87	482	501.7	96.1

COLUMNS 26 x 9,10 for 7,8 on Column 2 only

APPENDIX IX (a)

JOB ASSESSMENT - BACK

Age distribution of different grades

Grade	Description	Age in Years					All
		15-	25-	35-	45-	55+	15+
I	Use not essential	0	1	2	4	3	10
II	No effort required	19	47	49	59	58	232
IIIa	Slight Effort (a) intermittent	150	96	109	138	108	601
IIIb	(b) sustained	91	120	79	52	51	393
IVa	Moderate effort (a) intermittent	139	70	80	120	144	553
IVb	(b) sustained	0	1	2	5	4	12
Va	Maximum Effort (a) intermittent	91	108	113	159	152	623
Vb	(b) sustained	14	38	89	68	51	260
All Grades	—————	504	481	523	605	571	2684

COLUMNS 6, 7 x 12.

APPENDIX IX (b)

JOB ASSESSMENT - BACK

PREVALENCE OF POSITIVE AND S.C.R.

Grade	Number of Positives		S.C.R.	Total in Grade (100 %)
	Observed (%)	Expected		
I	5 (50.00)	4.82	(103.7)	10
II	97 (41.81)	100.59	96.4	232
IIIa	197 (32.78)	229.15	86.0	601
IIIb	147 (37.40)	142.03	103.5	393
IVa	218 (39.42)	214.87	1101.5	553
IVb	6 (50.00)	5.70	(105.3)	12
Va	267 (42.86)	259.68	102.8	623
Vb	136 (52.31)	116.16	117.1	260
All Grades	1073 (39.98)	1073	100	2684

COLUMN 18 x 12.

APPENDIX IX (c)

JOB ASSESSMENT - BACK.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES.

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRITIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
I	0	2	2	2	10
II	30	16	72	17	232
IIIa	56	28	159	35	601
IIIb	42	17	119	18	393
IVa	65	39	154	37	553
IVb	2	2	4	0	12
Va	87	35	194	44	623
Vb	45	25	69	26	260
ALL GRADES	327	164	773	179	2684

Columns 56 x 12

APPENDIX IX (d)

JOB ASSESSMENT - BACK

Sickness Absence and S.A.R.

Grading	Workers absent	%	Weeks of Absence in Past Year		S.A.R.	Number in each grade (100%)
			Observed	Expected		
I	1	10.00	3	4.3	(69.8)	10
II	15	6.47	143	92.7	154.3	232
IIIa	29	4.83	118	194.7	60.6	601
IIIb	20	5.09	84	117.3	71.6	393
IVa	35	6.33	184	188.8	97.5	553
IVb	0	-	0	0	-	12
Va	51	8.19	258	226.8	113.8	623
Vb	27	10.38	132	97.3	135.7	260
All Grades	178	6.63	922	921.9	100	2684

COLUMNS 26 x 12.

APPENDIX X (a)

JOB ASSESSMENT - ARMS

Age distribution of different grades

Grade	Description	Age in Years					All
		15-	25-	35-	45-	55+	15+
I	Use not Essential	0	0	2	1	5	8
II	No Effort required	6	4	7	17	12	46
IIIa	Slight Effort (a) intermittent	21	24	43	36	39	163
IIIb	(b) sustained	0	0	0	0	0	0
IVa	Moderate Effort (a) intermittent	350	283	231	262	252	1378
IVb	(b) sustained	0	2	2	6	4	14
Va	Maximum Effort (a) intermittent	102	125	136	189	186	738
Vb	(b) sustained	25	43	102	94	73	337
All Grades	_____	504	481	523	605	571	2684

COLUMNS 6,7 x 13

APPENDIX X (b)
JOB ASSESSMENT - ARMS

PREVALENCE OF POSITIVES AND S.C.R.

Grade	Number of Positives		S.C.R.	Total in Grade (100 %)
	Observed (%)	Expected		
I	2 (25.00)	3.98	(50.3)	8
II	19 (41.30)	20.21	94.0	46
IIIa	79 (48.47)	68.94	114.6	163
IIIb	0	0	-	0
IVa	490 (35.56)	513.33	95.5	1378
IVb	7 (50.00)	6.85	(102.2)	14
Va	308 (41.73)	310.03	99.3	738
Vb	168 (49.85)	149.66	112.3	337
All Grades	1073 (39.98)	1073	100	2684

OBSERVED : COLUMNS 18 x 13

APPENDIX X (c)

JOB ASSESSMENT - ARMS.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRISIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
I	0	0	3	1	8
II	7	4	10	6	46
IIIa	29	12	46	18	163
IIIb	0	0	0	0	0
IVa	132	76	388	72	1378
IVb	2	2	5	0	14
Va	98	41	229	47	738
Vb	59	29	92	35	337
ALL GRADES	327	164	773	179	2684

Columns 56 x 13

Appendix X (d)

Job Assessment - Arms.

Sickness Absence and S.A.R.

Grading	Workers % Absent		Weeks of Absence in Past Year		S.A.R.	Number in each grade (100%)
			Observed	Expected		
I	0	-	0	3.7	-	8
II	3	6.52	36	18.1	198.9	46
IIIa	6	3.68	22	57.8	38.1	163
IIIb	0	-	0	0	-	0
IVa	75	5.44	418	437.8	95.5	1378
IVb	0	-	0	5.9	-	14
Va	61	8.27	267	271.5	98.3	738
Vb	33	9.79	179	127.4	140.5	337
All Grades	178	6.63	922	922	100	2684

Columns 26 x 13

APPENDIX XI (a)

JOB ANALYSIS - HANDS

Age distribution of different grades

Grade	Description	Age in Years					All
		15-	25-	35-	45-	55+	15+
I	Use not essential	0	0	0	0	0	0
II	No effort required	1	0	4	2	5	12
IIIa	Slight effort (a) intermittent	72	85	77	80	75	389
IIIb	(b) sustained	16	6	11	9	11	53
IVa	Moderate Effort (a) intermittent	138	67	66	108	143	522
IVb	(b) sustained	97	170	181	172	134	754
Va	Maximum Effort (a) intermittent	26	45	50	92	84	297
Vb	(b) sustained	154	108	134	142	119	657
All Grades	_____	504	481	523	605	571	2684

COLUMNS 6,7 x 14.

APPENDIX XI (b)

JOB ASSESSMENT - HANDS

PREVALENCE OF POSITIVES AND S.C.R.

Grade	Number of Positives		S.C.R.	Total in Grade (100%)
	Observed (%)	Expected		
I	0	0	-	0
II	3 (25.00)	5.53	(45.2)	12
IIIa	159 (40.87)	153.16	103.8	389
IIIb	21 (39.62)	19.96	105.2	53
IVa	215 (41.19)	200.76	107	522
IVb	321 (43.15)	309.12	103.8	754
Va	115 (38.72)	131.51	87.4	297
Vb	239 (36.38)	252.96	94.5	657
All Grades	1073 (39.98)	1073	100	2684

OBSERVED : COLUMNS 18 x 14.

APPENDIX XI (c)

JOB ASSESSMENT- HANDS.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES.

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRISIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
I	0	0	0	0	0
II	0	1	3	1	12
IIIa	54	27	112	34	389
IIIb	9	2	12	5	53
IVa	67	39	136	36	522
IVb	89	43	246	43	754
Va	31	18	94	23	297
Vb	77	34	170	37	657
ALL GRADES	327	164	773	179	2684

Columns 56 x 14

Appendix XI (d)

Job Assessment - Hands

Sickness Absence and S.A.R.

Grading	Workers % Absent		Weeks of Absence in Past Year		S.A.R.	Number in each grade (100%)
			Observed	Expected		
I	0	-	0	0	-	0
II	0	5.41	0	4.9	-	12
IIIa	23	5.91	90	130.7	68.9	389
IIIb	5	9.43	67	16.5	406.1	53
IVa	44	8.43	239	177.5	134.6	522
IVb	41	5.44	205	261.6	78.4	754
Va	25	8.42	94	116.9	80.4	297
Vb	40	6.09	227	213.9	106.1	657
All Grades	178	6.63	922	922	100	2684

Columns 26 x 14

APPENDIX XII (a)

JOB ASSESSMENT - IECS

Age distribution of different grades

Grade	Description	Age in Years					All
		15-	25-	35-	45-	55+	15+
I	Use not essential	0	0	0	0	0	0
II	No effort required	148	195	144	149	126	762
IIIa	Slight Effort (a) intermittent	46	42	64	56	50	258
IIIb	(b) sustained	9	5	13	19	16	62
IVa	Moderate Effort (a) intermittent	196	86	86	132	160	660
IVb	(b) sustained	0	11	20	24	22	77
Va	Maximum Effort (a) intermittent	91	108	113	158	148	618
Vb	(b) sustained	14	34	83	67	49	247
All Grades	—————	504	481	523	605	571	2684

COLUMNS 6,7 x 15.

APPENDIX XII (b)

JOB ASSESSMENT - LEGS

PREVALENCE OF POSITIVES AND S.C.R.

Grade	Number of Positives		S.C.R.	Number in Grade (100%)
	Observed (%)	Expected		
I	0	0	-	0
II	285 (37.40)	292.99	97.3	762
IIIa	85 (32.95)	103.98	81.7	258
IIIb	26 (41.94)	26.75	97.2	62
IVa	246 (37.27)	245.56	100.2	660
IVb	39 (50.65)	36.23	107.6	77
Va	265 (42.88)	257.12	103.1	618
Vb	127 (51.42)	110.37	115.1	247
All Grades	1073 (39.98)	1073	100	2684

Columns 18 x 15

APPENDIX XII (c)

JOB ASSESSMENT - LEGS.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES.

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRISIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
I	0	0	0	0	0
II	79	44	216	48	762
IIIa	27	9	71	13	258
IIIb	11	3	18	6	62
IVa	71	45	179	40	660
IVb	11	4	32	5	77
Va	86	35	194	43	618
Vb	42	24	63	24	247
ALL GRADES	327	164	773	179	2684

Columns 56 x 15

APPENDIX XII (d)

JOB ASSESSMENT - LEGS

Sickness Absence and S.A.R.

Grade	Workers absent	%	Weeks absent in past year		S.A.R.	Number in each grade (100%)
			Observed	Expected		
I	0	-	0	0	-	0
II	37	4.86	173	247.5	69.9	762
IIIa	15	5.81	53	87.9	60.3	258
IIIb	5	8.06	69	23.3	296.1	62
IVa	43	6.52	233	214.6	108.6	660
IVb	0	-	0	31.9	-	77
Va	51	8.25	261	224.1	116.5	618
Vb	27	10.93	133	92.7	143.5	247
All Grades	178	6.63	922	922	100	2684

COLUMNS 26 x 15

APPENDIX XIII (a)

JOB ASSESSMENT - POSTURE

Age distribution of different grades

Grade	Description	Age in Years					All
		15-	25-	35-	45-	55+	15+
I	All sitting	1	12	7	5	3	28
IIa	Some standing (a) static	54	81	44	15	16	208
IIb	(b) mobile	10	34	68	64	58	234
IIIa	Mainly standing (a) static	38	8	10	16	23	95
IIIb	(b) mobile	122	156	169	219	209	875
IVa	All standing (a) static	73	33	76	99	83	364
IVb	(b) mobile	152	95	74	119	124	564
V	Walking long distances	54	62	75	70	55	316
All Grades	—————	504	481	523	605	571	2684

COLUMNS 6,7 x 16.

APPENDIX XIII (b)

JOB ASSESSMENT - POSTURE

PREVALENCE OF POSITIVES AND S.C.R.

Grade	Number of Positives		S.C.R.	Total in Grade (100%)
	Observed (%)	Expected		
I	10 (35.71)	11.43	(87.5)	28
IIa	76 (36.54)	69.86	108.8	208
IIb	120 (51.28)	106.05	113.2	234
IIIa	30 (31.58)	32.64	91.9	95
IIIb	362 (41.37)	365.63	99.0	875
IVa	130 (35.71)	149.11	87.2	364
IVb	216 (38.30)	211.72	102.0	564
V	129 (40.82)	126.56	101.9	316
All Grades	1073 (39.98)	1073	100.	2684

COLUMNS 18 x 16.

APPENDIX XIII (c)

JOB ASSESSMENT - POSTURE.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES.

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRISIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
I	2	0	12	1	28
IIa	27	10	56	10	208
IIb	40	11	90	19	234
IIIa	10	3	20	9	95
IIIb	102	57	226	69	875
IVa	44	21	92	15	364
IVb	65	38	154	36	564
V	37	24	83	20	316
ALL GRADES	327	164	773	179	2684

Columns 56 x 16

APPENDIX XIII (d)

JOB ANALYSIS - POSTURE

Sickness Absence and S.A.R.

Grading	Workers absent %		Weeks of Absence in past year		S.A.R.	Number in each grade (100%)
			Observed	Expected		
I	1	3.57	16	9.4	170.2	28
IIa	9	4.33	31	56.6	54.8	208
IIb	11	4.70	46	91.5	50.3	234
IIIa	4	4.21	41	28.4	144.4	95
IIIb	62	7.09	341	314.8	108.3	875
IVa	22	6.04	82	129.6	63.3	364
IVb	45	7.98	247	184.2	134.1	564
V	24	7.59	118	107.5	109.8	316
All Grades	178	6.63	922	922.0	100	2684

COLUMNS 26 x 16

APPENDIX XIV (a)

JOB ASSESSMENT - SITE.

AGE DISTRIBUTION OF DIFFERENT GRADES.

GRADE	DESCRIPTION	AGE IN YEARS					All 15+
		15-	25-	35-	45-	55+	
Ia	Office (a) Entirely indoors	3	2	1	0	1	7
Ib	(b) Some outdoors	10	10	11	5	3	39
IIa	Temperate workshop (a) Entirely indoors	85	90	72	66	55	368
IIb	(b) Some outdoors	21	32	25	22	16	116
IIIa	Intemperate workshop (a) Entirely indoors	158	116	187	209	214	884
IIIb	(b) Some outdoors	115	87	110	120	125	557
IV	Mainly Outdoors	78	112	85	134	118	527
V	Outdoors all weathers	34	32	32	49	39	186
ALL GRADES	_____	504	481	523	605	571	2684

Columns 6, 7 x 17

APPENDIX XIV (b)

JOB ASSESSMENT - SITE

PREVALENCE OF POSITIVES AND S.C.R.

Grade	Number of Positives		S.C.R.	Total in each Grade.(100%)
	Observed (%)	Expected		
Ia	3 (42.86)	2.04	(147.1)	7
Ib	15 (38.46)	13.90	(107.9)	39
IIa	126 (34.24)	137.08	91.9	368
IIb	557 (49.14)	444.56	127.9	116
IIIa	358 (40.50)	362.98	98.6	884
IIIb	251 (45.06)	220.99	113.6	557
IV	188 (35.67)	216.29	86.9	527
V	75 (40.32)	75.16	99.8	186
All Grades	1073 (39.98)	1073	100	2864

COLUMNS 18 x 17.

APPENDIX XIV (c)

JOB ASSESSMENT - SITE.

NUMBER OF MEN WITH SPECIFIED DIAGNOSES.

GRADE	DIAGNOSIS				NUMBER OF MEN IN GRADE
	DISK DISEASE	LOCAL OSTEOARTHRISIS	INDETERMINATE PAINS	OTHER DIAGNOSES	
Ia	0	0	3	0	7
Ib	5	2	10	1	39
IIa	35	24	98	22	368
IIb	20	8	34	11	116
IIIa	120	61	231	65	884
IIIb	69	33	192	39	557
IV	57	26	149	22	527
V	21	10	56	19	186
ALL GRADES	327	164	773	179	2684

Columns 56 x 17

APPENDIX XIV (d)

JOB ASSESSMENT - SITE.

SICKNESS ABSENCE AND S. A. R.

GRADING	WORKERS ABSENT (%)		WEEKS OF ABSENCE IN PAST YEAR		S. A. R.	NUMBER IN EACH GRADE (100%)
			OBSERVED	EXPECTED		
Ia	0	-	0	1.3	-	7
Ib	6	15.38	12	37.0	32.4	39
IIa	3	0.82	8	11.0	72.7	368
IIb	14	12.07	484	114.7	173.2	116
IIIa	68	7.69	401	313.9	177.7	884
IIIb	41	7.36	215	190.3	113.0	557
IV	37	7.02	166	188.3	88.2	527
V	9	4.84	36	64.9	55.5	186
ALL GRADES	178	6.63	922	922	100	2684

Columns 26 x 17

APPENDIX XV

RHEUMATIC SYMPTOMS AND EFFORT AT WORK.

(POSITIVES AND INTERMEDIATES)

GRADE ON ASSESSMENT	B A C K		A R M S		H A N D S		L E G S	
	Symptoms	Total	Symptoms	Total	Symptoms	Total	Symptoms	Total
I & II	60	843	11	217	20	401	49.5	1020
III	64	946	46	1378	35.5	575	47.5	722
IV	64	635	27.5	75.2	40.5	1051	45	695
V	30	260	24	337	22.5	657	22.5	247
ALL GRADES	218	2684	108.5	2684	118.5	2684	164.5	2684

Symptoms: Numbers of men with symptoms affecting this part.
(mean of Right side and Left side in the case of limbs)

Total: Total number of men in the grade.

Columns 47 - 54 x 12 - 15

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