



**MEDICAL RESEARCH COUNCIL  
INDUSTRIAL HEALTH RESEARCH BOARD**

# **SICKNESS ABSENCE AND LABOUR WASTAGE**

**Part I. By May Smith and Margaret A. Leiper**  
*(with the co-operation of Millais Culpin)*

**Part II. By Major Greenwood and May Smith**

*Crown Copyright Reserved*

LONDON  
HIS MAJESTY'S STATIONERY OFFICE

Price 1s. 3d. Net

NOTE.—A List of the Publications of the Industrial Health Research Board appears at the end of this Report. The Report can be purchased directly from

H.M. STATIONERY OFFICE at the following addresses :

ADASTRAL HOUSE, KINGSWAY, LONDON, W.C.2 ;

120 GEORGE STREET, EDINBURGH 2 ;

YORK STREET, MANCHESTER 1 ;

1 ST. ANDREW'S CRESCENT, CARDIFF ;

80 CHICHESTER STREET, BELFAST ;

or through any Bookseller.

For overseas agencies see p. 70.

**The offices of the Board are unable to supply them directly.**

(N.B.—Applications by post to the above addresses should quote the description in full of the publications wanted, and should be accompanied by the price as indicated in the list.

MEDICAL RESEARCH COUNCIL  
INDUSTRIAL HEALTH RESEARCH BOARD

REPORT No. 75

**SICKNESS ABSENCE AND  
LABOUR WASTAGE**

**Part I. By May Smith and Margaret A. Leiper**  
*(with the co-operation of Millais Culpin)*

**Part II. By Major Greenwood and May Smith**

*Crown Copyright Reserved*

LONDON  
HIS MAJESTY'S STATIONERY OFFICE

1936

Price 1s. 3d. Net

## THE BOARD

---

- E. P. CATHCART, C.B.E., D.Sc., M.D., F.R.S. (Regius Professor of Physiology, University of Glasgow) (*Chairman*).
- R. R. BANNATYNE, C.B. (Assistant Under-Secretary of State, Home Office).
- E. BEVIN (General Secretary, Transport and General Workers' Union).
- CYRIL BURT, D.Sc. (Professor of Psychology in the University of London).
- C. G. DOUGLAS, C.M.G., M.C., D.M., F.R.S. (Fellow and Tutor in Natural Science, St. John's College, Oxford).
- W. W. JAMESON, M.D., F.R.C.P. (Professor of Public Health in the University of London and Dean of the London School of Hygiene and Tropical Medicine).
- R. E. LANE, M.B., M.R.C.P. (Medical Officer, The Chloride Electrical Storage Co., Manchester).
- SIR FREDERICK J. MARQUIS, B.Sc., M.A., J.P. (Joint Managing Director, Lewis's Ltd.).
- MISS HILDA MARTINDALE, C.B.E. (Director of Women Establishments, H.M. Treasury).
- J. A. NIXON, C.M.G., M.D., F.R.C.P. (Emeritus Prof. of Medicine, University of Bristol).
- AIR VICE-MARSHAL SIR DAVID MUNRO, K.C.B., C.I.E., M.B.  
(*Secretary*).
- 

## STATISTICAL COMMITTEE

- PROFESSOR M. GREENWOOD, D.Sc., F.R.C.P., F.R.S. (*Chairman*).
- PROFESSOR E. L. COLLIS, D.M., M.R.C.P.
- P. N. HARVEY, F.I.A.
- L. ISSERLIS, D.Sc.
- P. L. MCKINLAY, M.D.
- A. S. MACNALT, D.M., F.R.C.P.
- AIR VICE-MARSHAL SIR DAVID MUNRO, K.C.B., C.I.E., M.B.
- P. STOCKS, M.D.
- M. YOUNG, M.D., D.Sc., D.P.H.
- G. UDN YULE, C.B.E., F.R.S.
- E. LEWIS-FANING, B.Sc. (*Secretary*).
- 

## OFFICES:

38, Old Queen Street, Westminster, London, S.W.1

## PREFACE

This report is issued by the Board on the recommendation of the Statistical Committee of the Medical Research Council.

It is necessary that the reader should clearly understand its objective and the limitations of its scope.

Most people engaged in industry are aware that the evaluation of sickness rates and the determination of the financial liabilities imposed by sickness upon the State, the Employer and the Employee are tasks of great difficulty and importance, the adequate performance of which requires both much technical knowledge and access to masses of detailed information. If they have examined official reports upon the subject, they will also know that every technical term employed has a precise connotation and that conclusions are only drawn when the weight of evidence, based upon strictly homogeneous data, is very great. In such investigations it is not a question of a few hundreds or thousands of years of life at risk, but of hundreds of thousands, or even millions.

In comparison with such an analysis, the data of this report must seem meagre and the numerical results quite incomparable with rates of sickness used for other purposes. The explanation is that the authors of the report had a wholly different objective and have only refrained from using a different notation, because of a natural repugnance to coining new technical terms.

In the course of the Board's work, help is frequently invited when, in the view of employers or employed, things are not going well. There is a feeling that the workers are unhappy or that, in spite of apparently unimpeachable environmental conditions, there is too much "sickness" or "lost time." When a case of this kind has to be investigated, some sort of datum line has to be found. It is necessary to make use of information, statistical information sometimes, which would be far too vague and ill-defined to serve as a basis for calculations upon which important financial issues turned. In this work, arithmetical calculations are not an end product, but merely pointers to help the field investigator to find which part of the organisation or system should first receive attention.

The authors of the report have felt that much time might be saved, if those in industry were to have their attention directed to the compilation of records intended to be used precisely as indicators, and for no other purpose. From that point of view, classifications such as those discussed on pages 13 *et seq.*, are of importance; they would be inadmissible in a nation-wide statistical analysis. Again, in a complete statistical analysis of sickness experience, civil state, which, for a variety of reasons, has not been considered at all in the present report, and age distribution need full examination. All that has been attempted has been to help those who wish to make a preliminary survey of the position.

Similar remarks apply to the discussion of what is called Industrial Wastage. It is evident that, on a nation-wide scale, the analysis of wastage—by the methods here described—would become almost meaningless. In that sense, real “wastage,” viz., the permanent lapsing from employment, is plainly best revealed by official data, while “wastage” in the sense of passing from one firm to another, or from one department of a particular firm to another, is not of national importance. But, from the point of view of the internal economy of any one firm, this “wastage” problem *is* of serious importance and it is desirable that some simple method of measuring it should be available.

It is thought that the suggestions made and the illustrations given will be helpful to those who keep records of personnel, a responsibility not, perhaps, so seriously regarded as that of keeping particulars of merchandise.

## SICKNESS ABSENCE AND LABOUR WASTAGE

---

I.—Sickness Absence : Its Measurement and Incidence in Clerical Work and Light Occupations. By MAY SMITH and MARGARET A. LEIPER (with the co-operation of MILLAIS CULPIN).

II.—Labour Wastage. By Major GREENWOOD and MAY SMITH.

*Appendix I.*—The Recording and Analysing of Sickness Absence.

*Appendix II.*—The Recording and Analysing of Labour Wastage.

*Appendix III.*—Summary of the Data Required.

**PART I.**  
**SICKNESS ABSENCE : ITS MEASUREMENT**  
**AND INCIDENCE IN CLERICAL WORK**  
**AND LIGHT OCCUPATIONS**

BY

MAY SMITH AND MARGARET A. LEIPER  
(with the co-operation of MILLAIS CULPIN)

CONTENTS

	<i>Page.</i>
1. Introduction .. .. .	1
2. Survey of the Available Data .. .. .	2
3. Age Constitution according to Sex and Occupation .. .. .	5
4. Age and Sickness Absence .. .. .	9
5. Comparison of Sickness Rates for Men and Women .. .. .	10
6. Comparison of Sickness Rates in Occupational Groups .. .. .	11
7. Duration of Sickness Absence .. .. .	13
8. Medical Diagnoses .. .. .	15
9. Long Sick Leave .. .. .	22
10. Some Particular Problems :—	
(a) <i>Incidence of Accidents in Different Regions</i> .. .. .	27
(b) <i>The Relation of Gastric and Nervous Disorders</i> .. .. .	28
(c) <i>Incidence of Organic Nervous Disease in a Particular Organiza-         tion</i> .. .. .	29
(d) <i>Some Differences of Long Sickness Absence</i> .. .. .	30
(e) <i>Sickness Absence and Noiseless Typewriters</i> .. .. .	32
11. General Psychological Observations :—	
(a) <i>Differences in Methods of Payment</i> .. .. .	33
(b) <i>Differences in Certainty of Work</i> .. .. .	34
(c) <i>Effect of Chances of Change</i> .. .. .	34
(d) <i>Men and Women</i> .. .. .	36
(e) <i>Some Occupational Differences</i> .. .. .	36
12. Summary .. .. .	38

1. INTRODUCTION

The problem of lost time through sickness absence of one year or under is of considerable importance. It is sometimes asserted that industrial sickness is increasing, one interpretation of the increase being that the health of the country is deteriorating, another that the increase is only apparent owing to better diagnosis and recording. Firms that have had health departments for years are equally at variance about the results : some say that they spend more money every year on their medical and welfare departments,



but that *pari passu* the absence increases ; others that since they introduced a health department their workers have been much healthier, absence has decreased and that the expenditure is financially, quite apart from other aspects, well worth while.

Such differences of opinion challenge enquiry. From the dogmatic statements often made it might be inferred that an elaborate system of record-keeping had been in operation for years, so that data were available for these generalizations. Actually, there is very little evidence by means of which we can estimate the amount of sickness absence in particular firms or occupations and its distribution and kind. A firm may keep records for its own purposes, but there is no standard by means of which it can be judged whether the amount of absence in a particular case is high or low for the class of work, nor what are the factors, general and particular, that have contributed to the result. It is quite certain that there are many determining factors and that they are not easy to disentangle.

The first requirement is a measure to enable us to answer the question "What exactly is the sickness absence in a particular firm or department ?" Whatever measure is used must be one that can be applied to all establishments and be easily understood. In practice, the percentage sickness is often given, but the various results are not comparable, as the percentage may be :—

- (1) The number of workers out of every 100 who have had any sickness at all. This may include those absent one day only and those absent six months, or only those who come under some insurance scheme.
- (2) The number of days lost each year by every 100 workers.
- (3) The number of days lost through sickness out of every 100 working days.

When records are kept consistently, the duty of keeping them may be given to medical officers, welfare workers, staff officers, time-keepers or others, and it is unlikely that all will be equally accurate. In some firms it is impossible for anyone to be absent unrecorded ; in others, absence is only known officially to the responsible head of the department, who may, or may not, have reason to report it ; it is also possible in some firms that no one responsible person knows of all short absences. Lastly, even if regular records are kept, they may apply to one part only of the staff, and there is no uniform procedure as to which part ; some firms keep records of the clerical but not of the factory staff, others do the reverse.

Because such great differences of standard, accuracy and range exist, only a limited number of records could be used for purposes of comparison.

## 2. SURVEY OF THE AVAILABLE DATA

In the survey here reported, we were originally dependent upon the records already kept by firms for their own purposes. No attempt has been made here to analyse the mass data available

through the insurance schemes: we have only concerned ourselves with differences in small groups. It was hoped that by a detailed study of a few organizations we might be able to find out what is a reasonable amount of sickness absence under given conditions.

The measure adopted was the average number of working days lost through sickness absence per person per year. A worker absent on Saturday morning and on Monday would be counted as having lost one-and-a-half days. If 1,000 days were lost by 250 workers in one year, then the sickness absence for that group would be taken as 4. This is a crude measure and gives no indication as to whether the loss is due to a few people having long periods of absence or to many having short periods. It is, however, a useful measure and does not involve much calculation.

In a preliminary survey about 30 organizations were able to supply data for a year at least of such a nature as to be fairly comparable, i.e. they had a medical or welfare department, arrangements for keeping in touch with sick employees and pension schemes; it is therefore possible to follow people up until they left, retired, or returned. One must note that naturally only firms working under good conditions are likely to keep any records, so that from them we cannot deduce what would be the rate under bad conditions. The range of variation was so wide, from 2 to 18 days, that the *prima facie* suggestion was differences in book-keeping. Thus, if one firm eliminated from its records automatically persons who had been absent through sickness for a month, another those who had been absent two months, etc., obviously the statistics would not be comparable. In the original material some instances of this were found and have been rejected. Table I has been compiled from organizations able to supply full records and for a period of not less than two years. The data are all from organizations with a medical department, exercising some form of selection for entry and some supervision afterwards and some form of pension scheme. Most of the workers concerned are engaged in light factory work, clerical work, or salesmanship. The sickness absence for each year is complete, i.e. a person absent from December 27th, 1934 to January 31st, 1935 would be entered as absent  $2\frac{1}{2}$  working days in 1934 and 25 working days in 1935.

The range is from 3.7 days to 11.4 days per man, and from 4.0 days to 18.3 days per woman; where the sexes could not be differentiated the range is from 3.3 days to 9.2 days.

Where several years are given for the same organization, there was notable consistency within each of the large groups. Group R is the largest and over a period of seven years the men only vary from 7.2 days to 8.7 days (the latter being the rate for 1929, when there was an influenza epidemic) and the women from 12.5 days to 14.9 days. Organization L ranges from 3.3 days to 4.7, apart from 1929 with 6.2 days. N shows a considerable reduction in 1927, during which year a special effort was made to study the problem

TABLE I.—SHOWING THE SICKNESS ABSENCE FOR A NUMBER OF ORGANIZATIONS PROVIDING RECORDS FOR TWO YEARS AT LEAST, EXPRESSED AS THE NUMBER OF WORKING DAYS LOST THROUGH SICKNESS PER PERSON PER ANNUM.

(M = Men. W = Women.)

Organization.	Aver. Nos. Employed.		1925.			1926.			1927.			1928.			1929.			1930.			1931.			1932.		
	M.	W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.	M.	W.	M.+ W.
A		960	—	—	9.2	—	—	8.0	—	—	8.9	—	—	6.4	—	—	8.1	—	—	5.6	—	—	6.7	—	—	—
B	400	600	—	—	4.9	—	—	4.3	—	—	4.3	—	—	—	4.2	5.8	—	—	—	—	—	—	—	—	5.8	4.1
C		5,500	—	—	5.8	—	—	6.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
D	700	200	—	—	3.6	—	—	—	—	—	—	—	4.0	4.6	11.2	—	—	—	—	—	—	—	—	—	—	—
E	2,500	3,000	—	—	6.8	—	—	5.6	—	—	7.5	4.1	6.8	—	5.5	7.1	—	—	—	—	—	—	—	—	—	—
F	3,000	800	—	—	—	6.5	8.5	—	6.6	8.9	—	6.8	10.0	—	7.5	11.9	—	—	—	—	—	—	—	—	—	—
G	400	500	—	—	—	—	—	—	—	—	—	—	3.7	5.7	5.0	—	—	—	—	—	—	—	—	—	—	—
H		4,000	—	—	—	—	—	—	—	—	—	—	4.8	—	—	8.6	—	—	—	—	—	—	—	—	—	—
I		500	—	—	—	—	—	—	—	—	—	—	4.2	—	7.4	—	—	—	—	—	—	—	—	—	—	—
J		1,000	—	—	—	—	8.0	—	—	9.0	—	—	—	6.4	—	8.1	—	—	5.6	—	—	6.7	—	—	—	—
K	4,500	6,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
L	3,500	3,000	—	—	—	—	3.3	—	—	3.6	—	—	4.3	—	6.2	—	—	4.2	—	—	4.7	—	—	3.7	6.0	—
M	1,600	600	—	—	—	—	3.6	—	—	5.5	—	—	4.1	—	—	—	—	—	—	—	—	—	—	—	—	—
N	6,000	6,500	11.3	18.1	—	11.2	16.7	—	7.7	10.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
O	200	600	6.0	10.4	—	4.0	7.1	—	5.3	9.9	—	6.6	9.3	—	7.0	12.1	—	—	—	—	—	—	—	—	—	—
P	2,000	2,000	11.4	14.7	—	10.3	12.9	—	—	—	—	8.5	16.3	—	10.0	18.3	—	7.1	12.8	—	8.2	13.8	—	—	—	—
Q	—	7,500	—	12.6	—	—	12.5	—	—	—	—	—	13.5	—	—	15.6	—	—	12.6	—	—	13.9	—	—	—	—
R	41,000	15,000	7.7	14.2	—	7.2	12.5	—	7.4	13.1	—	7.5	12.9	—	8.7	14.9	—	7.3	12.6	—	8.3	13.5	—	—	—	—
S	—	175	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7.5	—	—	5.3	—	—	—	4.0	—

of sickness. Unfortunately, various complications occurred afterwards making later years not comparable for the purpose of this report. Group F has a range for men from 6·5 days in 1926 to 6·8 days in 1928, with a rise to 7·5 days during an epidemic year. The women have a wider range, but their numbers are much smaller. Clearly, the crude rates here given must represent very different circumstances and conditions and even a similar rate may not be the resultant of the same sets of conditions. Sickness and health are not words representing two distinct conditions: each word expresses a relationship between many environmental conditions affecting mind and body, and the complicated make-up of each individual. It is realized that in this report we only touch the surface of the problems, but we hope that it may stimulate the responsible heads of organizations to keep and analyse sickness records.

Before comparing groups we ought at least to know (1) the age, (2) the sex, (3) the conditions of employment in practice, i.e., payment for illness, insurance, etc. (this varies sometimes from the official regulations), (4) the mobility of the labour, (5) length of service, (6) personality of the authorities—and to these desiderata we have as yet only an approximation. In the organizations analysed in detail, the general conditions of employment and treatment of sick employees are comparable.

### 3. AGE CONSTITUTION ACCORDING TO SEX AND OCCUPATION

The age factor, while probably of no particular interest to an individual organization, comparing its own rates, year by year, may be important if one department is to be compared with another or one organization with another. There are some departments almost exclusively staffed with young people who have just left school, whereas in others maturity may be an asset (Figs. 11 and 12 where the two groups belong to one organization, but the age distribution is very different). A group composed mainly of girls of 17 could not usefully be compared with a group of women of 47 or of men of 37. Stated thus, the proposition is obvious, in practice it is often ignored.

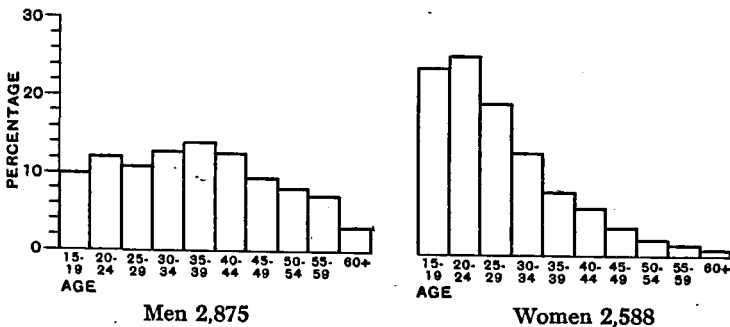


FIG. 1.—Age distribution for organization L: the numbers in each age-group being expressed as a percentage of the total.

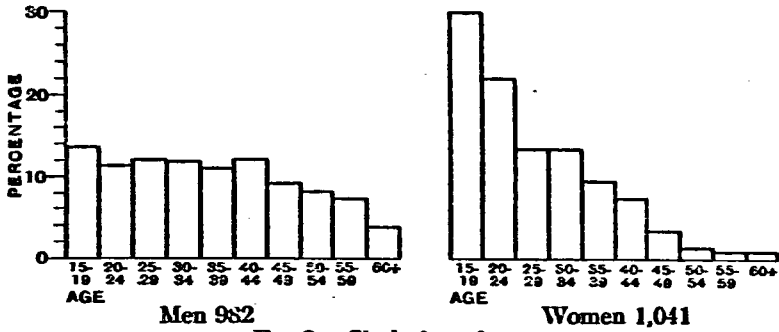


FIG 2.—Clerical workers.

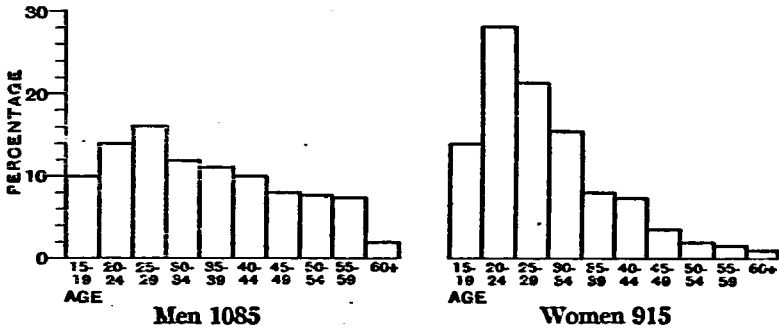


FIG. 3.—Selling and allied departments.

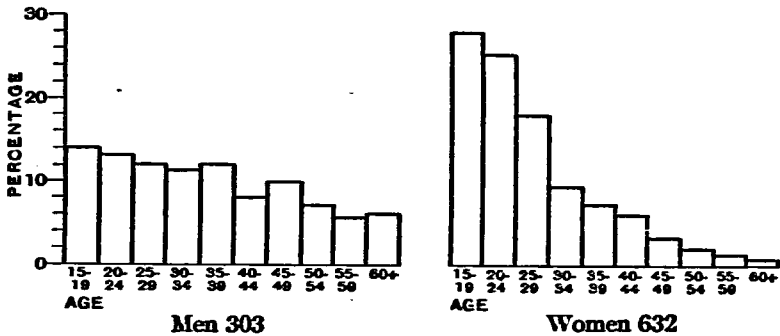


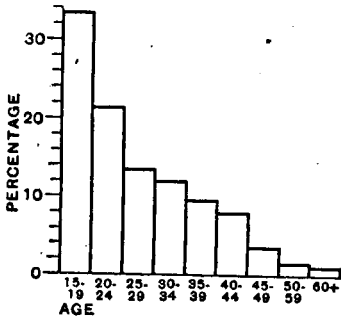
FIG. 4.—Workers engaged in the making of goods.

Age as such may not be a factor in sickness absence, but until it is known not to be, one must not assume its negligibility.

In Figs. 1, 2, 3, 4 the numbers of persons whose ages were available in the various age-groups of organization L in Table I have been expressed as percentage distributions. Fig. 1 gives the distribution for the whole organization.

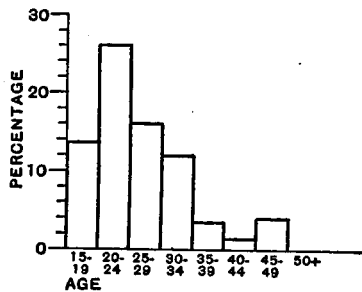
The total staff was further sub-divided into the main occupational groups, namely, those engaged chiefly in some form of clerical work, those connected with the selling of goods, those working at the manufacture and alteration of goods, and those connected with the distribution of goods. The general conditions of service in the sub-groups were, as far as could be ascertained, similar, nor did any one group contain a large number of highly specialized workers. Figs. 2, 3, 4 give the age distribution for the sub-groups.

It can be seen at a glance that in each group of men there is no one age outstanding, but merely a gradual reduction in the numbers after about 40. The women, on the contrary, are at a maximum after the groups under the age of 25. Two minor groups within this same organization show the difference in age distribution in some kinds of work. Fig. 5 illustrates a group of women clerical workers, and Fig. 6 a group of girls employed in cash desks. Figs. 7 and 8 give the distribution for organization D, employing mainly technical and clerical men and women clerical workers; although this is a small group compared with that illustrated in Fig. 1, yet there is a similar trend, the chief difference being that the peak period for women is in the next age-group. Figs. 9 and 10 represent another organization similar as far as work is concerned to that in Figs. 7 and 8, and although the smaller numbers make some of the distributions irregular, there is no striking difference. Figs. 11 and 12 illustrate two extremes of age distribution, within one organization. The workers in Fig. 11 are almost entirely young



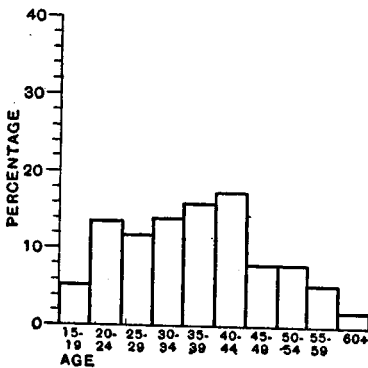
Women 487

FIG. 5.—Clerical workers.



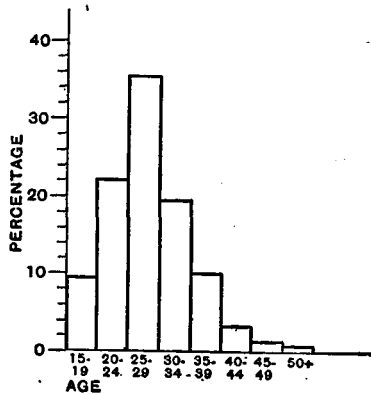
Women 69

FIG. 6.—Cash desk workers.



Men 322

FIG. 7.—Clerical and Technical workers.



Women 139

FIG. 8.—Clerical Workers.

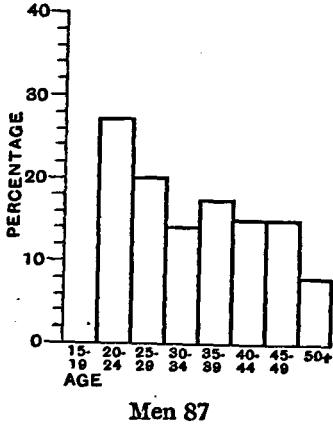


FIG. 9.—Scientific and technical workers.

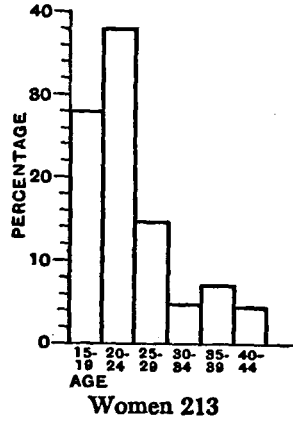


FIG. 10.—Typists.

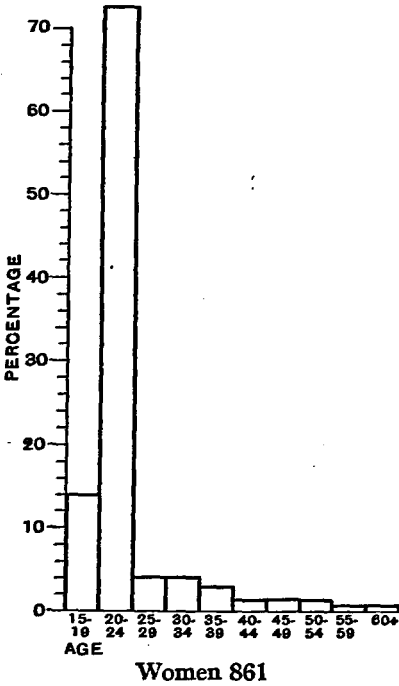


FIG. 11.—Clerical (general) workers.

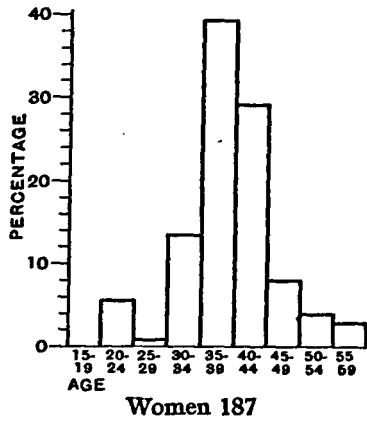


FIG. 12.—Clerical (specialized) workers.

people, the majority being between 20 and 24, those in Fig. 12 are engaged in specialized, very responsible work, the majority being between 35 and 45; a certain number can therefore be recruited from those in Fig. 11. With the exception of this highly specialized group there is a rapid fall in the numbers of women after the age of about 25, while there is little change in the numbers of men at different ages.

Other organizations have shown a similar picture.

## 4. AGE AND SICKNESS ABSENCE

To relate age to sickness absence requires more data than are available in most firms. One large organization, employing some 6,000 workers, and comprising many activities, has, however, made it possible for us to analyse the records, and so to get some idea of this relationship. The ages of the total staff range from 14 to 70: for the purpose of classification these have been arranged in three age groups for the years 1926-1930.

Table II shows the average sickness absence each year arranged in 3 age groups. Persons under the age of 15 and over 59 are omitted, as the numbers are too few for comparative purposes. Within these ages, and averaging the five years, there does not appear to be any important difference in the time lost by men, but the women show a slight progressive increase, namely a difference of one day per woman for the 45 to 59 age group compared with the 15 to 24 group. The effect of the influenza epidemic in 1929 shows up clearly.

TABLES II-VI

AVERAGE NUMBER OF WORKING DAYS LOST THROUGH SICKNESS PER PERSON FOR 3 AGE-GROUPS AND FOR EACH OF 5 YEARS

TABLE II.—ALL DEPARTMENTS

Age-Group.	Aver. No. concerned.		1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
15-24 ..	642	1,261	1.8	3.1	3.0	4.1	2.8	3.8	3.8	5.5	3.0	3.5	3.0	4.0
25-44 ..	1,471	1,165	2.4	3.0	2.5	4.3	2.8	4.2	4.1	6.4	2.6	4.1	2.9	4.4
45-59 ..	679	157	2.3	3.1	2.7	5.1	2.4	5.9	4.1	6.3	2.1	4.7	2.8	5.0

In the clerical and administrative group, taking an average of the five years, the men show a slight decrease with age; the women however, have a higher sickness absenteeism with advancing years, namely a range from 3.2 days per person to 4.6 days.

TABLE III.—CLERICAL DEPARTMENTS

Age-Group.	Aver. No. concerned.		1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
15-24 ..	235	542	1.6	2.6	3.0	3.4	2.6	3.1	3.5	4.1	3.4	2.6	2.9	3.2
25-44 ..	460	440	1.9	2.2	2.1	5.0	2.1	4.2	4.4	6.3	2.1	3.7	2.4	4.3
45-59 ..	246	58	1.8	3.8	1.8	4.9	3.0	5.3	3.1	5.4	1.8	3.8	2.3	4.6

In the selling department both the men and the women have a lower sickness absenteeism rate during the middle period than in the earlier, but the women are still higher in the later ages.



TABLE IV.—SELLING AND ALLIED DEPARTMENTS

Age-Group.	Aver. No. concerned.		1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
15-24 ..	259	387	3.0	4.7	3.7	6.3	3.6	5.7	4.5	7.8	3.3	5.2	3.6	5.9
25-44 ..	561	471	3.1	4.5	2.5	4.7	3.2	5.0	3.7	7.7	2.2	4.9	2.9	5.4
45-59 ..	248	562	2.7	2.4	3.8	5.9	1.8	6.7	4.7	10.0	2.1	6.9	3.0	6.4

The workroom group shows very little variation from age to age, but as in the selling group the 25-44 period is the lowest.

TABLE V.—DEPARTMENTS CONCERNED WITH THE MAKING OF GOODS\*

Age-Group.	Aver. No. concerned.		1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
15-24 ..	81	332	0.7	2.1	1.2	2.9	2.0	2.5	3.3	5.1	2.4	2.9	1.8	3.1
25-44 ..	133	254	0.2	2.0	1.0	2.5	1.0	2.7	2.2	4.3	1.1	3.6	1.1	3.0
45-59 ..	70	43	0.7	3.0	1.0	4.2	2.7	3.8	2.6	2.8	3.2	2.3	2.0	3.2

The distributive group shows an increase in the higher age groups, but the numbers are too few in the first age group to be important.

TABLE VI.—DISTRIBUTIVE DEPARTMENTS

Age-Group.	Aver. No. concerned (Men).	1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
15-24 ..	67	4.0	2.3	0.7	3.1	1.1	2.2	4.0	3.1	1.1	2.2	4.0	3.1
25-44 ..	317	2.7	3.8	3.8	5.1	3.9	4.0	3.7	3.9	2.4	4.0	4.0	4.0
45-59 ..	115	3.7	3.8	3.2	6.8	2.4	4.0	3.7	6.8	2.4	4.0	4.0	4.0

On the whole the evidence indicates that with the women of this organization there is a slight increase in sickness absence corresponding with the increase of age, but this is not so for the men.†

### 5. COMPARISON OF SICKNESS RATES FOR MEN AND WOMEN

Comparisons between the rates of sickness absence, for men and women are very rarely to be taken at their face value, as there are so many differences between the two groups besides sex. It has already been shown that the age distribution is very different, so that

\* These are referred to in the text as workrooms.

† It will be convenient at this point to note a distinction which will probably be obvious to many readers, but which may be overlooked, namely, the distinction between a sickness rate and a sickness absence rate. That the incidence of sickness increases with age—after early childhood—is an obvious fact of human experience, but it does not follow that an absence rate will so increase.

as the labour turn-over is much greater for the women, we are often comparing a relatively stable population of all ages with a relatively unstable one of young people : it is also rare for men and women to be doing exactly the same work with exactly the same chances of promotion and salary.

Reference to Table II shows that in each age group, the women have a higher sickness absence rate than the men, and this is true of each occupational group.

## 6. COMPARISON OF SICKNESS RATES IN OCCUPATIONAL GROUPS

Tables III, IV, V and VI give the difference between various occupational groups. Omitting the distributive group—a more specialized set—for each age-group the selling staff, both men and women, have a higher rate than any other group : the next is the clerical, with the workrooms as lowest. The differences between the clerical men and the selling men are not of importance, but in the case of the women they are.

The distributive group consists of men only and includes a number of engineers whose work renders them liable to minor accidents. In Table VII the occupational groups are given regardless of age. In each year those connected with the selling group have the highest rate, compared with the clerical and workroom workers. The group, however, labelled "selling" includes a number of workers connected with the selling departments who are not actually employed in selling : it was not possible to separate those for the years given in the Table, but it has been done for the year 1932.

TABLE VII.—AVERAGE NUMBER OF WORKING DAYS LOST THROUGH SICKNESS ABSENCE IN DIFFERENT OCCUPATIONAL GROUPS

Group.	Aver. No. concerned.		1926.		1927.		1928.		1929.		1930.		Aver. for 5 years.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
Selling ..	1,084	916	3·3	4·3	3·3	5·5	3·3	5·5	4·4	8·0	2·8	5·2	3·4	5·7
Clerical ..	984	1,047	1·8	2·5	2·2	4·2	2·7	3·7	4·1	5·1	2·4	3·1	2·6	3·7
Workrooms	310	670	1·0	2·1	0·7	2·7	1·4	2·6	2·6	4·4	1·8	3·3	1·5	3·0
Distributive	505	—	3·0	—	3·8	—	3·3	—	5·2	—	3·8	—	3·8	—

*Note.*—Children under 15 are included in these figures.

For that year the average sickness absenteeism for the whole selling group was 5·1 days per man, and 6·8 days per woman. If these are divided into those actually engaged in selling and those connected with the department, the average for actual sellers is 6·6 days for 522 men and 8·4 days for 679 women : 461 men belonging to the second set have a rate of 3·5 days and 253 women 2·4 days. This would lead to the deduction that it is rather the work of selling than the department itself that is the important factor in the difference.

The obvious difference between the salesman and most other workers is that his work brings him directly into contact with a varying succession of people. The clerical worker and the factory worker both have to work with numbers of other people, but these constitute a permanent background, whereas the salesman, the waitress, etc., in addition to their colleagues, have contact with a constantly changing flow of people. It therefore seemed worth while to make a more detailed comparison between those whose work brought them directly into contact with strangers, i.e. those employed in selling goods, in hairdressing, in restaurants, with those whose work was primarily impersonal. For this purpose the larger units within the main groups as given above were selected and graded into (1) those chiefly concerned with the making and repairing of things, (2) those concerned with the symbols of things, i.e. the workers with figures and words, and (3) those concerned with people.

Table VIII gives the details of these sub-groups. The numbers available are not large, but the trend is in the same direction for both men and women, namely, the highest rate for the groups concerned with people, and the lowest rate for the groups dealing with "things". The difference is greater in the women's groups. The differences are statistically significant.

TABLE VIII.—SHOWING THE AVERAGE NUMBER OF DAYS LOST PER PERSON THROUGH SICKNESS ABSENCE IN A NUMBER OF SELECTED GROUPS OVER A PERIOD OF 5 YEARS.

Those mainly concerned with People.			Those concerned with Symbols (Clerical).			Those mainly concerned with Things.		
No. of Groups.	No. of Persons.	Av. No. Days per Person.	No. of Groups.	No. of Persons.	Av. No. Days per Person.	No. of Groups.	No. of Persons.	Av. No. Days per Person.
M. (30)	642	3·1	(16)	449	2·7	(7)	124	2·1
W. (26)	380	5·6	(13)	655	3·5	(13)	335	3·0

Had the numbers permitted it, a further sub-division might have been made, namely those engaged in selling standardized articles and those in selling fashion goods. Not all selling demands salesmanship. The salesman whose goods are in daily requirement and relatively standardized has an easier time than the salesman who not only has to supply the goods, but suggest, if not create, the want; or out of a varied assortment to help to choose what will please the customer: so to sell fashion goods may demand different qualities from those required to sell bread, aspirin or matches. To sell articles in the latter class is of the nature of repetitive work and a successful seller of matches might be a failure at millinery or the seller of articles which are rapidly passed from the counter to the customer fail at goods requiring careful deliberation on the part of the seller and the

customer. Here is a field for vocational selection. It is unlikely that there will be a rigid line of demarcation between the types, but observation suggests that there is a difference worth further study.

### 7. THE DURATION OF SICKNESS ABSENCE

So far only absence in general has been considered: there is nothing to show whether the sickness absence in a given department was due to a few people having long periods of absence, or to large numbers having short periods.

The one-day absence is the commonest type. This does not mean that it causes the greatest amount of sickness absence, nor that if it were reduced to a minimum the total rate would be considerably improved: for example, in one group of 87 men there was a total loss of 955 days, which means an average absence of 11 days; of this there was a loss of 50 days in periods of one day, and the elimination of this altogether would only bring the average to 10·4 days.

One-day absence cannot be judged only by its duration; it can be disproportionately disturbing. There are many complaints from heads of departments of such absence, but there is no standard as to what constitutes a reasonable amount. In some firms little notice is taken of such absence. Where this is the case it is generally to be found that the one day covers the worst day of a bad cold, slight malaise, fatigue, disinclination to work, etc. In some occupations and in some departments of a particular firm the dislocation of work caused by such absence will be greater than in others. In the ironing department for example, in a laundry, the absence of a few skilled workers can cause considerable inconvenience: in the clerical department less.

Some firms definitely discourage those suffering from a cold from remaining at work, and believe that one day at home is useful in preventing a serious attack and in limiting the spread of infection. Where this policy prevails there does not appear to be more than the usual amount of sickness absence. (Columns 11, 12, 13 and 14 in Table IX.) In Table IX is given the number of spells of one-day sickness absence, the number from 2 days to 11 days, and the long period spells, i.e. over 29 days, each divided by the number employed. On the whole the high one-day rate is associated with a high longer period rate and vice versa. The organization in Column 1 is an exception as far as the long period absence is concerned, but it has a high medium period.\*

Analysis of the days of the week shows that there is more one-day sickness absence on Saturday and Monday than on any other day. Apart from the obvious implication, such figures may hide an illness of three days duration, although only one-and-a-half are working days. For various reasons much of this period absence is unsatisfactory. It is almost impossible to pre-arrange for it: extra work is thrown on the staff who are present, and thus the over-conscientious are likely to suffer. With the possible exception of the common cold there is no

---

\* Other periods of absence could be worked out similarly.

TABLE IX.—SHOWING THE AVERAGE NUMBER OF SPELLS PER PERSON OF ONE-DAY, 2 WEEKS OR LESS, AND OVER 29 DAYS SICKNESS ABSENCE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	W.	W.	W.	M.+W.	M.	W.	M.	W.	M.+W.	M.+W.	M.	M.	M.	M.	M.+W.
Average number Employed ..	135	674	194	1,288	87	236	200	600	1,370	1,048	722	400	775	641	2,230
Average number of days lost per person ..	6.8	12.7	7.0	8.1	11.0	7.8	7.0	12.1	4.7	2.2	3.7	6.3	4.5	5.4	2.2
Average number of spells—1-day absences ..	0.87	0.76	0.73	0.70	0.58	0.57	0.48	0.45	0.33	0.28	0.26	0.26	0.24	0.21	0.09
Average number of spells from 2 days to 11 days.	0.85	0.81	0.88	0.60	0.78	0.54	0.66	0.69	0.30	0.20	0.37	0.40	0.33	0.45	0.14
Average number of spells of 29 days and over.	0.01	0.07	0.04	0.04	0.07	0.04	0.03	0.07	0.02	0.01	0.02	0.04	0.02	0.04	0.01

facing p. 15]

TABLE X.—SHOWING A COMPARISON OF THE NUMBER OF DAYS LOST THROUGH LONG SICKNESS ABSENCE (= MORE THAN 29 DAYS DURATION) AND THROUGH SHORT SICKNESS ABSENCE

	1.		2.		3.		4.		5.		6.		7.		8.		9.		10.		11.		12.		13.		14.		15.		16.		17.		18.		19.		20.	
	Clerical.		Clerical.		Selling.		Workrooms.		Dispatch.		←		Selling.		→		Clerical.		Clerical.		Clerical.		Clerical.		Clerical.		Police.		Clerical.		Clerical.									
	1928.		1926-30.		1926-30.		1926-30.		1926-30.		1931.		1931.		1931.		1931.		1931.		1931.		1931.		1929.		1930.		1931.		1932.		1930.		1930.		1928.		1929.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.			
(1) Total number of working days lost per annum.	5,116	15,715	2,580	3,896	3,697	5,201	457	2,019	1,937	(E.)	(N.W.)	(W.)	(N.)	(L.)	(Outer L.)	(S.)	3,497	1,906	2,688	1,838	3,470	1,361	2,528	923	5,099	2,478	5,439	1,324	5,595	1,404	7,237									
(2) Average number employed ..	522	941	984	1,047	1,084	916	310	670	505	770	1,000	555	650	795	1,310	595	830	490	555	430	475	840	1,105	775	170	722	236	641	194	400	135	963	307	1,139	200	600	200	600		
(3) Average number of working days lost per person per annum.	9.8	16.7	2.6	3.7	3.4	5.7	1.5	3.0	3.8	4.8	5.9	4.2	6.8	4.3	5.1	4.4	6.0	4.5	7.2	3.8	7.2	4.3	6.0	4.5	11.2	3.7	7.8	5.4	7.0	6.3	6.8	5.3	8.1	4.8	6.6	9.3	7.0	12.1		
(4) Number having long sick leave as a percentage of the number employed.	5.2	7.7	1.9	1.7	1.7	2.3	1.3	0.9	1.8	2.9	3.1	2.3	2.6	2.6	2.0	2.5	2.9	2.4	2.5	2.8	3.4	3.2	2.4	1.7	4.1	2.2	4.2	3.7	3.6	4.3	0.8	2.2	5.5	3.7	1.5	4.7	3.0	6.7		
(5) Total amount of long sick leave as a percentage of the total number of days lost.	50.4	29.4	37.1	24.0	26.9	19.4	54.9	16.1	29.1	31.0	25.0	26.8	19.5	38.2	19.9	28.6	26.0	29.0	20.4	37.0	27.5	38.0	16.6	19.3	32.6	34.7	40.0	42.4	23.8	49.4	[3.9]	22.9	32.3	40.9	15.1	34.5	18.6	37.5		
(6) Average number of days per case of long sick leave.	95.4	64.2	50.3	51.9	55.2	48.1	62.7	54.2	62.6	52.3	47.8	47.7	50.8	62.0	51.5	49.7	54.3	53.2	58.3	50.0	59.0	51.3	56.9	52.0	88.7	58.3	73.6	61.3	46.2	73.5	36.0	55.5	47.1	52.9	66.7	68.9	43.5	67.9		
(7) Short sick leave, i.e., number of days lost per person per annum excluding all the days over 29 for each case of long sick leave.	6.4	14.0	2.2	3.3	3.0	5.2	1.0	2.8	3.2	4.1	5.4	3.7	6.2	3.4	4.7	3.9	5.3	3.9	6.5	3.2	6.2	3.6	5.3	4.3	8.8	3.1	5.9	4.2	6.4	4.4	6.8	4.7	7.1	3.9	6.1	7.5	6.6	9.5		

evidence that in these organizations absence for one day reduces the liability to the more serious ailments. Observation leads to the conclusion that the head of a department plays a considerable part in determining some of this absence. Where there is a general feeling that it would be unfair to stay away for an inadequate reason the absence is less. The lowest loss of this type occurred in a small unit of workers who, under a very enthusiastic head, could not bear to be away lest the work should be affected.

Table X gives, for a number of groups, the average sickness absence per person, the percentage of workers having 29 days and over in one spell, the percentage of such loss compared with the total loss, and the average number of days per absence for the long sick leave. The range for men, having long sick leave, is from 1.3 per cent. to 5.2 per cent. of the given population, and for women from 0.8 per cent. to 7.7 per cent., quite considerable differences. Roughly less than 5 per cent. of the various populations studied have illnesses of more than 29 working days, and they account on the average for about 30 per cent. of the total sickness loss though the range of variation is wide, viz. from 15.1 per cent. to 54.9 per cent. for the men, and from 16.1 per cent. to 40.0 per cent. for the women (excluding column 16 in which only one person had long sick leave).

#### 8. MEDICAL DIAGNOSES

It has been possible to obtain the medical diagnoses in some firms for several years and in others for one. As these, in the majority of cases, were made by a large number of medical practitioners in different parts of the country, purely individual idiosyncrasies of nomenclature cannot receive undue expression. For short sickness absence not requiring a medical certificate, the diagnosis is given by the firms' medical staff.

Many of the diagnoses are vague, and in practice only mean that the patient was unable to be at work on account of illness. It would be extremely difficult to devise any system of nomenclature that could, from a scientific point of view, be regarded as infallible. Classification is only valuable if it serves some purpose, and a classification that might be useful for large groups could be quite deceptive for small groups. In groups composed of less than 1,000 individuals there is little need for classification under such general headings, as Diseases of the Respiratory System, Diseases of the Naso-Pharyngeal and Upper Digestive Tract, Diseases of the Circulatory System and so on. The main distinction from the administrative point of view is between those illnesses involving one person for a long period and those affecting many for short periods. The medical staffs of industrial firms are often in a dilemma when tabulating the loss due to the various diseases represented on medical cards. Shall each diagnosis be treated separately, or can some, and if so which, be grouped? The first method produces a long and often useless list of diseases; the other produces a more manageable table but may

obscure the data for comparative purposes unless each organization knows what is included in each group. For example one doctor includes "influenza" in the group labelled "infections" and another with "colds and respiratory affections": "nervous dyspepsia" might be put with "digestive affections" or with "nervous affections".

When a question arises concerning the incidence of some particular disease the different classifications obscure the facts. In order to see if a practicable distribution would result from the use of the first method, the sickness data for two large organizations were analysed in detail. The total sickness absenteeism was calculated and also the number of days ascribed to each disease, the latter being expressed as a percentage of the former.

Out of a table consisting of 75 items, 49 accounted for less than 1 per cent. each of the total loss and the majority for less than 0.5 per cent.

The most important single cause of absenteeism was the cold and influenza group, which accounted for 26.3 per cent. and 33.2 per cent. respectively for the men, and 28.9 per cent. and 38.4 per cent. respectively for the women. If to these are added laryngitis, tonsillitis and allied complaints, we have 32.9 per cent. and 36.4 per cent. for the men and 42 per cent. and 42.4 per cent. for the two groups of women.\*

Next in importance comes accidents, accounting for 10.2 per cent. and 12.1 per cent. for the men, and 6.5 per cent. and 4.4 per cent. respectively for the women. This includes accidents both in and away from the works. While from the point of view of the factory or department the difference is important, from the point of view of lost time through sickness absenteeism it is not. Nor can any hard and fast line be drawn between accidents entered as such and other categories in which they might be included. For example, an accident sufficiently serious to involve an operation might be entered as "operation", or left as "accident".

In these two groups, operations account for over 6 per cent. of the total loss for one group of men and for under 1 per cent. of the other group, i.e. 0.21 days for each man in one organization compared with 0.04 days in the other. Differences under this heading are not important since there is no means of knowing if all operations are included.

Gastric affections, including dyspepsia, colic, biliousness, sickness, are relatively of more importance in one group than in the other, accounting for 5.4 per cent. against 9.7 per cent. for the men, or

---

\* Although this represents the actual absence due to colds and allied complaints, it does not represent the total incidence of colds. In one medical department the records for three years have been analysed of (a) those who stayed from work on account of cold, and (b) those who went to the clinic, sent by the head of their department, or of their own accord, but did not stay at home. Out of a staff of about 6,000 men and women, on an average 18 per cent. were absent for colds each year, but in addition 7.8 per cent. received treatment in the clinic and remained at work.



0.18 and 0.42 days per man respectively, and 6.1 per cent. against 8.6 per cent. for the women, or 0.27 and 0.52 days.

Septic conditions, e.g. abscesses, boils and local septic disabilities, account for 8.9 per cent. and 6.9 per cent. for the men, and 4.4 per cent. and 8.3 per cent. for the women. Differences in these cannot be stressed as in some organizations they may be entered under "Miscellaneous".

In the disease category that includes nervous breakdown, neurasthenia, nervous exhaustion, nerves, etc., i.e. the psychoneuroses, one group of men loses 2.0 per cent. against 5.3 per cent. for the other: there is no significant difference for the women, one having a loss of 6.7 per cent. and the other 7.0 per cent.

The category involving the organs of locomotion also shows differences between the two groups, namely, 7.9 per cent. for one

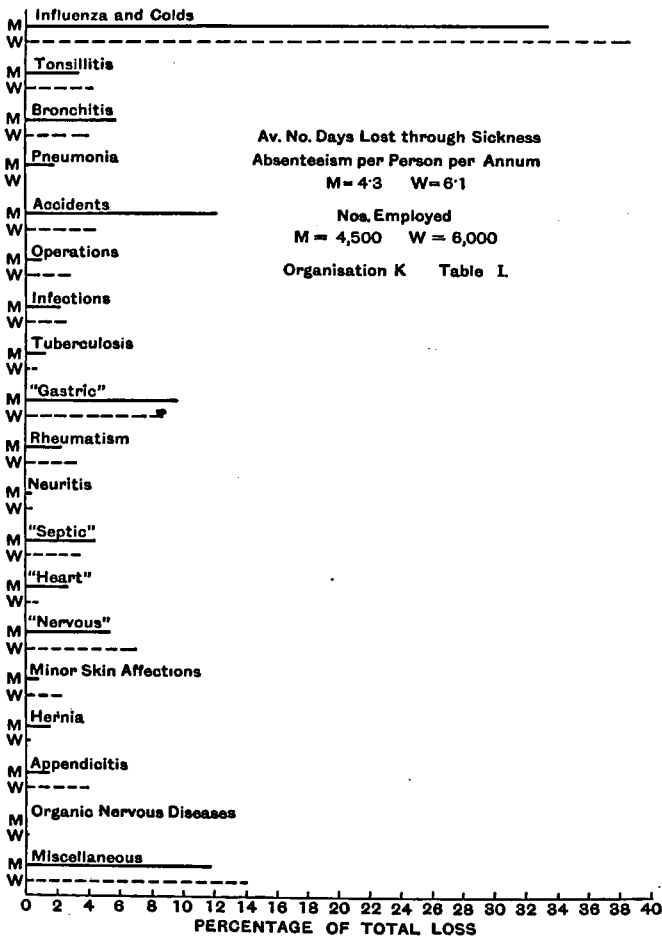


FIG. 13.—The amount of sickness absenteeism for one year due to different diseases expressed for each disease as a percentage of the total loss.

group of men against 2·3 per cent. for the other, and 4 per cent. and 3·1 per cent. for the groups of women.

Neuritis was kept separate : at times it is erroneously used as a synonym for "nervous," and at others quite correctly. In these organizations the correct use can be assumed and there is little difference between the two, viz. 0·8 per cent. and 0·3 per cent. for the men, and 0·2 per cent. and 0·3 per cent. for the women.

Fig. 13 expresses the distribution in detail for one organization.

It is worth while comparing the incidence of the various disease categories in these two organizations with an American experience.

" During the eight years from 1921 to 1928 inclusive, respiratory diseases caused 42·4 per cent. of the total disabilities from sickness and non-industrial accidents. Within the respiratory group influenza was shown to be by far the worst offender. The second most frequent respiratory disease was tonsillitis, but its incidence is only one-third that of influenza. Bronchitis ranked third in frequency and pneumonia fourth. The second most important disease group from the standpoint of sickness was composed of diseases of the digestive system. Non-industrial accidents constituted the third numerous group of causes. The contagious and infectious diseases upon which public health effort is so largely concentrated, produced less than 3 per cent. of the cases for which sick benefits were paid."\*

There is a close approximation to the American experience in the two organizations here analysed. Digestive disorders come second in the American figures, whereas they are third or fourth in the English figures, being exceeded by accidents: the American figures, however, do not give all accidents, but only those that are non-industrial.

In these groups over 70 per cent. of the total sickness absenteeism is accounted for by colds and influenza and minor respiratory diseases (excluding bronchitis, pleurisy, pneumonia and asthma), operations, gastric affections, rheumatism and allied disabilities, nerves, accidents, septic conditions.

For practical purposes it will be found that the following will account for the disabilities likely to affect a number of people :—

- (1) Colds and influenza, tonsillitis, laryngitis, pharyngitis, bronchial catarrh, sore throat.
- (2) Accidents.
- (3) Gastric affections, including dyspepsia, colic, biliousness.
- (4) Rheumatism and allied affections.
- (5) Nervous breakdown, neurasthenia, nervous debility, nervous exhaustion.
- (6) Various septic conditions, carbuncles, ulcers, boils.
- (7) Operations.
- (8) Affections of the eyes, ears, teeth.

Logically, this is not a classification, for there is no one basis of division. Strictly speaking, an "operation" ought not to be called a disease, but a method of treatment of an already existent disease ; it is, however, a frequent entry on industrial returns, and it serves

---

\* BRUNDAGE, DEAN K. The Incidence of Illness among Wage Earning Adults. *Journal of Industrial Hygiene*. 1930.

its purpose. Sometimes the reason for the operation is given, but as it frequently is not, it seemed more consistent to put together all operations, regardless of the diagnosis when it happened to be given. The chief disease likely to be hidden by this method is appendicitis, which is generally entered as such only when it has not been treated surgically. Hence the time reported as lost for appendicitis only represents a fraction of the actual loss due to that complaint, some of the appendicitis cases being included in the group called operations.

Colds and influenza have been taken together, not because they ought to be so classified, but because in actual practice no differentiation related to facts is possible. At times every cold tends to be called influenza and such variations as influenzal-cold, cold and influenza, catarrhal cold, catarrhal-influenza, though in the diagnoses of some doctors expressive of real differences, yet industrially cannot be regarded as important differentiations.

Infections in some classifications mean all infections including the common cold and influenza, as well as measles, scarlet fever and the like. In this study only the common zymotic diseases such as measles and scarlet fever are included under this heading.

Recorded accidents in some firms include only those occurring at work, in others those outside as well ; in some they are not entered in the sickness returns at all. In the tables given here all accidents involving half-a-day's absence are included.

Rheumatism is often a general word used to stand for some muscular pain : variations are myalgia, sciatica, fibrositis and such like. Owing to difficulties in differentiation, these have been entered as rheumatism and allied affections.

Nerves, nervous breakdown, nervous exhaustion and other synonyms are fairly common diagnoses,\* and in one frequently used classification are included under the heading " nervous disorders ", together with organic nerve diseases. Such a classification can be very misleading. In this study organic nervous diseases, such as trigeminal neuralgia and tabes, are separated from functional nervous disorders or the psycho-neuroses.

The data available enabled the following analyses to be made:— (1) an analysis of a group of about 6,000 workers over a period of five years ; (2) an analysis of an organization of about 10,000 workers in different parts of the country for one year ; (3) analyses of a few smaller organizations for several years ; (4) and analyses of different groups within the larger groups. The first two groups have been discussed above. The analysis over a period of five years has been made in order to get a more general idea of the kind of sickness in an industrial organization. It sometimes happens that in any one year there is an accidental preponderance of some type of illness : the five-year period adjusts this.

The first two groups are fairly large and hence give probably a clearer picture than smaller groups where one or two people absent

---

\* It is not unlikely that before long " neuronc instability " will join this group.

TABLE XIA.—SMALLER UNITS: SICKNESS ABSENCE CLASSIFIED ACCORDING TO CERTAIN DISEASE CATEGORIES, THE AMOUNT DUE TO EACH DISEASE CATEGORY BEING EXPRESSED AS A PERCENTAGE OF THE TOTAL LOSS

Number of Column .. .. .	1	2	3	4	5	6	7	8	9	10	11	12	13			
	M.	W.	M.	W.	M.	W.	M. + W.	M. + W.	M. + W.	M.	W.	M.	W.			
Average number days lost per person	3.29	4.43	4.36	6.09	7.01	12.06	5.3	9.9	6.0	10.4	4.0	7.1	4.6	11.2	3.7	7.8
Number of persons concerned ..	2,883	2,639	4,475	5,925	200	600	200+600	200+600	200+600	775	170	722	236			
Occupation.	Miscellaneous.		Shop Assistants.		←—Clerical and Administrative.—→						Clerical.		Clerical.			
Colds and influenza (with laryngitis and tonsillitis).	32.9	42.0	36.4	42.4	55.2	44.5	30.5	32.6	35.7	42.4	38.0	35.8	25.3			
Accidents .. .. .	10.2	6.5	12.1	4.4	5.4	5.3	3.7	5.1	7.2	2.6	3.0	8.3	3.5			
Operations .. .. .	6.3	4.9	0.9	2.8	9.4	13.1	12.0	11.8	11.6	7.6	1.7	4.5	12.1			
Rheumatism and allied affections ..	7.9	4.0	2.3	3.1	0.8	6.0	4.0	3.4	3.5	3.5	2.8	5.7	11.9			
Gastric affections .. .. .	5.4	6.1	9.7	8.6	2.0	2.2	2.4	1.3	2.8	3.9	4.4	3.9	3.4			
Septic conditions .. .. .	8.9	4.4	6.9	8.3	1.9	1.1	—	—	—	1.5	0.5	4.4	1.5			
"Nerves" .. .. .	2.0	6.7	5.3	7.0	3.9	8.5	5.2	9.2	7.1	1.8	2.4	2.8	8.8			
Total percentage loss due to above disease-categories.	73.6	74.6	73.6	76.6	78.6	80.7	57.8	63.4	67.9	63.3	52.8	65.4	66.5			

TABLE XIA.—*contd.*

Number of Column .. .. .	14	15	16	17	18	19	20	21	22	23	24
	M.	W.	M.	W.	M.+W.	M.+W.	M.+W.	M.+W.	W.	W.	M.
Average number of days lost per person ..	5.4	7.0	6.3	6.8	5.9	6.2	5.3	7.9	12.2	13.7	4.8
Number of persons .. .. .	641	194	400	135	440	1,892	827	414	60	58	1,139
Occupation.	Clerical.		Clerical.		Clerical.	Work-rooms.	Work-rooms.	Work-rooms.	Clerical.		Police.
Colds and influenza (with tonsillitis) .. ..	33.9	49.0	30.7	70.9	35.7	28.1	33.6	25.0	36.7	36.8	27.1
Accidents .. .. .	3.5	5.7	6.2	3.0	4.9	6.6	6.0	5.3	14.2	9.9	12.5
Operations .. .. .	6.8	1.1	4.6	1.5	2.6	5.2	1.5	8.0	7.3	—	5.7
Rheumatism and allied affections .. ..	3.8	1.0	1.4	0.4	5.9	8.2	7.9	8.8	13.1	6.2	19.0
Gastric affections .. .. .	3.3	1.9	2.1	3.4	7.0	2.5	1.7	2.9	2.4	3.8	4.9
Septic conditions .. .. .	2.8	—	2.5	0.8	2.8	3.4	2.9	2.9	1.1	2.1	9.9
"Nerves" .. .. .	2.5	10.9	3.0	6.7	29.5	19.3	18.6	12.1	4.4	9.5	1.6
Total percentage loss due to above disease-categories.	56.6	69.6	50.5	86.7	88.4	73.3	72.2	65.0	79.2	68.3	80.7

for a long period can affect the whole considerably. A firm of 1,000 workers might have one long-absence case of tuberculosis or a serious accident : it does not follow that a firm ten times as large would have ten times as many such cases.

In Table XIA the percentage distribution of the important disease categories for a number of smaller groups is given, as well as for the larger groups. In 20 out of the 24 groups these account for over 60 per cent. of the total loss, in 12 of them for over 70 per cent., and in four over 80 per cent.

In the majority of the groups, colds and influenza account for some 30 to 50 per cent. of the sickness absence and quite outweigh any other one cause. After that there is no agreement in details. Accidents vary in importance and as one would expect, are lowest among such groups as clerical workers.

In Group 11, where the seven categories account for only 52·8 per cent. of the total loss, there was one case of tuberculosis causing 19 per cent. of the loss ; this is given as an example of how one very long-period case can affect small numbers unduly.

The next disease group with a wide range of variation is the "nervous", which accounts for as much as 29·5 per cent. of the total loss in one group and as little as 1·6 per cent. in another. Such differences cannot be here accounted for. Some allowance would have to be made for diagnostic differences. Where medical officers take the modern view of the psycho-neuroses they might include in this category, disordered action of the heart, and emotional disturbances related to gastric disorders, which would be differently grouped by others. This does not, however, account for all the differences. In order to give the actual loss as well as the relative loss, the number of days ascribed to each of the more important disease groups has been divided by the numbers on the staff, and the result expressed as the number of days lost per person per disease in Table XI B.

In Table XII A there is given the regional distribution of the organization considered as a whole in Tables XIA and B (columns 3 and 4). In each part of the country the colds and influenza type of illness is responsible for the greatest loss. With tonsillitis it accounts for nearly 50 per cent. of the women's sickness absence in the north-west. For the men, accidents form the next highest loss in four out of the seven groups, and in the London area they constitute 17·8 per cent. of the total loss, a considerable amount of which being due to accidents away from the works. With the women the accident rate is not important, the second and third places being given to gastric disorders and nerves.

## 9. LONG SICK LEAVE

It has already been said that for the purposes of this report long sick leave was arbitrarily taken as that involving more than 29 working days. As only a small percentage of each total population is concerned, the importance of each individual case is exaggerated. In spite of this certain diseases are characteristic of each group.

TABLE XIb.—SICKNESS ABSENCE CLASSIFIED ACCORDING TO CERTAIN DISEASE CATEGORIES, THE AMOUNT DUE TO EACH DISEASE-CATEGORY BEING EXPRESSED AS THE NUMBER OF DAYS LOST PER PERSON

	M.	W.	M.	W.	M.	W.	M.+W.	M.	W.	M.+W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.		
Average number of days per person lost through sickness absence	3.29	4.43	4.36	6.09	7.01	12.06	5.3 9.9 8.75	6.0 10.4 9.30	4.0 7.1 6.33	4.76	4.64	11.21	3.72	7.79	5.41	7.02	6.32	6.84	5.9	6.2	5.3	7.9	12.2	13.7
Number of persons concerned ..	2,883	2,639	4,475	5,925	200	600	200 600	200 600	200 600	1139	775	170	722	236	641	194	400	135	440	1,892	827	414	60	58
Colds and influenza (including tonsillitis and laryngitis).	1.09	1.86	1.59	2.59	3.88	5.38	2.67	3.03	2.26	1.29	1.91	4.26	1.31	1.97	1.84	3.43	1.94	4.84	2.11	1.74	1.78	1.98	4.45	5.04
Accidents .. .. .	0.33	0.29	0.53	0.27	0.38	0.64	0.32	0.47	0.46	0.60	0.12	0.34	0.31	0.28	0.19	0.40	0.39	0.21	0.29	0.41	0.32	0.42	1.73	1.35
Operations .. .. .	0.21	0.22	0.04	0.17	0.66	1.58	1.05	1.10	0.73	0.27	0.34	0.19	0.17	0.94	0.37	0.07	0.13	0.10	0.15	0.32	0.08	0.63	0.88	0.00
Rheumatism and allied affections	0.25	0.18	0.10	0.19	0.06	0.71	0.35	0.32	0.22	0.91	0.16	0.31	0.21	0.93	0.20	0.07	0.09	0.03	0.35	0.51	0.42	0.70	1.59	0.84
Gastric affections .. .. .	0.18	0.27	0.42	0.52	0.14	0.27	0.21	0.12	0.18	0.23	0.18	0.49	0.15	0.26	0.18	0.13	0.16	0.23	0.41	0.15	0.09	0.23	0.29	0.53
Minor septic affections .. .. .	0.29	0.19	0.31	0.51	0.14	0.13	—	—	—	0.47	0.07	0.05	0.16	0.12	0.15	0.00	0.19	0.06	0.17	0.21	0.15	0.23	0.13	0.30
"Nerves" .. .. .	0.07	0.30	0.23	0.43	0.27	1.02	0.45	0.86	0.45	0.08	0.08	0.27	0.11	0.69	0.14	0.76	0.29	0.46	1.74	1.20	0.99	0.96	0.53	1.30
Other causes not differentiated ..	0.87	1.12	1.14	1.41	1.48	2.33	3.70	3.40	2.03	0.91	1.78	5.30	1.30	2.60	2.34	2.16	3.13	0.91	0.68	1.66	1.47	2.75	2.60	4.34

Out of 29 groups varying in numbers from 200 to over 1,000, the nervous breakdown type of illness occurs more frequently than any other one diagnosis, i.e., 27 times out of the 29, and the range is from an amount that is negligible to nearly 40 per cent. in one group. Next in importance are accidents, influenzal debility, gastric affections and rheumatism.

Since with small numbers analysis would only give a series of individual cases, we have selected from the 29 groups available those consisting of more than 500 people. For each of these groups those people have been taken out who had more than 29 working days' sickness absence in one spell. The total loss due to this absence has been computed and also the number of days ascribed to the various disease categories, the latter being expressed as a percentage of the former. The greatest range is for the nervous breakdown category causing 39.4 per cent. of the long absence in one group and none in two groups. The exceptions are in themselves interesting, one being a group of policemen and the other a group of

TABLE XIII.—SICKNESS ABSENCE CLASSIFIED BY DISEASES, THE AMOUNT DUE TO EACH DISEASE-CATEGORY BEING EXPRESSED AS A PERCENTAGE OF THE TOTAL LOSS \*

A REGIONAL DISTRIBUTION FOR ONE ORGANIZATION

Numbers of persons ..	E.		N.W.		W.		N.		L.		Outer L.		S.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
	770	1,000	555	650	795	1,310	595	830	490	555	430	475	840	1,105
Average number of working days lost per person per annum.	4.8	5.9	4.2	6.8	4.3	5.1	4.4	6.0	4.5	7.2	3.8	7.2	4.3	6.0
Colds and influenza ..	31.2	34.1	39.0	47.1	34.5	36.4	39.3	37.8	36.0	42.5	26.8	37.4	27.3	36.4
Tonsillitis ..	3.5	4.3	2.6	2.4	2.1	4.4	5.5	3.2	1.9	3.2	1.0	7.5	4.3	5.4
Bronchitis ..	6.5	3.9	7.4	3.7	7.6	4.7	2.8	1.0	5.1	5.8	5.8	2.4	4.2	5.3
Pneumonia ..	1.2	—	—	—	3.5	—	2.5	—	2.9	—	—	—	1.4	—
Accidents ..	11.9	4.3	11.9	4.1	7.7	4.8	10.0	5.6	17.8	5.6	6.9	1.4	16.2	3.8
Gastric conditions ..	10.4	8.3	7.0	8.4	12.3	8.6	12.0	13.6	5.0	7.2	9.7	8.6	9.2	5.6
Nervous conditions ..	4.8	6.2	6.3	3.5	3.5	8.8	6.1	4.6	5.0	6.2	5.4	10.8	6.4	8.5
Operations ..	1.6	5.6	—	8.3	1.6	0.4	2.1	3.5	—	0.7	0.9	—	—	1.0
Rheumatism, etc. ..	2.1	5.2	1.4	3.4	1.4	1.9	1.4	2.3	1.1	4.9	8.4	4.4	2.6	0.8
Septic Conditions ..	3.1	1.6	2.5	2.5	4.6	3.7	1.9	4.1	3.3	3.6	13.9	8.0	4.3	2.8
Glands ..	3.3	6.0	2.4	4.1	2.8	4.9	1.7	3.7	0.9	3.8	7.1	5.7	1.7	5.5
Infections ..	2.4	1.8	2.9	1.4	2.5	2.4	1.6	3.4	3.2	0.8	5.1	—	1.3	4.5
Appendicitis ..	2.9	4.2	—	3.1	—	—	5.0	—	5.9	1.4	2.6	2.7	2.8	2.6
Skin affections ..	1.0	3.1	—	2.9	—	2.0	—	2.0	—	1.4	0.2	2.8	2.4	0.6
Heart and Tachycardia ..	—	—	3.1	0.7	5.3	—	2.4	1.3	4.3	3.2	—	—	1.4	0.4
Tuberculosis ..	—	—	3.1	—	—	0.7	—	—	2.9	0.3	—	—	2.5	2.6
Hæmorrhage ..	—	—	—	—	1.2	—	—	—	3.9	—	—	—	—	0.4
Tumours ..	—	—	—	—	—	1.2	—	3.2	—	—	—	—	—	2.9
Hernia ..	2.8	0.8	2.3	—	—	—	—	—	—	—	—	0.6	3.1	0.6
Paralysis ..	2.1	—	—	—	—	—	—	—	—	0.5	—	—	—	—
Neuritis ..	—	—	—	—	—	—	0.3	0.1	0.0	—	—	0.1	—	1.3
Ears and Eyes ..	—	—	0.1	0.1	4.4	1.4	4.0	0.6	1.5	0.5	0.7	1.4	0.2	0.4
Teeth ..	1.0	1.2	0.3	0.9	—	1.3	0.7	0.7	0.7	3.2	2.4	2.8	0.6	1.0
Unclassified ..	8.4	9.3	7.6	3.3	5.0	7.5	6.0	3.3	3.1	4.1	3.2	3.3	8.3	7.4

\* The numbers being small, we have given a detailed analysis.

These distributions do not permit of any consideration of age.

The number of days lost per person for the more important disease groups is given in Table XII B.



(1917) TABLE XIIb.—SHOWING THE NUMBER OF DAYS LOST PER PERSON THROUGH SICKNESS ABSENCE, CLASSIFIED BY DISEASES, THE AMOUNT DUE TO EACH DISEASE-CATEGORY BEING EXPRESSED AS A PERCENTAGE OF THE TOTAL LOSS.

	E.		N.W.		W.		N.		L.		Outer L.		S.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
Average number employed ..	770	1,000	555	650	795	1,310	595	830	490	555	430	475	840	1,105
Average number working days lost per person.	4.80	5.93	4.17	6.81	4.28	5.14	4.38	6.04	4.50	7.20	3.76	7.18	4.33	6.01
Colds and influenza .. ..	1.50	2.02	1.63	3.21	1.48	1.87	1.72	2.28	1.62	3.06	1.01	2.69	1.18	2.19
Tonsillitis .. .. .	0.17	0.25	0.11	0.16	0.09	0.23	0.24	0.20	0.08	0.23	0.04	0.54	0.19	0.33
Accidents .. .. .	0.61	0.30	0.50	0.28	0.33	0.24	0.43	0.34	0.80	0.40	0.26	0.10	0.70	0.23
Gastric affections .. ..	0.50	0.49	0.30	0.57	0.53	0.44	0.53	0.82	0.23	0.53	0.37	0.62	0.40	0.34
Rheumatism and allied affections	0.10	0.31	0.06	0.23	0.06	0.10	0.06	0.14	0.05	0.36	0.31	0.32	0.12	0.05
"Nerves" .. .. .	0.23	0.37	0.26	0.24	0.15	0.45	0.27	0.28	0.22	0.45	0.20	0.78	0.28	0.51
Operations .. .. .	0.08	0.33	0.00	0.56	0.07	0.02	0.09	0.21	0.00	0.05	0.04	0.00	0.00	0.06
Other causes not differentiated	1.61	1.86	1.31	1.56	1.57	1.79	1.04	1.77	1.50	2.12	1.53	2.13	1.46	2.30

TABLE XIII.—THE LONG SICKNESS ABSENCE. THE NUMBER OF WORKING-DAYS LOST THROUGH THE VARIOUS DISEASE CATEGORIES EXPRESSED AS A PERCENTAGE OF THE TOTAL LOSS.

	Clerical Work.		Selling and Technical.		Miscellaneous Work. (Period=5yrs.)		Police.	Clerical Work.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.
Average number employed ..	522	.941	4,475	5,925	2,883	2,633	1,139	600	641
Number having long sickness Absence expressed as a Percentage of the total number employed.	5.2	7.7	2.7	2.6	1.8	1.7	3.7	6.7	3.7
Accidents .. .. .	—	2.5	16.2	2.6	15.9	7.9	14.4	5.1	2.2
Appendicitis .. .. .	8.8	4.0	3.3	15.0	0.3	2.9	10.3	—	2.3
Bronchitis .. .. .	3.6	2.4	9.0	6.5	5.8	0.4	1.3	2.3	2.1
Diabetes .. .. .	—	—	4.2	0.4	1.0	1.6	—	—	—
Ear and Eye Affections	5.4	—	2.9	0.5	0.2	2.3	—	1.2	2.2
Gastric Affections	—	2.8	10.4	11.0	10.2	4.0	3.1	2.4	12.1
Glands .. .. .	6.3	—	2.1	5.6	—	1.9	3.7	12.4	—
Hæmorrhage .. .. .	2.9	—	5.1	0.0	2.9	—	—	—	—
Heart Affections .. .. .	—	—	6.7	1.6	0.5	—	—	—	4.1
Hernia .. .. .	—	—	2.1	0.9	0.6	0.5	1.5	—	—
Infectious Diseases	5.3	2.3	2.6	6.1	5.2	11.1	2.1	1.4	3.5
Influenza and Influenzal Debility	2.8	12.9	4.1	6.0	6.3	7.3	3.3	5.7	2.2
Kidney Affections .. .. .	1.1	5.3	—	—	1.4	0.6	6.0	—	2.3
"Nerves" .. .. .	31.3	39.4	8.7	10.6	2.6	9.9	—	15.6	—
Neuritis .. .. .	—	—	0.5	1.0	0.8	0.3	—	3.3	—
Operations .. .. .	8.8	8.0	1.3	5.6	13.6	21.3	—	29.5	14.7
Phlebitis .. .. .	—	—	—	—	1.4	1.0	—	—	8.3
Pneumonia, Pleurisy .. .. .	—	—	4.5	—	7.0	6.1	—	1.9	16.1
Rheumatism and allied affections	—	4.8	1.9	6.9	11.2	4.1	24.1	8.4	2.2
Septic Conditions .. .. .	—	—	4.0	3.2	4.4	2.3	3.0	—	11.5
Skin Affections .. .. .	—	0.8	1.2	3.5	2.8	3.4	3.8	—	—
Teeth .. .. .	—	—	—	0.7	—	0.9	—	—	—
Tonsillitis, Laryngitis	1.3	1.4	1.5	4.4	1.3	3.0	1.5	—	—
Tuberculosis .. .. .	10.7	1.3	3.1	2.6	1.5	1.9	5.5	5.9	7.2
Unclassified .. .. .	11.7	12.3	4.4	5.4	3.0	5.4	16.5	5.1	7.0

men technical and clerical workers specially selected by the medical staff.\* Accidents are important in some groups but where the percentage is high, it is due to a few people suffering from serious injury sustained when away from their work. The three disease categories that in any group of workers analysed in this report account for more than 20 per cent. of the loss, are nervous breakdowns, operations, and rheumatism.

On page 3 it was pointed out that in some firms, when an employee was known to be suffering from a disease necessitating long absence, he was treated as if non-existent from the point of view of records: he was not dismissed, but it was not considered necessary to continue reporting him. The result is to give a deceptively low sickness rate. In the organizations here analysed in detail, such has not been the case, but a rough comparison with those where this procedure prevails might be made if we treat these similarly. We should then get a measure of the short sickness absenteeism, which is quite a useful criterion provided it is known what is not included. If we allow each of the people with long sick leave to count only the first 29 days of it, omitting the other days, we get a figure that measures the short period absenteeism. The result of doing this is given in Table X, Row 7. The majority of the men lie between 3.0 days

\* See Report No. 61. Ind. H. Res. Bd.

and 5.0 days per annum, the extremes being 1.0 days and 6.6 days : the women have a wider range, namely, from 2.8 days to 14.0 days, the majority being between five days and seven days.

### 10. SOME PARTICULAR PROBLEMS

So far we have been primarily concerned with seeking the similarities that exist in the amount and kind of sickness absenteeism, and only incidentally the more obvious differences : with the data available this is probably all that can be seriously considered. There are, however, some interesting points of difference that are worth mentioning, even though they may have only a limited range of applicability. In Table XIV there is given a distribution of sickness absence by regions for one organization, the kind of work done being, however, the same in each region.

TABLE XIV.—SHOWING THE AVERAGE NUMBER OF WORKING DAYS LOST PER PERSON FOR (a) ALL SICKNESS ABSENCE (b) SICKNESS ABSENCE WITH ACCIDENTS EXTERNAL TO THE WORKS OMITTED, AND (c) ALL LONG SICK LEAVE OMITTED

	E.		N.W.		W.		N.		L.		Outer L.		S.	
	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.	M.	W.
Average number working days per person.	4.8	5.9	4.2	6.8	4.3	5.1	4.4	6.0	4.5	7.2	3.8	7.2	4.3	6.0
Total loss minus outside accidents. (Average number of days per person).	4.5	5.9	3.9	6.8	4.2	5.0	4.1	5.9	3.9	7.0	3.6	7.1	4.1	5.9
Difference expressed as a percentage.	6.3	0	7.1	0	2.7	2.0	6.4	1.7	13.3	2.8	5.3	1.4	4.7	1.7
Total loss minus all long sick leave. (Average number of days per person).	3.3	4.5	3.1	5.5	2.7	4.1	3.1	4.5	3.2	5.8	2.4	5.2	2.7	4.6
Loss due to Accidents outside expressed as percentage of long sick leave from all causes.	6.6	0	9.7	0	2.4	0	6.4	0	18.8	8.1	8.0	0	9.8	0

#### (a) Incidence of Accidents in Different Regions

Comparing the relative amount of loss due to accidents, it will be seen that the London area has a higher rate than any other part of the country, namely, for men 17.8 per cent. of the total loss against 6.9 per cent. the lowest and 16.2 per cent. the next highest (Table XIIA). If we omit from each group the amount of time lost through accidents outside the works and calculate sickness absenteeism from other causes, the London men are reduced from 4.5 days per person to 3.9 days, a difference of 13.3 per cent. on the original figure, the reduction for other regions being from a minimum of 2.7 per cent. to a maximum of 7.1 per cent. ; for women the accident rate is not so important. If those accidents which occurred outside the works and involved more than 29 working days' absence are extracted, we can find what proportion of the total long sick leave is to be ascribed to this cause. In the London area 18.8 per cent.

of the long sick leave is due to such accidents, against 9·8 per cent. for the next highest. It seems that the London rate is clearly affected by the heavy loss due to accidents outside the works. That the difference between London and the other areas as regards total sickness absence is not due to a number of long absences for different diseases, is shown if we compare the long and short sickness absenteeism rates. Eliminating all the long sick absence the London rate is still the second highest. Expressed in days the London area loses through accidents 0·80 days per man, the next highest being 0·70, the lowest 0·26 days, a difference of 12½ per cent. and 62½ per cent. respectively.

(b) *The Relation of Gastric and Nervous Disorders*

In each group after the respiratory diseases and accidents, gastric and nervous disorders are an important cause of sickness absence. A more detailed study of the relationship of the two groups was made possible through the kindness of a medical officer whose records for nine years were available.

In Table XV the time lost through colds and influenza, gastric affections and "nerves" respectively for nine years is expressed as a percentage of the total time lost through sickness absenteeism.

TABLE XV.—SHOWING THE TIME LOST THROUGH COLDS AND INFLUENZA, GASTRIC AFFECTIONS AND NERVES, THE AMOUNT DUE TO EACH BEING EXPRESSED AS A PERCENTAGE OF THE TOTAL TIME LOST

Women—Clerical.

	1923.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Average number of working days lost per person.	7·0	9·3	9·2	8·0	8·9	6·4	8·1	5·6	6·7
Average number employed.	911	948	971	983	961	915	956	991	985
Colds and Influenza.	23·4	35·9	34·7	33·4	48·8	36·5	53·9	42·6	42·3
Gastric ..	7·5	7·8	9·9	4·3	2·9	2·7	1·8	3·6	4·4
"Nerves" ..	27·0	15·1	11·9	19·5	13·8	17·7	12·1	9·7	10·5

Examining the fluctuations of the various diseases from year to year (Fig. 14) it looked as if there were some relationship between "gastric" and "nervous" disabilities, of such a nature, that when one was high the other was low, i.e. a negative correlation. Clearly the period of time is too short for anything approximating a final conclusion.\*

\* If the correlation on the annual fluctuations be measured, the value obtained is  $-0.49$ , a figure not statistically significant since a value of  $-0.67$  could occur by chance about once in 20 times. Working out the partial correlation with influenza constant we get  $-0.81$ , a result which even with these few observations is suggestive and unlikely to be due to chance, since  $-0.71$  would give the same chance.

That, however, in these very carefully compiled data such a negative relationship is revealed points to the probability that some at least of the gastric symptoms might equally as well, from the point of view of diagnosis, be incorporated in the nervous group, or that what one physician would enter as gastric another would enter as nervous. In no other group of people have we enough data for such a study.

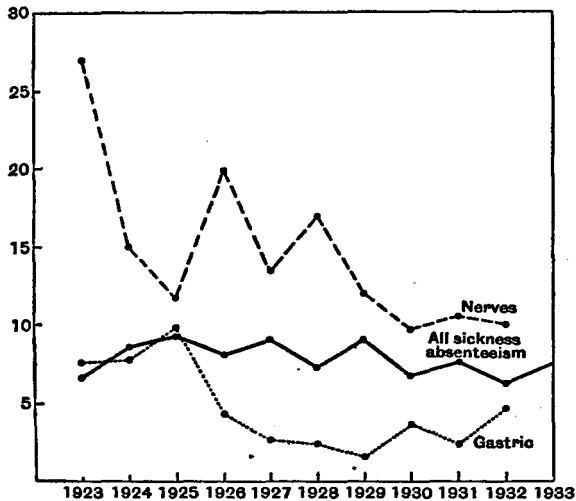


FIG. 14.—Shewing the fluctuation of nervous and gastric disorders.

That emotional conflict, conscious or unconscious, can have an effect on the digestive processes has been recognized for a long time. But, too rarely, when the digestive disturbance occurs, does anyone ask whether in this particular case there is any emotional cause. This is not to rule out the temporary results of dietetic errors and the like, but the anomalies of the industrial gastric disorders are too great to be ascribed solely to that cause.

An illustration of this aspect of the problem was furnished by a woman factory worker, who complained of constant indigestion. She reported that the doctor said that there was nothing wrong except her nerves. She worked under a blustering foreman, of whom she was terrified, and remarked, "He fair makes me feel all churned up inside". It is not unlikely that a change of department or learning to disregard the manner of the foreman would have resulted in a cure.

#### (c) *Incidence of Organic Nervous Diseases in a Particular Organization*

As an example of the exaggerated effect of a few on the whole when the numbers are small, is the very high figure of 17.2 per cent. of a total rate in a group\* due to organic nervous disease. Normally

\* The complete details of this group have not been given.

as far as industrial figures are concerned this disease-category is negligible. Enquiry showed that this high figure in one year was entirely due to the unexpected number of three people absent for long periods with tabes, trigeminal neuralgia, and disseminated sclerosis respectively: it is most unlikely that such an amount will occur again. If the sickness absenteeism of more than 29 days be omitted a more representative figure is obtained.

(d) *Some Differences of Long Sickness Absence*

If we compare the medical diagnoses involving the longest absence for a number of groups we find some striking differences. Each entry in Table XVI represents one spell of sickness absence. For each organization the ten longest absences involving 30 days at least in one spell—when there were 10—have been selected.

Most of the diagnoses on these lists can be accepted as indicating a definite condition, taking as the standard the diagnoses that are used in records of teaching hospitals, e.g. rhinitis, and Graves' disease. Without discussing the question of "clinical entities" one can accept those of this group as conveying a fairly definite picture. Others are too indefinite to convey such a picture, and this indefiniteness may be due to neglect to particularize: e.g. heart, gastritis, operation. These cases, even though vaguely defined are to be regarded as belonging to the same group, although gastritis needs special consideration.

Another group includes a set of diagnoses that rarely appear in the records of teaching hospitals, and according to the reader's point of view may or may not indicate definite and definable disorders. This is a group that includes nervous debility, general debility, and probably cardiac debility or over-strain. Into this group, too, should perhaps come a few others that, on their face value, belong to the first group: high blood pressure, for example, may cover symptoms belonging to the nervous group, whilst "neuritis"—a comparatively rare disease in hospital records—in its fairly frequent occurrence in some industrial sickness returns probably serves as a disguise for cases of the "nervous" kind. There is a growing tendency to regard Graves' disease as a "nervous" manifestation.

Whilst again avoiding a discussion of fundamental issues, we can speak of "organic" and "nervous" disorders to indicate the two main groups, bearing in mind that the diagnostic data at our command leave an uncertain number still outside any useful classification.

We then find differences in the incidence of the nervous disorders in the sick lists at our disposal.

The diagnoses in column 1 of Table XVI, for example, include one each of nervous breakdown, nervous exhaustion, influenza with nervous exhaustion, and nervous debility. Those in columns 5 and 7 include none of these "nervous disorders".

The above examples are of men only. Column 2, which deals with women, resembles column 1 in its predominance of the "nervous" group, and it is to be noted that it concerns the same organization.

TABLE XVI.—DIAGNOSIS OF SELECTED CASES OF LONG SICKNESS ABSENCE

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Men.	No. of days.	Women.	No. of days.	Men.	No. of days.	Women.	No. of days.	Men.	No. of days.	Women.	No. of days.	Men.	No. of days.	Men.	No. of days.
Nervous Break-down.	300	Dyspepsia and Nervous Debility.	278	Tuberculosis..	71	Graves' Disease	202	Tuberculosis	175½	Appendicitis..	83	Accidents ..	137	Gastric Ulcer	221
Tuberculosis..	276	Hydronephrosis	243	Debility ..	35	Operation ..	186	Rheumatism	94½	Septic Condi-	69	Tuberculosis..	131	Heart ..	210
Nervous Ex-	193	High Blood	181	Operation ..	33	Nervous De-	164	Kidney Disease	75½	tions.	69	Rheumatism..	129½	Ulcer ..	117
haustion.		Bronchial		Synovitis ..	31	bility.		Duodenal Ulcer	59	Gastritis	63	Haemorrhoids	85	Tuberculosis..	104½
Exophthalmic	161	Pressure and		Duodenal Ulcer	30	Tuberculosis	161	Sciatica	58½	Operation ..	53	Kidney trouble	92	Accident ..	83½
Goitre.		Catarrh.				Graves' Disease	134	Phlebitis ..	58½	Heart ..	51½	Rheumatism..	90	Heart ..	72
Influenza and	159	Pleuritis and	154			Rheumatism	116	Accident ..	55	Operation ..	48½	Dermatitis ..	84	Jaundice ..	58
Nervous Ex-		Peritonitis.				Operation ..	101	Appendicitis	50	Laryngitis ..	47	Rheumatism..	76	Operation ..	52
haustion.		Operation ..	163			Haemorrhoids	96	Quinsey ..	47	Cystitis ..	47	Arthritis ..	68	Asthma ..	44
Rhinitis ..	138	Anaemia and	141			Neuritis	90	Operation ..	45	Bronchitis ..	43½	Rheumatism..	60	Appendicitis..	43½
Pleurisy ..	126	General De-				Accident ..	82			Bronchitis ..	42½				
Nervous Debi-	124	lity.													
Scarlet Fever	104	Nervous Ex-	123												
Appendicitis	99	haustion.													
		Cardiac and	109												
		Nervous													
		Overstrain.	105												
		General De-													
		bility.	103												
		Neurasthenia													

Column 4 provides only one "nervous" diagnosis; column 6 appears free from "nervous" cases but it is possible that gastritis, heart, and laryngitis may cover examples of such disorders. This is only surmise, but clinical experience can support this: the heart condition in column 6 that incapacitates for  $51\frac{1}{2}$  days and then allows the patient to return to work without further disability is more likely to be "nervous" than organic. It would then be of the same nature as the "cardiac and nervous over-strain" in column 2.

(e) *Sickness Absence and Noiseless Typewriters*

An enquiry undertaken for a study of "noiseless" compared with "standard" machines enabled an incidental study of sickness to be made. It is given here, not as a contribution to the study of noise, but as an illustration of some of the difficulties of interpreting sickness data particularly when the numbers concerned are few.

Thirty-eight typists were observed over a period of two years, from the point of view of sickness absence and work. During one year they used the standard pattern of machine, and during the other the noiseless. The total loss of working days while using the noiseless machines was 188.5 days, a mean of 4.9 days per person per annum, with the standard machines the loss was 401.5 days, a mean of 10.6 days. On the face of it, this would suggest that the noiseless machines were, in some way, related to the lower sickness absenteeism rate. Analysis, however, of the duration of the sickness showed that one-half of the higher total was due to two people, one absent for  $66\frac{1}{2}$  days as a result of an accident occurring away from the office, and the other for  $135\frac{1}{2}$  days with Graves' disease, neither of which could be reasonably attributed to the type of machine. If these two are excluded from the group there is left a sickness absence loss of 188 days due to 36 people, i.e. an average of 5.2 days. The difference between 4.9 days and 5.2 days is not significant.

## 11. GENERAL PSYCHOLOGICAL OBSERVATIONS

The differences both in the rate of sickness absenteeism and its kind challenge enquiry, but to unravel the complicated web of causes would require the compilation of data for 10 years before even the foundations for such an enquiry could be laid. Nor is it a question of a statistical analysis only: the investigator needs also a detailed knowledge of the conditions of the work—material and psychological, methods of selection, of supervision, chances of promotion, labour wastage, at least, in order to give him the background for the sickness absence rate. This rate is a final expression in arithmetical form of the resultant of all the conditions acting upon the individuals, and can be an index of those conditions. The preceding pages of this report have given the results of analysing the data we have been able to obtain. In the course of several years' study of these problems opportunities have occurred for discussing some of the aspects relevant



to this enquiry with numbers of people in different positions. Some general account of the resulting impressions is here given each of which might serve as a starting point for further investigation.

In the body of the report we have only presented the general trends shown by groups : we have not a detailed knowledge of the individuals composing the groups. Experience of investigating other problems has shown that the individual differences are often extremely important.

(a) *Differences in Methods of Payment*

It has been shown in another part of this report that the factory worker tends to have lower sickness absenteeism than workers in other occupational groups of the same organization : it is more usual for the piece rate payment to operate in a factory than elsewhere, hence it is sometimes argued that the factory worker cannot afford to lose money by staying at home. It is also true that workers on a " commission " basis lose money by absence and some of these have a high absenteeism rate. Expressed in general form, if the alternatives before any of us were to work or starve, it is certain that many who now remain at home for the minor ailments would of necessity be at work, and in consequence the sickness absence of the group to which we belonged would be correspondingly low : whether the mortality would be correspondingly high, we do not know. On the other hand, if by absence from work we were to lose nothing, neither in the form of money, promotion, appreciation by the authorities, nor time, and conditions at home were comfortable, there is little doubt that many of us would be tempted to avail ourselves of such opportunities and would find it hard not to avoid the discomfort of going to work when suffering from some of the minor ailments.

This, however, only represents the more objective point of view and assumes that the same environmental conditions operate on all individuals alike. If we subject a number of people to the same condition of no monetary loss for absence, we shall not find that all stay away the same length of time for the same kind of illness. To some people an illness is something to be resisted as long as possible, a feeling of malaise is accepted as a challenge, and only a very serious disability will make them give up ; nor are these people confined to any one walk of life. Others are so much interested in their work or in its conditions, that they cannot bear to be away from it, and hence will behave as the previous group, although the motive is different. Some, again, cannot, and others make no effort to resist, so they succumb easily to particular forms of illness.

Again, it must be realized that there is no hard and fast line between sickness and health : a person may be disabled for one kind of work but not for another. A slight sore throat might be a disability to a teacher, when it would not be to a clerk : a pain in the wrist could interfere with the work of a telegraphist, but not necessarily with that of a teacher. It is possible in some organizations

to transfer people from one department to another when suffering from minor disabilities : in others this is impossible. Hence, sickness measured by absence would be different even for the same disease, and for the same people in different environments. It is unlikely, therefore, that the method of payment is the sole determinant.

### (b) *Differences in Certainty of Work*

Organizations differ considerably with regard to the mobility of their labour. Until we have many more details of labour turnover it will be impossible to know exactly what part is played by what is called "permanence".

We must note that the commercial use of the word is not quite equivalent to the dictionary definition. There are some organizations where there is contractual permanence, i.e., apart from major misdemeanours or a national cataclysm there is no likelihood of loss of work. There are also organizations where, although there is no contractual permanence, there is virtual permanence, i.e., there is little chance of bankruptcy or of staff reduction, and dismissal only takes place for serious inefficiency—sickness not being in that category. From the individual workers' point of view there is little difference between this and the former system.

"Permanent" is also used for the staff that is not temporary, i.e., there is so much contract that dismissal cannot take place without specified notice which may vary from one week to six months ; and, in the so-called "permanent" organizations there are some workers not on that basis : such variations of meaning make a critical consideration of figures very necessary.

Sometimes where there is no contractual permanence, and where in theory dismissal can take place at a very short notice, the nature of the work or of the conditions of the work are so highly specialized that, in fact, there is little chance of dismissal or of the worker leaving voluntarily. The practical result is equivalent to permanence. Where this factor of permanence, actual or virtual, occurs, there seems to be higher sickness absence than in other groups ; this is the characteristic of N.O.P.Q.R. in Table I. There is, however, the modifying influence of

### (c) *Effect of Chances of Change*

Some organizations are very much more alive than others : there are more chances of promotion or of change with advancing experience. While it is true that some people prefer not to change, and would refuse promotion if offered, yet the majority hope for change, and there is a valuable sense of adventure when a beginner feels that he may rise from the lower ranks to the highest. Firms that have branches in several towns or in other countries offer interesting possibilities of advancement, and thereby provide a stimulus : horizontal as well as vertical opportunities for movement

are valuable and in some cases not enough advantage is taken of the possibilities available in the organization.

Inelastic conditions, in work of such a specialized nature that real change is impossible, form a very trying set of circumstances for some people, and can be associated with a high rate of sickness absenteeism.

When there is a prospect of continuous employment for efficient workers, not necessarily within the same department, or even town, an individual has a better chance of being interested and of getting away from concomitant circumstances that may be to him intolerable. It is not only the work itself that has to be estimated but the conditions under which it is done. For example, a typist's work involves much more than the actual typing. The work is in a particular setting, which may be of more importance than the typing. The flow of work may be regular or irregular, sometimes quality and sometimes quantity may be required, an organization may be too rigid or too slack, the head may be incompetent and so on: these and similar circumstances may make all the difference between high or low sickness absenteeism in particular cases. Where circumstances make it difficult to pass to other organizations or to do other work, stability can be achieved at the expense of mobility, and thus exaggerate the effect of the departmental conditions on the individual.

In a particular organization employing numbers of typists, selected by the same tests and doing the same work, one Friday afternoon during a mild influenza epidemic, most of the girls in one room were absent, while in the other very few were away. The head of the first room was a petty nagger, the head of the other a well-balanced happy person.

It is possible for an organization to give the individual workers the impression that they are of no account as such, that the machinery of organization is of more importance than the people who are part of it. The result is a feeling of impotence on the part of the staff. An extreme example of this was the director, who remarked, "I am entirely uninterested in the staff until they are entered up as statistics." Had vital statistics been his work his personal attitude would not have had serious consequences; unfortunately, he was in a position of authority.

The difficulty of the head of a department knowing all the individuals of a group is often insurmountable, but he can by his own example and teaching train his immediate subordinates to be intelligent and human in dealing with those under them.

A general attitude of grousing among workers may be a good medium for the cultivation of disease germs, and a most expensive luxury. Where workers feel that they will get justice and reasonable consideration; where such opposition as comes, is inherent in things themselves, and not due to the wilful ignorance or lack of imagination of someone with more authority than ability, then there is a mental environment that will prevent the easy yielding to every chance of

sickness. Naturally, no group of people can expect to be without the congenital grouser, who always finds all conditions wrong, but if the general mental environment is healthy, his attitude will not affect others.

#### (d) *Men and Women*

In each organization the women have a higher rate than the men, although they represent younger groups. Various suggestions are offered by experienced people. Women are paid less than the men and so have less to spend on necessities. They very often have home duties apart from their industrial work; while this in itself may not be harmful, it is serious if it involves lack of fresh air or sleep. It is true that not all women in industry are so circumstanced, but there are enough to constitute a problem for some organisations.

It is possible that owing to the shorter industrial life of a woman the medical entrance examination is not so stringent. By the majority of women the industrial life is not looked upon as a career, so they may be less interested in making a success of it. No one explanation fits a majority of workers.

#### (e) *Some Occupational Differences*

On the whole the clerical worker tends to have a higher rate than the factory worker, working under the same general conditions.

It is held by some people that the factory tends to select a physically better type than the office, or perhaps that the physically inferior types tend to drift to office work. In organizations where the same standard of fitness is demanded, this cannot be the chief reason. As a matter of fact much factory work is physically unexacting and from the point of view of the movements required, there is little to choose between the factory work and clerical work involving the use of mechanical appliances. Some think that the clerical occupations attract a more intelligent type than the factory, thereby assuming that a high degree of intelligence involves a higher liability to sickness—an assumption not to be uncritically accepted. It is obviously difficult to prove or disprove, but where data are available it does not seem to be true. That clerical work tends to recruit those who are better at examinations is probable, as schools often advise such pupils to become clerical workers. If an organization draws its people from a limited group of schools where such a tendency exists, the factory will get the less bookish children. There is no reason to suppose that such are less liable to sickness.

Another factor not to be ignored is that to many people there is a greater satisfaction in dealing with real things or their organization than in manipulating their symbols. In interviews with large numbers of people for other reasons, abundant evidence was collected showing that the clerical worker, as time went on, tended to become less satisfied with his work than the producer. For one thing, in dealing with real things there is usually an objective standard of efficiency and the worker knows if his work is or is not up to the

required standard. This is not so for the clerical worker. The typist, for example, is in some departments liable to approval or disapproval on the arbitrary judgment of a superior, so that work that has been accepted for some time may on a particular occasion be harshly criticized because the superior is bad-tempered. The robust person takes no notice, or is amused, but there are some who in these circumstances live in a state of anxious uncertainty, a mental background that prompts to refuge in illness. Some clerical work is of that particularly irritating type demanding attention irregularly and spasmodically on a general background of routine. If work is purely routine, then the worker can think of other things, and if it demands continued attention there is no problem; work that is neither one thing nor the other is trying. It cannot be said to cause illness but rather to help to determine it.

With shop assistants, who have a higher sickness absenteeism than the other comparable occupational groups, there are some important differences in condition. It is unlikely that there is any important physiological difference between them and their colleagues, but there may be temperamental differences. At this stage we cannot offer any answer. The general conditions of selling in a large store involve at least (*a*) periods of rapid work alternating with periods of comparative calm—the rush periods are more characteristic of some departments than others; (*b*) a constant adjustment to the claims, not infrequently irrational, of other people; (*c*) a fear of not earning enough commission when this is the basis of payment; (*d*) a fear of complaints. To the right type these conditions are stimulating and interesting: to the wrong type a constant source of worry.

Lastly, in some individual cases there is an unrecognized mental conflict as a result of social mal-adjustment. A boy or girl of factory environment put into clerical work for a slight examination superiority might find himself in a supposedly superior environment: if he is really able, or can adjust easily, he will probably settle down happily: if, however, he is the over-sensitive type, that feels its lack of equality and over-estimates the opinions and judgments of others, he is likely to break down. The struggle to be superior may be against too great odds. An illustration of this kind of conflict on the conscious level, occurred during a transport strike. A large organization had arranged for special conveyances for the staff and a limited number of routes were arranged. Members of the staff were asked to say where they could most conveniently board a conveyance. It was known that many workers said they could join at places actually far away from their residences, rather than admit that they lived in a less desirable neighbourhood. They preferred the discomfort of a long walk to the admission that they lived in a poor part. For the short duration of these emergency measures, no serious consequence was likely to follow, but where such a conflict is long continued and however it may be expressed, it can be a factor in determining breakdown.

In another report\* we have shown that the nervous person is liable, other things being equal, to have more sickness absence than others. It does not necessarily take the form of the so-called nervous breakdown, but may be a general liability to become ill owing to the weakening of his resistance through his mental conflicts.

## 12. SUMMARY

From the investigation here described, we can give only a tentative answer to the problem of what constitutes a reasonable amount of sickness absenteeism in particular circumstances. In the two large groups examined in the greatest detail, the rates for the men are three days and four-and-a-half days, respectively, and the women four days and a little over six days.

The factory worker tends to have a lower rate than the clerical worker or shop assistant within the same organization and working under similar general conditions.

The shop assistant has a higher rate than the other workers working under the same general conditions.

Women have a higher rate than the men, age group for age group.

The greatest loss in every group and age is due to influenza and colds, accounting roughly for between 30 per cent. and 40 per cent. of the total sickness loss.

Observation of a number of organizations suggests that the highest rate for long and short sickness absence is in those organizations which are so very highly specialized either in regard to the work or to the conditions of the work, that it is difficult for the workers to obtain other employment or for the employers to replace them.

The lowest rates are in those organizations where the selection of employees is good, where there are adequate chances of promotion for efficient workers, where the medical staff understand the nature of the work to be done and also the workers, where there is stability but not rigidity of organization.

In practice the problems of sickness absenteeism cannot be isolated from the more general problem of other forms of lost time, which is itself but a part of the still wider problem of management. Until, however, we have some *facts* of the actual incidence of absence and the conditions, physical, physiological and psychological, that in particular organizations are associated with this loss, we shall not be able to deal with the larger problem.

The tentative generalizations of this report are only to be interpreted within the data here available. At this stage we only claim to have made a beginning. If, however, at the end of 10 years, it can be shewn that all our general statements have to be modified and that the report is "out of date," it will have served its purpose.

---

\* Report No. 61. Industrial Health Research Board.

## PART II

## LABOUR WASTAGE

BY

MAJOR GREENWOOD AND MAY SMITH

---

 CONTENTS

	<i>Page.</i>
1. Introduction .. .. .	39
2. The Crude Wastage Rate .. .. .	40
3. The Industrial Life Table .. .. .	44
4. Analysis of an Organization .. .. .	46
5. Detailed Analysis of Another Organization .. .. .	50

---

## INTRODUCTION

In any human undertaking, whether a government department, a factory or a shop, a number of those engaged drop out; some prove unsuitable, some break down in health, some think they can "better themselves", some prove to be redundant owing to changes in the nature or scope of the undertaking. Labour, like human life, wastes and the measurement of this wastage is of importance. Its importance from the point of view of the Board is obvious enough; if in two undertakings in all other respects apparently identical, viz. handling the same product, situated in the same area, recruiting a similar population and paying the same wages, the wastage in one were much greater than in the other and an ostensible cause of this wastage were "sickness", a health problem would offer itself for solution. But the importance of the subject transcends this limit. Suppose that in the imagined establishments the higher wastage rate of one were assigned to unsuitability of the engaged; then the question would suggest itself whether the firm's recruiting staff were sufficiently familiar with the requirements of the undertaking or sufficiently good judges of the quality of applicants. If the undertaking were concerned with the manufacture of articles involving a high degree of manipulative skill, it might happen that no newly engaged person would become an asset until he or she had been in the factory for several months, he might indeed be a liability, making

demands on the time of more skilled persons who must teach him. It might even happen that the organizers of a business could foresee many months ahead a greatly increased demand for their product. Then they will wish to know how many beginners should be engaged *now* in order that three or six months ahead they will be able to use their plant to maximum advantage.

It follows, therefore, that the measurement and interpretation of labour wastage is very much more than a merely academic question, interesting only to those who are attracted by arithmetical calculations, and that no apology is needed for a detailed discussion of the subject. In what follows, points will be discussed which many readers may think obvious, and the illustrative material we present is scanty. An excuse is provided by the old saying that the Best may be the enemy of the Good. The literature of labour wastage is extensive but it is not, we think, very satisfactory from the point of view of the business man or factory manager\*. Sometimes one has masses of figures the analysis of which is imperfect and the results thought to be deducible from which are expressed by various indices not clearly defined. Sometimes one has algebraical dissertations on the theory of measurement unaccompanied by any data at all. In the former case the reader is confused by masses of figures, in the latter by an unfamiliar symbolism. We have attempted to steer a course between these extremes.

The rate of wastage that has been most extensively studied and accurately measured is that of life; we shall see that *every* method in use for the measurement of death rates has its application to the measurement of labour wastage. There is, of course, a complete formal analogy between the two; so far as the particular establishment is concerned, a worker who has left has died and a worker who is engaged is born. That in the industrial career of an individual he may be born and may die several times does not affect the arithmetical analogy but, as will shortly appear, the differences in the vicissitudes of the industrial as compared with the physiological population do affect the practical values of the different methods of measurement.

## 2. THE CRUDE WASTAGE RATE

The first problem is to obtain a figure that will enable us to measure the "deaths" relative to the population, for a given period of time. The most useful unit of time is the calendar year. If the population remained stationary except for deaths there would be no difficulty; the number of deaths divided by the population in question, expressed as a percentage would be the required figure. Such simplicity, however, rarely occurs either in the population in general or in an industrial organization; births in the former group, new entrants in the latter necessitate calculation.

---

\* The best recent account is that by Professor Albino Ugge, in Vol. VI of *Trattato Elementare di Statistica*, edited by Gini, pp. 74 *et seq.*, Milan, 1935.



If the population of a country at the beginning of a year were one million and at the end of the year one and a half millions, then the population for the year would be taken as the average of the two, namely two-and-a half millions divided by two.

If the deaths during the year were 12,000 the crude death rate would be this figure divided by one and a quarter millions, which could be expressed as a percentage, or as is more usual with large numbers as a rate per thousand, in this case 9·6 per thousand.

Similarly the industrial wastage could be expressed by dividing the number leaving within the year by the average number employed, and expressing that as a percentage. If at the beginning of the year there were 1,000 on the staff and, assuming normal conditions 1,500 at the end, and if 90 left during the year, then the wastage rate per 100 would be 90 divided by 1,250, multiplied by 100 = 7·2 per cent.

The simple death rate as above defined is a valuable statistical instrument and so is the corresponding wastage rate. But from the point of view of why people die, or, in the industrial world, leave, both have their limitations.

In our imaginary example 9·6 per thousand would be a very satisfactory rate of mortality if it applied to a population such as that of England and Wales, much less satisfactory if it had been calculated from, say, the established staff of the Home Civil Service. The population of England and Wales consists of men, women and children of all ages; the active civil service contains no infants and very few persons older than 65. Its crude death rate ought to be low. The crude death rate of England and Wales in 1921 was 12·1 per 1,000 persons. The death rate of occupied males was about 9·2.

Similar objections can be urged against a crude industrial wastage rate. Just as we know that a "real" population which has a high birth rate will certainly have a high crude death rate, there is also evidence that an industrial population with a high "birth" rate will have a high industrial "death" or wastage rate. There is a further difficulty which does not often arise in population statistics, but does sometimes when the methods of a settled country are applied without care to the records of a new land (new, that is, to the statistician). Sometimes one sees printed impossibly low rates of mortality for colonial territories. This will happen when there has been a sudden large influx of people. If, for instance, a thousand refugees entered a colony, with a normal population of 100, on Christmas Day, 1934, one could not take the average of 100 and 1,100 as the figure for the population. A thousand had only been exposed to the risk of dying *in the colony* for six days. Similarly if a ship put in at the colony and discharged 50 people dying of yellow fever into the local hospital, it would be unreasonable to debit these deaths to the local population. Such errors as these are rare in vital statistics, but analogous mistakes can easily be made in wastage statistics. Staff may, for instance, be engaged for rush periods and discharged. Firms vary very much with regard to the number of temporary staff employed, i.e. those engaged for a specific limited period: some never have occasion to

take on such workers, whereas to others they are a recognized regular necessity, for example, sale time in many organizations, of unforeseeable demands for work in others.

These temporary workers must be kept in a class apart for statistical purposes. If some of them are kept on afterwards then they should be included as ordinary entrants from the date of entry. These industrial deaths ought not to be debited to the permanent staff. In the present report we are not concerned with wastage of this kind.

When the crude rates have been worked out, we have a simple and convenient measure, but when we wish to compare one group with another, whether within the same organization or not, or even the same organization with itself for different years, we ought to know whether in fact the two groups to be compared are really comparable. Comparisons, for example, are often made between one industrial organization and another taking the men and women together and all ages. Now a group composed of 90 per cent. women and 10 per cent. men, would be likely to have a higher wastage rate—quite apart from the suitability of the workers for the work—than a group composed of 10 per cent. women and 90 per cent. men: a group composed of 60 per cent. new entrants and 40 per cent. workers, who had been with the firm for 10 years at least, would be likely to have a higher rate on this account alone than one composed of only 10 per cent. new entrants and 90 per cent. seniors.

The wastage rate ought to be calculated for the men and women separately, for different age groups and for duration of service.

In the construction of official tables, in order to make allowance for age and sex, it is usual to calculate a standard rate, i.e., not what the death rate actually is (the crude rate tells that), but how the population would have died, if its age and sex composition had conformed to a certain standard, which may be some arbitrarily constituted standard, or the population of the whole country, e.g., a population containing so many males aged 0-5, 5-10, etc. Its use is to tell us whether the differences between two crude death rates are really due to differences not in healthiness but to differences in age and sex composition.

Say the crude death rate in France is higher than in England, if that is merely because there are more old people and young children than in England, then the age-standardized rate for the two countries would be equal. Precisely the same method could be applied to leavers in an industrial organization using not their chronological age but their age in the firm. We might enumerate our population in "industrial" age groups, say, numbers at 1st January and 31st December, with less than three months' service, three to six months and so on, and we might classify leavers into the same groups. Then we could compute rates at "ages" and so have material for a standardized wastage rate. There is, however, a different way of using the data which for some purposes is more useful. To make the distinction between the two methods clear, we

will simplify one of our previous examples. Suppose that it were the practice of some firm to engage people once a year only—as was once the practice of some farmers—and that such a firm had engaged on the first of January 1,000 persons, of whom 100 left during the year. Then in terms of our previous definitions, the wastage rate would be 100 divided by  $(1,000 + 900)/2$ , since the population at the beginning of the year was 1,000, at the end of the year  $1,000 - 100 = 900$ .

But it would at once occur to anybody that a useful measure of wastage could be obtained without any average by simply taking the ratio of either those who did leave, viz., 100 to those who had the chance of leaving, viz., the 1,000 starters, or, if preferred, the ratio of those who did not leave, viz., 900 to the 1,000 starters. Obviously, the former fraction  $100/1,000 = 0.1$  is not the same as the wastage rate defined above, which is  $100/950 = 0.1053$ . Obviously, it will always be smaller. Take the extreme case, if the whole 1,000 left the new ratio would be  $1,000/1,000 = 1.0$ , but the other wastage rate would be 1,000 divided by  $(1,000 + 0)/2$ , i.e.,  $1,000/500 = 2$ . The first rate defined, viz., the ratio of losses to average population in the period to which the losses refer, is called a *central rate*, because the denominator is the estimated number of persons present at the middle of the period; the second fraction is called a probability of leaving (in mortality, of dying) because it gives a measure of the proportion of those leaving to those who had the opportunity of leaving.

Which of these measures is to be preferred depends upon circumstances. The advantage of the *central rate*—which we will continue to call the crude wastage rate—is that it is easy to calculate. That advantage is conserved when we allow for experience. It would not be difficult to enumerate the numbers in employment at the beginning and end of the year whose seniority was not more than one month, and the losses during the year of those who had not been in employment more than one month, and so on. But, save in the very improbable case of all engagements being made once a year on the same day, it is not so easy to compute what we will call wastage probabilities. That is why in current vital statistics, e.g., the reports of the Registrar-General, central rates are invariably used (except for the mortality of the first years of life) and probabilities of dying only under special circumstances. Indeed, so far as comparisons of organization with organization are concerned, there is no good reason for preferring probabilities to central rates.

But in the internal work of an organization, the probability method may have a distinct advantage. To take a case which, although imaginary, is not without practical importance, suppose that new entrants to a technical department are of no productive value until they have been at their job for three months. Suppose that a firm knows that in order to meet an anticipated pressure of work, it will in three months' time need 100 more productive workers in a particular department. How many new people

should the firm engage *now* in order to be reasonably sure of having the needed staff? Clearly, data presented in probability form would give the answer. It is also, as we shall now show, much easier to obtain data in probability form for industrial wastage purposes than for the study of human mortality.

### 3. THE INDUSTRIAL LIFE TABLE

It occurred long ago to population statisticians that the best of all ways of measuring mortality would be to follow everybody from the cradle to the grave. If one were to establish at Somerset House a dossier for every infant born and to enter the important facts in its life down to and including the date of death, then in 100 years from beginning the business one would have a complete history of life and death. In 2034, Somerset House would announce that of the 1934's  $x$  per cent. died under one,  $y$  per cent. between one and two, and so on. The practical impossibility has, however, already suggested itself. The public do not want to wait 100 years to learn something about mortality rates anyhow, and some of the children born in England and Wales in 1934 will die elsewhere. Consequently, life tables such as these never have been and probably never will be compiled, although insurance offices do construct from their records tables which approximate to the ideal.

But in the matter of industrial wastage the construction of such tables is actually easier than the construction of standardized rates for two reasons. The first is that, unlike Somerset House in the imaginary population case, every firm has a record of the industrial birth and death of each individual it employs. The second is that serious practical interest in industrial wastage is confined to the first year or two of industrial life. Indeed, to be fair to the vital statistician, this life table or survivorship method is virtually employed so far as concerns the first year of life. The official statistician does ascertain how many of the October infants born in 1933 are alive in October 1934, although for practical reasons not here relevant the results are not stated quite in the same way.

We therefore reach the conclusion that the most complete is really the simplest method to adopt. If a card is started for each employee and when that employee leaves the date of leaving is entered upon the card and the card transferred to a "dead" cabinet, a clerk can supply an answer to a fundamental question in half an hour. Suppose one wishes to know the wastage of entrants of the year 1934 during the first year of service, then one calls in the living and dead cards of 1934 on December 31st, 1935. Every one of the entrants has had a chance of leaving or has actually left in the first year of service. Take out the "dead" cards recording a service of less than 12 months and divide by the total number of cards and the answer is given. If we need a more detailed analysis, it is simple to carry out. Say the total of entrants were 1000 and suppose 1000 entrants are followed up until they have completed one year from the date of entry, or have left; they can then be classified according to

length of service. Suppose that of these 1000, 50 left or were discharged with less than one month's service, then the wastage in the first month is  $50/1000 = 5$  per cent. Only 950 are there for the next month, and of these 30 leave, giving a wastage rate of  $30/950 = 3.2$  per cent., and leaving 920 to begin the third month : of these suppose 20 leave, then  $20/920 = 2.2$  per cent. is the wastage of the third month, leaving 900 to begin the next month.

So in similar fashion the other months can be computed. In this example the wastage rate for the first month is 5 per cent., for the sixth month 1.2 per cent. and for the twelfth month 0.7 per cent. with 820 to carry on. The crude rate is  $180/1000 = 18$  per cent. but from the above computation we know exactly where the greatest loss occurred. This wastage might then be used as the measure for the organization.

TABLE XVII

No. = 1,000

Length of Service in Months.	Number Present.	Number Leaving.	Number leaving as a Percentage of those present at the beginning of the Period.
0	1,000	50	5.0%
1	950	30	3.2
2	920	20	2.2
3	900	12	1.3
4	888	11	1.2
5	877	11	1.3
6	866	10	1.2
7	856	9	1.1
8	847	8	0.9
9	839	7	0.8
10	832	6	0.7
11	826	6	0.7
12	820	—	—

Unless large numbers of entrants are admitted on the same date such a scheme could not be worked out for a calendar year, since those who entered late in the year could not have been present a year : it presupposes that every entrant has been at least a year or has left. There is no reason why a shorter period should not be taken as a unit.

Useful comparisons could be made between entrants selected by different methods, or between different departments. There are, however, some difficulties to be considered.

The first is that one may be working for the future. If a firm required here and now an analysis of its wastage experience, the above described method could only be used if a *complete* record of entrance and loss covering at least two years were available and, if

the entrants were few, then, even with a complete record, the real significance of the results might not be easy to determine. A village with a population of 50 might easily have a rate of mortality of zero per 1000 in one year and 20 per 1000 in the next, because in the former year nobody and in the latter one person died, yet no sensible person would draw any conclusions as to the health of the community from the difference. That is true of wastage rates. It is a matter for the professional statistician to assess the importance of fluctuations in small numbers. These, however, are objections which can be made to any method of analysis. In the illustrations subsequently given the significance of differences—in the technical sense of the statistician—has been estimated and, when needed, a caution is given.

A few more words may be said as to the reason for attention to wastage rates in the first year of employment.

In all but the simplest of mechanical operations, new entrants are for days or weeks, unproductive. Whether in the charge on the time of others or in actual waste of material they are unprofitable to their employers. Some American authors have made elaborate calculations of the money loss incurred by frequent changes of staff. If the wastage rate is very high in the first days or weeks of employment, it is often a fair presumption that the method of engagement is faulty. If, on the other hand, the wastage rate is at first low but after the probationary period increases, it is probable that the general conditions of service are unsatisfactory.

It is hardly necessary to say that the conditions of application of this test vary from industry to industry and from occupation to occupation within an industry.

In the following pages arithmetical illustrations of the methods described are given; they are necessarily meagre and the explanations of the facts tentative. We desire to emphasize as strongly as we can the fact that, unless and until the arithmetical analysis we have described is widely used, conclusions must be tentative. When the measurement of labour wastage has become a matter of routine, valuable conclusions will begin to emerge. Vital statistics had been for many years, one might almost say for centuries, in a far more advanced state of development than are those of labour wastage, before *any* practical use was made of them.

It is not useful at this stage to spend much time in the discussion of analytical improvements or even of detailed specifications of particulars, until the simplest information is available with respect not to a few hundreds but to many thousands of workers.

#### 4. ANALYSIS OF A PARTICULAR ORGANIZATION

In Table XVIII we give the experience of 524 persons engaged by a firm during 1930 whose records have been followed until the individuals had left or had been on the books for one year, whichever happened first. The method of working has been described on page 45. Of the 524 entrants only 254 were still working for the firm at the end of a year.

TABLE XVIII  
Men and Women = 524

Length of Service in Weeks.	Number Present.	Number Leaving.	Number leaving as a Percentage of those present at the beginning of the Period.
0- 3	524	130	24·8%
4- 7	394	21	5·3
8-11	373	17	4·6
12-15	356	15	4·2
16-19	341	19	5·6
20-23	322	16	5·0
24-27	306	10	3·3
28-31	296	12	4·1
32-35	284	7	2·5
36-39	277	4	1·4
40-43	273	5	1·8
44-47	268	7	2·6
48-51	261	7	2·7

The greatest loss occurred during the first month when 130 = 24·8 per cent. left ; after this there is a gradual, though slightly, irregular reduction. These persons differed in sex, age and occupation, and all or any one of these differences might affect the wastage rate.

In Tables XIX A, B, C and D sub-classifications are made.

As the numbers are small for detailed classification the leavers have been arranged in four period groups, (1) those who were on the books for less than one month, (2) those who remained four weeks but less than 28 weeks, (3) those who remained 28 weeks but less than 52 weeks, and (4) those who had not left at the end of a year.

For 432 out of the above 524, an age classification and other details were available. Those aged from 14 to 20 have been separated from those of 21 and over. Such a classification is not very valuable, but we have no further details. As the classification stands the age groups do not show any significant differences (in no case is the difference equal to the minimum statistical requirement) : in each group the greatest loss occurs in the first six months. In this connection it is to be noted that the people for whom we have no details are the 92 who left after a few days' service.

If the same people are classified according to sex we find that at each service-period the women have a higher rate than the men, although the sex difference at each period taken alone may not be important.

The firm had a suspicion that the kitchen staff had an abnormally high rate of leaving, so to test this the women staff were divided into kitchen staff and all others. Obviously when the numbers are scanty chance must play its part, so some of these differences may have no practical importance, in the sense that had the experience been wider the differences might have been smoothed out. Nobody would be

TABLES XIX. A, B, C and D.

A.					B.							
Men and Women. All Ages = 524.					Men and Women. Ages 14-21 = 222.				Men and Women. Age 21+ = 210.			
Period of service in weeks.	No. at beginning.	No. leaving.	No. remaining.	No. leaving as percentage of the number at beginning.	No. at beginning.	No. leaving.	No. remaining.	No. leaving as percentage of the number at beginning.	No. at beginning.	No. leaving.	No. remaining.	No. leaving as percentage of the number at beginning.
0-3	524	130	394	24.8	222	16	206	7.2	210	22	188	10.5
4-27	394	98	296	24.9	206	53	153	25.7	188	45	143	23.9
28-51	296	42	254	14.2	153	18	135	11.8	143	24	119	16.8
Not left	254	—	—	—	135	—	—	—	119	—	—	—
C.												
Period of service in weeks.	Men = 126.				Women = 306.							
0-3	126	10	116	7.9	306	28	278	9.2				
4-27	116	20	96	17.3	278	78	200	28.1				
28-51	96	9	87	9.4	200	33	167	16.5				
Not left	87	—	—	—	167	—	—	—				
D.												
Period of service in weeks.	Women. Kitchen Staff = 150.				Women. All others = 156.							
0-3	150	21	129	14.0	156	7	149	4.5				
4-27	129	39	90	30.2	149	39	110	26.2				
28-51	90	16	74	17.8	110	17	93	15.5				
Not left	74	—	—	—	93	—	—	—				



much surprised if on tossing a penny half-a-dozen times the head fell uppermost four times: if in six hundred tosses there were four hundred heads anybody would suspect some bias either in the coin or the method of tossing.

It will be sufficient to illustrate one of the many methods in use for testing the "significance" of an observed difference upon a particular case which interested the management of the firm.

Of all the 306 women engaged, 139 = 45·4 per cent. left with less than a year's service. Of these women 150 were engaged for kitchen staff and 76 left; 156 were engaged elsewhere and 63 left.

Now if there is really no differentiation of the groups, we should expect the over-all percentage of wastage, viz. 45·4 to measure the wastage in each group, i.e. that of the kitchen staff, 68 would have left, and of the others 71. Eight more members of the kitchen staff left than we should expect and eight fewer numbers of the remaining staff. Is this difference consistent with the play of chance, or, put in other words, if the "true" rate of leaving were 45·4 per cent., how often would batches of 150 and 156 differ as much as or more than these two did differ? The answer to that arithmetical question is that as big a difference would be manifested, or a bigger difference, about once in fourteen trials. These are no long odds against the event and indeed the calculation slightly exaggerates the improbability\*, but they are sufficient to suggest the need of further inquiry. Reference to the details shows that most of the disadvantage relates to the first month of service. In that month the proportion of wastage in the kitchen staff was more than three times that of the other staff. This then suggests that *either* the selection of staff for kitchen service was inefficient *or* that the general conditions of service were such that only the hardiest or best adapted "survived" the probationary period. Which is the more probable answer can only be learned by further *ad hoc* investigation. It should be remembered that a purely *statistical* inquiry is *never* final or decisive. The office statistician can tell the staff manager as a result of his calculations whether there is a *prima facie* case for investigation; he can, sometimes, decide whether a proposed explanation is adequate, but he can never be the final arbiter.

In the other tables the results of various tabulations are shown; few of these differences are sufficiently striking in themselves to be more than suggestive.

Returning to the question as to what ought to be done when the arithmetical analysis has found some suggestive differences in wastage rates we reach a more difficult stage of the inquiry. *Why* did these people leave?

It is well known that many so-called reasons for leaving are meaningless, being dependent (1) on the type of person leaving—there are people for example who cannot bear that any one should have more than the minimum knowledge of their life, and hence

---

\* If the correction suggested by Yates (supp. to *J. Roy. Stat. Soc.*, Vol. I, 1934, pp. 217, *et seq.*) is used, the odds are nearer 10 to 1 than 13 to 1.

assign some vague reason for leaving, (2) on the person entering the reason, who may, in the absence of accurate knowledge make up a possible reason, or may not wish to enter the truth. The simplest classification would be into those who were dismissed, and those who resigned : there may be a certain ambiguity in particular cases but if nothing else can be done, it is of value in comparing departments.

In the group of people comprising Table XIXA the leavers were classified according to ill-health, own accord, unsatisfactory, and no reason given.

**TABLE XX.—SHOWING THE LOSS DUE TO DIFFERENT REASONS, THE NUMBER IN EACH CATEGORY EXPRESSED AS A PERCENTAGE OF THE TOTAL NUMBER OF LEAVERS IN THE PERIOD**

Period of service in weeks.	Number leaving.	Ill-health.	Own accord.	Unsatisfactory.	Unknown.
0-3	130	% 3·9	% 10·0	% 10·0	% 76·2
4-27	98	14·3	28·6	36·7	20·4
28-51	42	7·1	33·2	23·8	31·0

Reference to the above table will show that a large percentage left without giving a reason.

With so many labelled "unknown" the distribution of other reasons is not of much value. Even so, an investigation into the method of selection is indicated when, omitting those who were on the books less than a month, 36·7 per cent. have to be dismissed as unsatisfactory in the next period and 23·8 per cent. in the third.

##### 5. DETAILED ANALYSIS OF THE LABOUR WASTAGE OF ANOTHER ORGANIZATION

In this case we had access to the figures of a branch of an organization from its opening day. A record of all those who started work on the day of opening was made, and these have been followed up for two years. Those who entered at any other date have been kept separate. On each card was entered, the date of entry, date of leaving, reason for leaving, department, sex and age. The method of working out is that described on page 45.

321 men and 754 women began work on the first day, and of these at the end of one year, 208 men i.e. 64·8 per cent. and 465 women = 61·7 per cent. were still on the staff. Of those who began the second year 88·0 per cent. of the men and 73·3 per cent. of the women were there at the end of the year ; comparing the numbers at the end of the two years with those at the beginning 57·0 per cent. of the men and 45·2 per cent. of the women stayed at least two years.

Apparently the management allowed some time for the people to settle down, and the conditions of work must have proved fairly satisfactory to the workers, since there are no leavers during the first month.

TABLE XXIA.—AN ANALYSIS OF THE LENGTH OF SERVICE OF THOSE STARTING WORK ON THE OPENING DATE

Weeks' service.	Men = 321.					Women = 754.				
	No. leaving for various reasons.	No. re-dundant.	No. present.	Wastage as percentage <i>Excluding</i> redundant.	<i>Including</i> redundant.	No. leaving.	No. re-dundant.	No. present.	Wastage as percentage <i>Excluding</i> redundant.	<i>Including</i> redundant.
0-3 .. ..	0	0	321	0	—	0	0	754	0	—
4-7 .. ..	3	1	321	0.9	1.3	9	5	754	1.2	1.9
8-11 .. ..	9	8	317	2.8	5.4	29	1	740	3.9	4.1
12-15 .. ..	7	8	300	2.3	5.0	34	2	710	4.8	5.1
16-19 .. ..	3	11	285	1.1	4.9	19	32	674	2.8	7.6
20-23 .. ..	5	9	271	1.9	5.2	20	9	623	3.2	4.7
24-27 .. ..	4	14	257	1.6	7.0	13	21	594	2.2	5.7
28-31 .. ..	2	0	239	0.8	0.8	17	1	560	3.0	3.2
32-35 .. ..	3	2	237	1.3	2.1	16	0	542	3.0	3.0
36-39 .. ..	3	1	232	1.3	1.7	11	1	526	2.1	2.3
40-43 .. ..	1	3	228	0.4	1.8	15	7	514	2.9	4.3
44-47 .. ..	4	1	224	1.8	2.2	14	1	492	2.9	3.1
48-51 .. ..	7	1	219	3.2	3.7	8	1	477	1.7	1.9
52-55 .. ..	4	2	211	1.9	2.8	19	2	468	4.1	4.5
56-59 .. ..	2	0	205	1.0	1.0	16	0	447	3.6	3.6
60-63 .. ..	2	0	203	1.0	1.0	11	0	431	2.6	2.6
64-67 .. ..	2	2	201	1.0	2.0	9	1	420	2.1	2.4
68-71 .. ..	0	0	197	0	0	6	2	410	1.5	2.0
72-75 .. ..	1	3	197	0.5	2.0	10	1	402	2.5	2.7
76-79 .. ..	1	2	193	0.5	1.6	9	0	391	2.3	2.3
80-83 .. ..	1	0	190	0.5	0.5	13	1	382	3.4	3.7
84-87 .. ..	1	0	189	0.5	0.5	10	0	368	2.7	2.7
88-91 .. ..	1	0	188	0.5	0.5	4	0	358	1.1	1.1
92-95 .. ..	0	0	187	0	0	4	0	354	1.1	1.1
96-99 .. ..	2	1	187	1.1	1.6	3	1	350	0.9	1.1
100-103 ..	1	0	184	0.5	0.5	4	1	346	1.2	1.5
104+ .. ..	—	—	183	—	—	—	—	341	—	—

As the management had no means of knowing beforehand exactly how many workers would be required in each department it was found after some experience that certain departments were over-staffed, so at intervals rather large numbers were dismissed as redundant. Reference to Table XXIII will show that these dismissals amounted to 21·5 per cent. for men and 11·7 per cent. for women, an amount that in more ordinary circumstances would reflect seriously on those responsible for the selection of staff for this kind of work.

Strictly speaking, people who are dismissed because of unforeseen circumstances connected with the amount of the work, are not ordinary leavers. In Table XXIA we have kept them separate. As, however, they were not on the books after dismissal, the figure for the following month has been obtained by subtracting both sets of losses. It is, though, common knowledge that when there is a question of having to dismiss people, no one dismisses the ablest or the most competent, except in very unusual circumstances. The class labelled "redundant" will undoubtedly contain a number who would have had to leave in any case.

We have for these reasons given the wastage figures calculated from all leavers as well as for ordinary leavers, omitting the redundant.

The greatest loss among the men and women (neglecting the overstaffed dismissals) occurred about the third month, after which there was a steady but irregular decline till towards the end of the year, when there was a rise followed by relative stability. Of course, the statistical reliability of the percentage decreases with the numbers concerned.

Usually, though, an organization does not take on such large numbers of workers on a specific date, but smaller numbers at intervals. We have, therefore, kept those who started on any other than the opening day, separately. As these could not all have had the opportunity of being on the books for the same period of time, they have been followed up till each person had been either employed one year or had left.

The highest rate occurs in the first month, for the men and for the women, after which there is an irregular diminution.

A comparison of these rates with those given in Table XXIA shows some important differences. In the first place the original group of entrants suffered no loss during the first month, against 12·5 per cent. for the women and 11·9 per cent. for the men of the other group.

Secondly, the highest rate for women in the Table XXIA group is 7·6 per cent., including those dismissed as redundant: for the women of the other group the rate remains over 9 per cent. until about the fifth month. The men of group XXIB are too few for comparative purposes, but it is noteworthy that the same tendency appears.

TABLE XXIB.—AN ANALYSIS OF THE LENGTH OF SERVICE OF THOSE STARTING WORK AFTER THE OPENING DAY

Weeks of service.	Men = 84			Women = 393		
	Number leaving.	Number present.	Number leaving as a percentage of the number present.	Number leaving.	Number present.	Number leaving as a percentage of the number present.
0-3	10	84	11.9	49	393	12.5
4-7	3	74	4.1	37	344	10.8
8-11	4	71	5.6	30	307	9.8
12-15	5	67	7.5	27	277	9.6
16-19	3	62	4.8	23	250	9.2
20-23	2	59	3.4	15	227	6.6
24-27	1	57	1.8	9	212	4.2
28-31	1	56	1.8	10	203	4.9
32-35	4	55	7.3	7	193	3.6
36-39	1	51	2.0	7	186	3.8
40-43	1	50	2.0	12	179	6.7
44-47	2	49	4.1	2	167	1.3
48-51	4	47	8.5	8	165	4.8
52+		43			157	

It seems a legitimate deduction that the original selection had been a good one, probably because the best available labour had been obtained at the beginning.

TABLE XXIIA.—A COMPARISON OF THE LENGTH OF SERVICE OF LEAVERS WHO STARTED WORK ON THE OPENING DATE, CLASSIFIED IN AGE-GROUPS, THE NUMBER IN EACH SERVICE GROUP BEING EXPRESSED AS A PERCENTAGE OF THE NUMBER IN THE GROUP

Service in months.	Men=321			Women=754		
	Number leaving aged 14 and 15.	Number leaving aged 16-23.	Number leaving aged 24 +	Number leaving aged 14 and 15.	Number leaving aged 16-23.	Number leaving aged 24 +
	Number at beginning = 16	Number at beginning = 130	Number at beginning = 175	Number at beginning = 78	Number at beginning = 399	Number at beginning = 277
	%	%	%	%	%	%
Under 1	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
From 1-2	1 = 6.3	3 = 2.3	0 = 0	1 = 1.3	8 = 2.0	5 = 1.8
.. 2-3	1 = 6.7	8 = 6.3	8 = 4.6	2 = 2.6	15 = 3.8	13 = 4.8
.. 3-4	0 = 0	8 = 6.7	7 = 4.2	7 = 9.3	17 = 4.5	12 = 4.6
.. 4-5	0 = 0	3 = 2.7	11 = 6.9	5 = 7.4	35 = 9.8	11 = 4.5
.. 5-6	1 = 7.1	6 = 5.6	7 = 4.7	2 = 3.2	19 = 5.9	8 = 3.4

TABLE XXIIb.—A COMPARISON OF THE LENGTH OF SERVICE OF LEAVERS WHO STARTED AFTER THE OPENING DATE, CLASSIFIED IN AGE-GROUPS (WOMEN), THE NUMBER IN EACH SERVICE GROUP BEING EXPRESSED AS A PERCENTAGE OF THE NUMBER IN THE GROUP

Month's service.	Number leaving aged 14 and 15.	Number leaving aged 16—23.	Number leaving aged 24+
	Number at beginning = 107.	Number at beginning = 190.	Number at beginning = 96.
Under 1 month ..	18 = 16·8	18 = 9·5	13 = 13·5
" 2 " ..	12 = 13·5	20 = 11·6	5 = 6·0
" 3 " ..	11 = 14·3	11 = 7·2	8 = 10·3
" 4 " ..	11 = 16·7	9 = 6·4	7 = 10·0
" 5 " ..	5 = 9·1	14 = 10·6	4 = 6·3
" 6 " ..	5 = 10·0	5 = 4·2	5 = 8·5

The same people have also been classified according to age into three groups. In the original set there is no consistent difference relating to age, but in the other group the youngest has a higher rate than the older groups on five out of six of the service-periods. The crude wastage for the year for the 14 and 15 year olds is 70·1 per cent. and for the others 56·3 per cent. and 55·2 per cent. In this town there is a shortage of juvenile labour and so some competition for their services. This is reflected in the fact that out of 78 appointed, 30 left for the two reasons of "own accord" and "to take another post".

TABLE XXIII.—SHOWING THE AGES AND REASONS FOR LEAVING OF ALL THOSE APPOINTED FOR THE OPENING DAY OVER A PERIOD OF TWO YEARS

	Men					Women				
	14 & 15.	16-23.	24+	Total.	No. at all ages as a percentage of total.	14 & 15.	16-23.	24+	Total.	No. at all ages as a percentage of total.
Nos. .. .. .	16	130	151	321		78	399	277	754	
Inefficient and unsatisfactory.	2	21	12	35	10·9	1	37	30	68	9·0
Another Position	1	15	11	27	8·4	14	46	18	78	10·3
Marriage	—	—	—	—	—	0	17	19	36	4·8
Health .. .. .	0	2	1	3	0·9	1	18	22	41	5·4
Own Accord .. .. .	0	0	4	4	1·3	16	47	39	102	13·5
Redundant .. .. .	2	24	43	69	21·5	5	43	35	83	11·7
Still Present .. .. .	11	68	104	183	57·0	41	186	114	341	45·2

A study of the reasons for leaving is given in Table XXIII. The alleged reasons are obviously only a rough indication of the facts and must not be interpreted too literally: marriage, for example, might be classified by some people as "own accord", and a permitted resignation might hide an impending dismissal.

In the table the ages are classified into three groups and the alleged reasons for leaving are set out over a period of two years. The chief difference between the men and the women is in the "own accord" category, for 13·5 per cent. of the women give this as a reason against 1·3 per cent. of the men. 5·4 per cent. of the women give "health" and only 0·9 per cent. of the men.

When further sub-divided into age groups the numbers are rather too small for importance to be attached to differences; the only noteworthy difference between the 16-23 age group and the older group is the loss for health reasons, viz., 22 out of 277 = 7·9 per cent. in the older group, compared with 18 out of 399 = 4·5 per cent. in the younger group, and the greater number leaving to go to another post in the younger group, namely, 46 out of 399 = 11·5 per cent., against 18 out of 277 = 6·5 per cent.

As a comparison we have used some wastage figures for a number of women clerks in the Government service. Such a service might reasonably be taken as representing the lowest standard of wastage to be attained by any organization.

TABLE XXIV.—SHOWING THE REASONS FOR LEAVING IN (a) A COMMERCIAL FIRM FOR ONE YEAR, (b) A GOVERNMENT DEPARTMENT FOR FOUR SEPARATE YEARS

	Commercial firm.		Government department.			
	M.	W.	W.	W.	W.	W.
Numbers .. ..	265	835	2,013	2,087	2,173	3,020
Wastage as a Percentage.	34	54	11·4	10·9	9·8	7·1
Reasons for leaving.	No. in each category of leaving expressed as a percentage of total.		No. in each category of leaving expressed as a percentage of total.			
Unsatisfactory ..	7·6	8·4	—	—	—	—
Another Position ..	8·3	12·7	5·2	6·0	4·5	3·4
Marriage .. ..	—	4·3	5·0	3·9	4·0	2·8
Health .. ..	—	3·8	0·1	0·2	0·3	0·3
Death .. ..	—	—	0·1	0·2	0·3	0·1
Own Accord .. ..	1·1	14·3	—	—	—	—
Redundant .. ..	17·0	10·5	—	—	—	—
Other Reasons ..	—	—	0·9	0·5	0·7	0·4

TABLE XXV.—NUMBERS REMAINING AT WORK OUT OF 1,000 ENTRANTS IN VARIOUS ORGANISATIONS IN ACCORDANCE WITH VARIOUS RATES OF LOSS

Re- main- ing after months.	Cordite factory (war- time). W.	L.2. Factory (war- time). W.	L.1. Factory (war- time). W.	L.1. Factory (peace- time). W.	L.1. Factory.		L.1. Factory (war- time). Ages 13-17.	L.1. Factory (war- time). Ages 23-27.	L.1. Factory (war- time). Ages 28+	A stores 1930. All ages 524 M.+W.	A stores 1932. W. 754	A stores 1932. M. 321	Another group. W. 393	A laundry 1933. W. 175
					(Peace- time). Ages 18-22. W.	(War- time). Ages 18-22. W.								
0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	892	904	917	921	928	912	929	921	911	824	1,000	1,000	877	971
2	832	839	868	855	848	853	881	860	877	752	981	988	780	943
3	778	779	826	795	800	813	841	811	830	676	943	935	700	926
4	733	735	791	749	754	778	799	777	807	645	887	885	631	909
5	691	703	757	703	710	749	764	729	781	618	811	832	572	909
6	657	671	730	658	668	727	739	696	742	584	773	774	536	887



Clearly death, health and marriage would affect all organizations. "Another position" might stand for promotion to another part of the same organization situated in another town, or for work with another organization.

Such a miscellaneous group as the total staff of a store would hardly be comparable with a group of clerical workers. We have therefore selected from the total number of workers the clerical and selling staff, i.e., those whose work would be practically the same and those more nearly allied.

We must point out that comparison is not without danger. This commercial firm differs from the other not only in being commercial but also in its "age", the figures we have had being those of its first year of life. For example, the labour wastage of one small factory in its first year of life was 115·4 per cent., but 8 years later it was only 13·3 per cent. There is every indication that the wastage of the firm given above will be less in succeeding years, but apart from marriage, the rate for which does not differ materially in the two groups, there is very little that is comparable in the two organizations, and there is little likelihood that a commercial wastage for women will be as low as 10 per cent.

In Table XXV a comparison is made between a number of groups of workers for which we have figures. To simplify comparison, the numbers employed have been assumed to be 1,000, and the necessary corrections made. Instead of showing the losses month by month, the numbers remaining at the end of each month are given.

Seven of the factories are munition factories during the war, two are factories of the post-war period, and the others are modern stores, and a laundry. With the exception of the latter, the similarity of the figures is striking.

Does this mean that this amount of labour wastage must be accepted as a permanent feature, or have these particular organizations something in common that involves this loss? We cannot answer these and other related questions until many more data are available.

We only offer this inadequate study in the hope that its very inadequacy will prompt more research.

In conclusion, we should like to express our thanks to the organizations that have helped us with the necessary data and the medical and welfare staffs who have so kindly replied to our numerous queries, and also to our colleagues in the Statistical Department of the London School of Hygiene and Tropical Medicine.

## APPENDIX I

### THE RECORDING AND ANALYSING OF SICKNESS ABSENTEEISM

The keeping of records is not an end in itself, but a means to an end; therefore, any form of record that can facilitate the required end will be useful. It is not suggested that the methods outlined

here are the only ones, or necessarily in all cases the best ; they are given to enable a certain uniformity of procedure to be observed so that comparisons between one firm and another may be made.

The sickness record should be of such a nature as to enable some one person to work out the total number of days lost through sickness absenteeism in a given firm or department for any specified period.

If there is a medical or welfare department it is suggested that a card for each person should be kept, containing at least the name, age, department, date of entry, date of leaving, duration of sickness and medical diagnosis.

Name				Date of birth		
Department				Date of entry into firm		
Occupation				Date of leaving	Length of service	
Sex				Cause of leaving		
First day of absence.		Returned to work.		Nature of sickness.	Duration in working days.	Remarks.
Day of week.	Date.	Day of week.	Date.			

FIG. 15.

It is assumed that the management enforces a regulation to the effect that no one who has been absent for sickness, even for one day, can get back to work without reporting to the medical department. Heads of departments frequently look upon this as a needless waste of time. Actually, it is a very useful precaution. Apart from the superior accuracy of the records resulting from this regulation, it enables the medical department to verify that the worker is fit for work and also it checks absenteeism for trivial causes.

On the card all sickness should be entered, including visits to the department for treatment or rest.

Accidents even though entered separately, should also be included if they cause a period of absence.

Only working days should be included: thus, an absence of Friday afternoon, Saturday morning, and all day Monday would be reckoned two days.\*

(1) The first calculation should be the total number of days lost through sickness in the year, men and women being kept separate: this figure divided by the average number employed (excluding from both the sickness and the number employed those people taken on for a short time for a specific purpose) will give the average number of days lost per annum. For example, if an average of 400 men have a total sickness loss in 1933 of 2,528 days, the sickness absenteeism rate is 6.3 days per man.

Such a calculation could be made even if no individual cards were kept. The head of each department should be authorized to send to a responsible person each day the names of those absent, or he should enter them in a register provided for the purpose. When the absentee returned, the cause of absence should be noted and the dates of absence. It is not enough to consider only such absence for which benefit is claimed under the National Health Insurance; the one-day or two-day absence is often of more significance.

(2) It is often useful to know whether the rate is due to a few people having long periods of absence, or to many people having short periods. A comparison could be made comparing the one-day absenteeism with the long period absence. Calculate the number of one-day absences and the number of spells of 30 days and over and divide each by the number employed. For example, suppose 722 men have 188 spells of one-day absence and 16 spells of more than 29 days, then  $188 \div 722 = 0.26$ , and  $16 \div 722 = 0.02$  will give the average number of spells per man, or to avoid fractions, 26 and 2 respectively per 100 men. If another department has a one-day absence rate of 72 per 100 men, there is a case for investigation. Other periods could be worked out similarly.

*To allow for the long period absence.*—Suppose it is known that a worker will certainly be absent for six months at least: ought he to be taken off the records for statistical purposes, or included as a sick person till he returns or leaves officially? In a small group a few long absences can give an erroneous impression. In spite of this, however, it is better to include all absences however long and make a correction afterwards. For example, in one organization 17 absences of 30 days and over accounted for 1,249 days and represented 40 per cent. of the total loss. If we allow each of them 29 days and exclude the other days, then these 17 would have between them 493 days,

---

\* Some organizations work on the basis of a six-day week, so that a person absent on Friday afternoon, Saturday morning and all day Monday, would be counted as absent two-and-a half days. A few include Sunday, but this is not advisable: we are measuring sickness absenteeism not the actual incidence of sickness. For those who wish to compare the six-day method with the five-and-a half-day, the subtraction of half a day from the figure obtained by the six-day method will give an approximate figure. The range of difference between a five-and-a half-day and six-day week for five years, was from 0.23 days to 0.61 days.

leaving 756 days over ; when we subtract the latter from the total of 2,528 days, there are 1,772 days of short sickness absence, which divided by 400 gives a rate of 4.4 days per person. The result might be expressed thus :—

Gross sickness rate per person .. 6.3 days.  
Rate excluding days over 29 .. .. 4.4 days.

In this case the amount of long sick absence was higher than in other years and therefore its omission reduces the figure considerably. In another group of people the omission of the sickness absenteeism of over 29 days only reduced the rate from 6.8 days to 6.6 days per person.

This calculation according to the period of absence is very useful in comparing one department with another.

(3) An analysis of the kind of sickness can be worked out from the medical diagnoses. The total number of days lost owing to various disabilities must be calculated and the result expressed as a percentage of the total loss. In the table, 5,737 days are lost

TABLE XXVI.—AN EXAMPLE OF AN ANALYSIS OF MEDICAL DIAGNOSES SHOWING THE NUMBER OF DAYS LOST THROUGH SICKNESS ABSENCE (a) EXPRESSED AS A PERCENTAGE OF THE TOTAL LOSS AND (b) EXPRESSED AS THE NUMBER OF DAYS LOST PER PERSON ASCRIBED TO EACH DISEASE GROUP

	No. of Days	(a)	(b)
Colds and Influenza .. ..	1,909	33.3	2.81
Gastric Affections .. ..	744	12.9	1.10
Tonsillitis .. ..	695	12.1	1.02
Gynæcological Conditions .. ..	302	5.3	0.45
Rheumatism .. ..	296	5.2	0.44
Nervous Breakdown .. ..	262	4.6	0.39
Accidents .. ..	242	4.2	0.36
Anæmia .. ..	209	3.6	0.31
Eyes and Ears .. ..	205	3.6	0.30
Skin Affections .. ..	184	3.2	0.27
Tuberculosis .. ..	149	2.6	0.22
Infections .. ..	145	2.5	0.21
Bronchitis .. ..	123	2.1	0.18
Pleurisy and Pneumonia .. ..	107	1.9	0.16
Bronchial Catarrh .. ..	97	1.7	0.14
Teeth .. ..	64	1.1	0.09
Organic Nervous Disease .. ..	4	0.1	0.00
Total .. ..	5,737	—	—
Number Employed .. ..	679	—	—
Average number of working days lost per person.		—	8.45

through sickness, of which 1,909 = 33.3 per cent., are due to colds and influenza, and similarly with the other diagnoses. For comparative purposes, particularly when the numbers are few, the number of days per person per disease is preferable.

In Table XXVI, 1,909 days were lost through colds and influenza : the number employed was 679, so the rate for colds and influenza is  $1,909/679 = 2.8$  days per person. The next important disease group is gastric affections, 744 days being lost by a group consisting of 679, i.e.,  $744/679 = 1.10$ . The complete details are given in Table XXVI.

## APPENDIX II

### THE RECORDING AND ANALYSING OF LABOUR WASTAGE

(1) From the cards find out the number of men and of women who have left during the unit of time selected. Estimate the average number employed during the period, omitting, both from the leavers and the number employed, those appointed for a limited definite time. Divide the number leaving by the average number employed and express the result as a percentage.

*Example*

Period of time	.. ..	1st January – 31st December
Average number employed		Men = 316 ; women = 964
Number leaving	..	Men = 43 ; women = 226
Crude wastage rate	..	$43/316 \times 100 = 13.6$ ; $226/964 \times 100 = 23.4$ .

This is the most important rate to work out.

(2) *Specific rates.*

Age Groups.	Number on Staff.		Number of Leavers.		Wastage rate expressed as a percentage of the number in the group.	
	Men.	Women.	Men.	Women.	Men.	Women.
14 and 15 ..	200	400	10	20	5.0	5.0
16-19 ..	800	9,000	100	200	12.5	22.2
20-29 ..	1,000	1,200	150	300	15.0	25.0
30-39 ..	1,000	600	100	60	10.0	10.0
40+ ..	800	200	20	20	2.5	10.0

(3) *Rate allowing for length of service.*

The cards will contain such details as the following :

	Entered	Left
A.B. .. ..	4.5.1932	6.7.1932
C.D. .. ..	8.9.1932	9.8.1933
E.F. .. ..	9.10.1932	Not left.

This means that A.B. left after two months' service, that C.D. left after 11 months, and that E.F. was still at work 12 months after he had entered the firm. Enter on each card the length of service expressed in weeks.

As we are interested in the first year of service all cards of leavers beyond 12 months will be added to those who have not left. Suppose we have 1,000 entrants to study, and of these 180 leave within the

year, then 820 are there to begin a second year. The leavers are as follows :—50 left under one month, 30 under two and so on. Table XVII on page 45 gives the completed details.

Where the numbers are small a classification into longer periods might be used, but even so it is advisable to work out the leavers during the first month; this rate and that for the next three months might be taken as a measure of the period wastage. It would be particularly useful for comparing one department with another.

(4) It will be found of practical value, where the numbers are sufficiently large, to classify leavers according to their total length of service. When anyone leaves, enter on his card the length of service, thus three months, entered as  $\frac{3}{12}$ , two years and seven months as  $2\frac{7}{12}$ . It would be easy to work out how many left after 20 years' service, how many after two years, two months, etc. This distribution could be compared with the composition according to service of the whole staff on some specific date.

### APPENDIX III

#### SUMMARY OF THE DATA REQUIRED

(1) The total number of working days lost through sickness including accidents, during the year for men and for women. Where it is possible a further classification into departments, e.g. clerical, factory, outdoor, maintenance, sales, drivers, etc., is desirable.

(2) The average number of men and of women employed workers admitted for a definite limited time to be kept separate.

(3) The number of men and of women who left during the year.

(4) The length of service of each person.

(5) In addition where facilities for compilation exist, (a) an analysis of a group of entrants followed up till each has been on the staff for a year or has left, showing how many left with less than a month's service, under two months, and so on, and (b) an analysis of the number of days lost through various disease categories, for example, colds and influenza, accidents, minor gastric disorders, nervous breakdown, operations.

## LIST OF PUBLICATIONS

(The prices given are net: those in brackets include postage.)

*June, 1936*

The following publications relating to the work of the Industrial Health Research Board can be purchased directly from H.M. Stationery Office, at the following addresses: Adastral House, Kingsway, London, W.C.2; 120 George Street, Edinburgh 2; York Street, Manchester 1; 1 St. Andrew's Crescent, Cardiff; 80 Chichester Street, Belfast; or through any Bookseller.\*

## ANNUAL REPORTS

First to March 31st, 1920. 6*d.* (7*d.*); Second to September 30th, 1921 (with Analysis of Published Work). 1*s.* 6*d.* (1*s.* 8*d.*); Third to September 30th, 1922. 2*s.* (2*s.* 1½*d.*); Fourth to December 31st, 1923. 1*s.* 3*d.* (1*s.* 4*d.*); Seventh to December 31st, 1926. 9*d.* (10*d.*); Eighth to December 31st, 1927. 9*d.* (10*d.*); Ninth to December 31st, 1928. 9*d.* (10*d.*); Tenth to December 31st, 1929. 6*d.* (7*d.*); Eleventh to June 30th, 1931. 1*s.* 6*d.* (1*s.* 7½*d.*); Twelfth to June 30th, 1932. 1*s.* 0*d.* (1*s.* 1*d.*); Thirteenth to June 30th, 1933. 9*d.* (10*d.*); Fourteenth to June 30th, 1934. 9*d.* (10*d.*); Fifteenth to June 30th, 1935. 9*d.* (10*d.*).

The following reports are out of print and not included in the list. Nos. 25, 26, 28, 32, 34, 35, 36, 38, 42 and Annual Reports, Nos. 5 and 6.

## REPORTS CLASSIFIED ACCORDING TO SUBJECT MATTER

## (i). Hours of Work, Rest Pauses, etc.

- No. 1.—The Influence of Hours of Work and of Ventilation on Output in Tinplate Manufacture, by H. M. Vernon. (1919.) 6*d.* (7*d.*)
- No. 2.—The Output of Women Workers in relation to Hours of Work in Shell-making, by Ethel E. Osborne. (1919.) 6*d.* (7*d.*)
- No. 5.—Fatigue and Efficiency in the Iron and Steel Industry, by H. M. Vernon. (1920.) 3*s.* (3*s.* 1*d.*)
- No. 6.—The Speed of Adaptation of Output to altered Hours of Work, by H. M. Vernon. (1920.) 1*s.* (1*s.* 1*d.*)
- No. 24.—A Comparison of different Shift Systems in the Glass Trade, by E. Farmer, R. C. Brooks and E. G. Chambers. (1923.) 1*s.* 6*d.* (1*s.* 7*d.*)
- No. 41.—Rest Pauses in Heavy and Moderately Heavy Industrial Work, by H. M. Vernon and T. Bedford, assisted by C. G. Warner. (1927.) 9*d.* (10*d.*)
- No. 47.—Two Studies on Hours of Work. I.—Five-Hour Spells for Women with reference to Rest Pauses, by H. M. Vernon and M. D. Vernon, assisted by I. Lorrain-Smith. II.—The Two-Shift System in certain Factories, by May Smith and M. D. Vernon. (1928.) 1*s.* 3*d.* (1*s.* 4*d.*)

*References, hours of work and rest pauses also occur in Report No. 56.*

## (ii). Dexterity

- No. 63.—Inspection Processes in Industry, by S. Wyatt and J. N. Langdon. (1932.) 1*s.* (1*s.* 2*d.*)
- No. 64.—A Classification of Vocational Tests of Dexterity, by A. E. Weiss Long and T. H. Pear. (1932.) 1*s.* 3*d.* (1*s.* 5*d.*)
- No. 66.—An Experimental Study of Certain Forms of Manual Dexterity, by J. N. Langdon. (1932.) 1*s.* (1*s.* 2*d.*)

\* For overseas agencies see p. 70.

- No. 67.—Manual Dexterity: Effects of Training, by E. M. Henshaw, J. N. Langdon and P. Holman. (1933.) 1s. (1s. 2d.)
- No. 73.—The Acquisition of Skill: Analysis of Learning Curves, by J. M. Blackburn. (1936.)

### (iii). Industrial Accidents

- No. 4.—The Incidence of Industrial Accidents, with special reference to Multiple Accidents, by Major M. Greenwood and Hilda M. Woods. (1919.) 6d. (7d.)
- No. 19.—Two Contributions to the Study of Accident Causation, by Ethel E. Osborne, H. M. Vernon and B. Muscio. (1922.) 1s. 6d. (1s. 7d.)
- No. 55.—A Study of the Personal Qualities in Accident Proneness and Proficiency, by E. Farmer and E. G. Chambers. (1929.) 3s. (3s. 2d.)
- No. 68.—Tests for Accident Proneness, by E. Farmer, E. G. Chambers and F. J. Kirk. (1933.) 9d. (11d.)

*References to industrial accidents also occur in Reports Nos. 39 and 62.*

### (iv). Atmospheric Conditions

- No. 11.—Preliminary Notes on Atmospheric Conditions in Boot and Shoe Factories, by W. D. Hambly and T. Bedford. (1921.) 3s. (3s. 2d.)
- No. 18.—Two Investigations in Potters' Shops, by H. M. Vernon and T. Bedford. (1922.) 2s. 6d. (2s. 8d.)
- No. 20.—A Study of Efficiency in Fine Linen Weaving, by H. C. Weston. (1922.) 1s. 6d. (1s. 7d.)
- No. 21.—Atmospheric Conditions in Cotton Weaving, by S. Wyatt. (1923.) 2s. (2s. 1d.)
- No. 37.—Fan Ventilation in a Humid Weaving Shed. An Experiment carried out for the Departmental Committee on Humidity in Cotton Weaving, by S. Wyatt, assisted by J. A. Fraser and F. G. L. Stock. (1926.) 1s. 9d. (1s. 10d.)
- No. 39.—The Relation of Atmospheric Conditions to the Working Capacity and the Accident Rate of Miners, by H. M. Vernon and T. Bedford, assisted by C. G. Warner. (1927.) 1s. 3d. (1s. 4d.)
- No. 46.—A Physiological Investigation of the Radiant Heating in Various Buildings, by H. M. Vernon and M. D. Vernon, assisted by I. Lorrain-Smith. (1928.) 2s. (2s. 2d.)
- No. 48.—Artificial Humidification in the Cotton Weaving Industry. Its Effect upon the Sickness Rates of Weaving Operatives, by A. Bradford Hill. (1927.) 2s. 6d. (2s. 8d.)
- No. 58.—A Study of Heating and Ventilation in Schools, by H. M. Vernon and T. Bedford, assisted by C. G. Warner. (1930.) 2s. 6d. (2s. 8d.)
- No. 59.—Sickness amongst Operatives in Lancashire Cotton Spinning Mills, by A. Bradford Hill. (1930.) 1s. 6d. (1s. 8d.)
- No. 60.—The Atmospheric Conditions in Pithead Baths, by H. M. Vernon and T. Bedford (assisted by C. G. Warner). (1930.) 9d. (10d.)

*References to atmospheric conditions also occur in Reports Nos. 1, 5, 22, 24, 51.*



**(v). Vision and Lighting**

- The Relation between Illumination and Efficiency in Fine Work (Typesetting by Hand), by H. C. Weston and A. K. Taylor. Joint Report of the Industrial Fatigue Research Board and the Illumination Research Committee. (1926.) 6d. (7d.)
- The Effect of Different Systems of Lighting on Output and Accuracy in Fine Work (Typesetting by Hand), by H. C. Weston and A. K. Taylor. Joint Report of the Industrial Fatigue Research Board and the Illumination Research Committee. (1928.) 4d. (5d.)
- The Relation between Illumination and Industrial Efficiency—The Effect of Size of Work. Joint Report of the Industrial Health Research Board and the Illumination Research Committee. (1935.) 4d. (5d.)
- The Effect of Lighting on Efficiency in Rough Work, by S. Adams. Joint Report of the Industrial Health Research Board and the Illumination Research Committee. (1935.) 4d. (5d.)
- No. 40.—The Effect of Eyestrain on the Output of Linkers in the Hosiery Industry, by H. C. Weston and S. Adams. (1927.) 1s. (1s. 1d.)
- No. 49.—On the Relief of Eyestrain amongst Persons performing very fine Work, by H. C. Weston and S. Adams. (1928.) 1s. 3d. (1s. 4d.)
- No. 57.—Further Experiments on the Use of Special Spectacles in very fine Processes. 1s. 3d. (1s. 4d.)
- References to vision or lighting also occur in Reports Nos. 9, 20, 23.*

**(vi). Vocational Guidance and Selection**

- No. 12.—Vocational Guidance (a Review of the Literature), by B. Muscio. (1921.) 1s. (1s. 1d.)
- No. 16.—Three Studies in Vocational Selection, by B. Muscio and E. Farmer. (1922.) 1s. 6d. (1s. 8d.)
- No. 31.—Performance Tests of Intelligence, by F. Gaw. (1925.) 2s. 6d. (2s. 8d.)
- No. 33.—A Study in Vocational Guidance, by F. Gaw, L. Ramsey, M. Smith and W. Spielman, under the general direction of Cyril Burt. (1926.) 4s. (4s. 2d.)
- No. 43.—A Study of Telegraphists' Cramp, by M. Smith, M. Culpin and E. Farmer. (1927.) 1s. 6d. (1s. 7d.)
- No. 53.—The Use of Performance Tests of Intelligence in Vocational Guidance, by F. M. Earle, M. Milner and Others. (1929.) 2s. 6d. (2s. 8d.)
- No. 55.—A Study of Personal Qualities in Accident Proneness and Proficiency, by E. Farmer and E. G. Chambers. (1929.) 3s. (3s. 2d.)
- No. 61.—The Nervous Temperament, by M. Smith and M. Culpin. (1930.) 1s. (1s. 1d.)
- No. 74.—The Prognostic Value of Some Psychological Tests, by E. Farmer and E. G. Chambers. 9d. (10d.)

*References to vocational selection also occur in Report No. 64.*

**(vii). Time and Movement Study, Methods of Work**

- No. 3.—A Study of Improved Methods in an Iron Foundry, by C. S. Myers. (1919.) 2d. (2½d.)
- No. 7.—Individual Differences in Output in the Cotton Industry, by S. Wyatt. (1920.) 6d. (7d.)
- No. 8.—Some Observations on Bobbin Winding, by S. Wyatt and H. C. Weston. (1920.) 1s. 6d. (1s. 7d.)

- No. 9.—A Study of Output in Silk Weaving during the Winter Months, by P. M. Elton. (1920.) 2s. 6d. (2s. 8d.)
- No. 14.—Time and Motion Study, by E. Farmer. (1921.) 2s. (2s. 1d.)
- No. 15.—Motion Study in Metal Polishing, by E. Farmer. (1921.) 2s. (2s. 1d.)
- No. 17.—An Analysis of the Individual Differences in the Output of Silk-Weavers, by P. M. Elton. (1922.) 1s. 6d. (1s. 7d.)
- No. 22.—Some Studies in the Laundry Trade, by May Smith. (1922.) 2s. 6d. (2s. 8d.)
- No. 23.—Variations in Efficiency in Cotton Weaving, by S. Wyatt. (1923.) 3s. (3s. 2d.)
- No. 30.—An Experimental Investigation into Repetitive Work, by I. Burnett. (1925.) 2s. 6d. (2s. 7d.)
- No. 52.—The Comparative Effects of Variety and Uniformity in Work, by S. Wyatt and J. A. Fraser (assisted by F. G. L. Stock). (1929.) 1s. 3d. (1s. 4d.)
- No. 56.—The Effects of Monotony in Work, by S. Wyatt and J. A. Fraser (assisted by F. G. L. Stock). (1929.) 2s. (2s. 1d.)
- No. 72.—Incentives: Some Experimental Studies, by C. A. Mace. (1935.) 1s. (1s. 2d.)

#### (viii). Posture and Physique

- No. 29.—The Effects of Posture and Rest in Muscular Work, by E. M. Bedale and H. M. Vernon. (1924.) 2s. 6d. (2s. 8d.)
- No. 36.—On the Design of Machinery in relation to the Operator, by L. A. Legros and H. C. Weston. (1926.) 2s. 6d. (2s. 7d.)
- No. 44.—The Physique of Women in Industry (A Contribution towards the Determination of the Optimum Load), by E. P. Cathcart, E. M. Bedale, C. Blair, K. Macleod and E. Weatherhead, with a special section by S. G. Overton. (1927.) 5s. (5s. 2d.)
- No. 50.—The Physiological Cost of the Muscular Movements involved in Barrow Work, by G. P. Crowden. (1928.) 1s. (1s. 1d.)
- No. 71.—The Physique of Man in Industry, by E. P. Cathcart, D. E. R. Hughes, and J. G. Chalmers. (1935.) 1s. 3d. (1s. 5d.)
- References to posture, etc., occur also in Reports Nos. 15 and 16.*

#### (ix). Sickness and Absenteeism

- No. 51.—A Study of Absenteeism in a Group of Ten Collieries, by H. M. Vernon and T. Bedford (assisted by C. G. Warner). (1928.) 2s. 6d. (2s. 8d.)
- No. 54.—An Investigation into the Sickness Experience of Printers (with special reference to the Incidence of Tuberculosis), by A. Bradford Hill. (1929.) 4s. 6d. (4s. 8d.)
- No. 62.—Two Studies of Absenteeism in Coal Mines, by H. M. Vernon and T. Bedford. 1s. (1s. 1d.)
- No. 75.—Sickness Absence and Labour Wastage. Part I, by May Smith and M. A. Leiper. Part II, by Major Greenwood and May Smith.

#### (x). Miscellaneous

- No. 10.—Preliminary Notes on the Boot and Shoe Industry, by J. Loveday and S. H. Munro. (1920.) 1s. 6d. (1s. 7d.)
- No. 13.—A Statistical Study of Labour Turnover in Munition and other Factories, by G. M. Broughton, E. H. Newbold, and E. C. Allen. (1921.) 3s. (3s. 2d.)

- No. 27.—Results of Investigation in certain Industries. (1924.) 6*d.* (7*d.*)  
 No. 45.—Two Contributions to the Experimental Study of the Menstrual Cycle. I.—Its Influence on Mental and Muscular Efficiency, by S. C. M. Sowton and C. S. Myers. II.—Its Relation to General Functional Activity, by E. M. Bedale. (1928.) 2*s.* 6*d.* (2*s.* 8*d.*)  
 No. 65.—Two Studies in the Psychological Effects of Noise. I.—Psychological Experiments on the Effects of Noise, by K. G. Pollock and F. C. Bartlett. II.—The Effect of Noise on the Performance of Weavers, by H. C. Weston and S. Adams. (1932.) 1*s.* 3*d.* (1*s.* 5*d.*)  
 No. 70.—The Performance of Weavers under Varying Conditions of Noise, by H. C. Weston and S. Adams. (1935.) 6*d.* (8*d.*)

## REPORTS CLASSIFIED ACCORDING TO INDUSTRY

NOTE.—Most of the reports in the following list deal exclusively with the industries under which they are placed. In certain instances, however, reports have been prepared on some general subject, but yet make sufficient reference to a particular industry to justify inclusion under the appropriate heading. These reports are distinguished by an \*. Reports which have no application to particular industries are not included in this section.

### A.—MINING INDUSTRY

- No. 39.—The Relation of Atmospheric Conditions to the Working Capacity and Accident Rates of Miners. 1*s.* 3*d.* (1*s.* 4*d.*)  
 No. 51.—A Study of Absenteeism in a Group of Ten Collieries. 2*s.* 6*d.* (2*s.* 8*d.*)  
 No. 60.—The Atmospheric Conditions in Pithead Baths. 9*d.* (10*d.*)  
 No. 62.—Two Studies of Absenteeism in Coal Mines. 1*s.* (1*s.* 1*d.*)

### B.—METAL AND ENGINEERING INDUSTRIES

- No. 1.—The Influence of Hours of Work and of Ventilation on Output in Tinplate Manufacture. 6*d.* (7*d.*)  
 No. 2.—The Output of Women Workers in Relation to Hours of Work in Shell-making. 6*d.* (7*d.*)  
 No. 3.—A Study of Improved Methods in an Iron Foundry. 2*d.* (2½*d.*)  
 No. 5.—Fatigue and Efficiency in the Iron and Steel Industry. 3*s.* (3*s.* 1*d.*)  
 \*No. 6.—The Speed of Adaptation to Altered Hours of Work. 1*s.* (1*s.* 1*d.*)  
 No. 15.—Motion Study in Metal Polishing. 2*s.* (2*s.* 1*d.*)

### C.—TEXTILE INDUSTRIES

- No. 7.—Individual Differences in Output in the Cotton Industry. 6*d.* (7*d.*)  
 No. 8.—Some Observations on Bobbin Winding. 1*s.* 6*d.* (1*s.* 7*d.*)  
 No. 9.—A Study of Output in Silk Weaving during the Winter Months. 2*s.* 6*d.* (2*s.* 8*d.*)  
 No. 17.—An Analysis of the Individual Differences in the Output of Silk-Weavers. 1*s.* 6*d.* (1*s.* 7*d.*)  
 No. 20.—A Study of Efficiency in Fine Linen Weaving. 1*s.* 6*d.* (1*s.* 7*d.*)  
 No. 21.—Atmospheric Conditions in Cotton Weaving. 2*s.* (2*s.* 1*d.*)  
 No. 23.—Variations in Efficiency in Cotton Weaving. 3*s.* (3*s.* 2*d.*)  
 No. 37.—Fan Ventilation in a Weaving Shed. 1*s.* 9*d.* (1*s.* 10*d.*)  
 No. 40.—The Effect of Eyestrain on the Output of Linkers in the Hosiery Industry. 1*s.* (1*s.* 1*d.*)

- No. 48.—Artificial Humidification in the Cotton Weaving Industry. Its Effect upon the Sickness Rates of Weaving Operatives. 2s. 6d. (2s. 8d.)
- \*No. 49.—On the Relief of Eyestrain amongst Persons Performing very Fine Work. 1s. 3d. (1s. 4d.)
- No. 59.—Sickness amongst Operatives in Lancashire Cotton Spinning Mills. 1s. 6d. (1s. 8d.)
- No. 70.—The Performance of Weavers under Varying Conditions of Noise. 6d. (8d.)

#### D.—BOOT AND SHOE INDUSTRY

- No. 10.—Preliminary Notes on the Boot and Shoe Industry. 1s. 6d. (1s. 7d.)
- No. 11.—Preliminary Notes on Atmospheric Conditions in Boot and Shoe Factories. 3s. (3s. 8d.)

#### E.—POTTERY INDUSTRY

- No. 18.—Two Investigations in Potters' Shops. 2s. 6d. (2s. 8d.)

#### F.—LAUNDRY INDUSTRY

- No. 22.—Some Studies in the Laundry Trade. 2s. 6d. (2s. 8d.)

#### G.—GLASS INDUSTRY

- No. 24.—A Comparison of Different Shift Systems in the Glass Trade. 1s. 6d. (1s. 7d.)

#### H.—LETTERPRESS PRINTING INDUSTRY

- \*No. 16.—Three Studies in Vocational Selection. 1s. 6d. (1s. 7d.)
- \*No. 26.—On the Extent and Effects of Variety in Repetitive Work. The Relation between Illumination and Efficiency in Fine Work (Typesetting by Hand). The Effects of Different Systems of Lighting on Output and Accuracy in Fine Work (Typesetting by Hand). 1s. 6d. (1s. 7d.)
- No. 54.—An Investigation into the Sickness Experience of Printers (with special reference to the Incidence of Tuberculosis). 4s. 6d. (4s. 8d.)

#### J.—LIGHT REPETITION WORK

- No. 14.—Time and Motion Study. 2s. (2s. 2d.)
- No. 25.—Two Contributions to the Study of Rest Pauses in Industry. 1s. 6d. (1s. 7d.)
- No. 26.—On the Extent and Effects of Variety in Repetitive Work. 1s. 6d. (1s. 7d.)
- No. 30.—An Experimental Investigation into Repetitive Work. 2s. 6d. (2s. 7d.)
- No. 32.—Studies in Repetitive Work with special reference to Rest Pauses. 2s. 6d. (2s. 7d.)
- No. 52.—The Comparative Effects of Variety and Uniformity in Work. 1s. 3d. (1s. 4d.)

#### K.—MUSCULAR WORK

- No. 29.—The Effects of Posture and Rest in Muscular Work. 2s. 6d. (2s. 7d.)
- No. 41.—Rest Pauses in Heavy and Moderately Heavy Industrial Work. 9d. (10d.)

- No. 44.—The Physique of Women in Industry. (A Contribution towards the Determination of the Optimum Load.) 5s. (5s. 2d.)
- No. 50.—The Physiological Cost of the Muscular Movements involved in Barrow Work. 1s. (1s. 1d.)
- No. 71.—The Physique of Man in Industry. 1s. 3d. (1s. 5d.)

SPECIAL REPORTS OF THE MEDICAL RESEARCH COUNCIL ON  
SUBJECTS RELATED TO THE BOARD'S WORK

*Alcohol*

- No. 56.—The Effects of Alcohol and some other Drugs during Normal and Fatigued Conditions. By W. McDougall and May Smith. (1920.) 1s. (1s. 1d.)

*Miners' Diseases, etc.*

- No. 89.—Report on Miners' "Beat Knee," "Beat Hand," and "Beat Elbow." By E. L. Collis and T. L. Llewellyn. (1924.) 1s. 6d. (1s. 7d.)
- No. 80.—Second Report of the Miners' Nystagmus Committee. (1923.) 9d. (10d.)
- No. 176.—Third Report of the Miners' Nystagmus Committee. (1932.) 9d. (10d.)

*Nutrition*

- No. 87.—Report on the Nutrition of Miners and their Families. By the Committee upon Quantitative Problems in Human Nutrition. (1924.) 1s. 3d. (1s. 4d.)
- No. 151.—A Study in Nutrition. An Inquiry into the Diet of 154 Families of St. Andrews. By E. P. Cathcart and A. M. T. Murray, assisted by M. Shanks. (1931.) 1s. (1s. 2d.)
- No. 165.—Studies in Nutrition. An Inquiry into the Diet of Families in Cardiff and Reading. By E. P. Cathcart and A. M. T. Murray, assisted by M. Shanks. (1932.) 6d. (7d.)

*Dust*

- No. 199.—Physical Methods for the Estimation of the Dust Hazards in Industry. By H. L. Green and H. H. Watson. 1935. 1s. (1s. 2d.)

OTHER PUBLICATIONS IN 1935-36

- BEDFORD, T.: "The Effective Radiating Surface of the Human Body." *J. Hyg. Camb.*, 1935, 35, 303.
- BEDFORD, T.: "Skin Temperature in Relation to the Warmth of the Environment." *J. Hyg. Camb.*, 1935, 35, 307.
- HILL, A. BRADFORD: "The Recent Trend in England and Wales of Mortality from Phthisis at Young Adult Ages." (In the Press).
- WESTON, H. C. and GUNTON, H. C.: "Illumination and Visibility of Work as Factors in Scientific Management." *Proc. Sixth International Congress for Scientific Management*, London, 1935.
- WESTON, H. C.: "The Productive Value of Good Factory Lighting." British Industries. (Journ. of the Federation of British Industries), March, 1936, Vol. XIX, No. 3.

## OVERSEAS AGENCIES OF H.M. STATIONERY OFFICE

[A selection of Government publications may usually be inspected at the offices of His Majesty's Trade Commissioners.]

**IRISH FREE STATE.**—Messrs. Eason & Son, Ltd., 40/41, Lower O'Connell Street, Dublin.

**CANADA.**—Imperial News Company, Ltd., 235, Fort Street, Winnipeg; 818, Richards Street, Vancouver; 106, Jurvis Street, Toronto; Wm. Dawson Subscription Service, Ltd., 70, King Street East, Toronto; Benjamin News Company, 975, St. Antoine Street, Montreal.

**AUSTRALIA.**—Messrs. McGill's News Agency, 183-5, Elizabeth Street, Melbourne, Victoria; Messrs. Angus & Robertson, Ltd., 89, Castlereagh Street, Sydney, New South Wales; Messrs. Albert & Son, Ltd., 180, Murray Street, Perth, Western Australia; Messrs. Oldham Beddome & Meredith [1932] Pty., Ltd., 36, Elizabeth Street, Hobart, Tasmania.

**NEW ZEALAND.**—Messrs. Whitcombe & Tombs, Ltd., Auckland, Christchurch, Dunedin and Wellington.

**SOUTH AFRICA.**—Central News Agency, Ltd., Cape Town, P.O. Box 9; Johannesburg, P.O. Box 1033; Durban, P.O. Box 938; Port Elizabeth, P.O. Box 356; Pretoria.

**INDIA.**—Messrs. Thacker & Co., Ltd., Bombay; Messrs. Higginbothams, Ltd., Madras and Bangalore; The Book Company, Ltd., College Square, Calcutta.

**GOLD COAST.**—The Methodist Book Depot, P.O. Box 100, Cape Coast. Branches at Accra, Kumasi, Sekondi and Swedru.

**DENMARK.**—A. Busck, Kjøbmagergade 49, Copenhagen.

**FINLAND.**—Akademiska Bokhandeln, Helsingfors.

**FRANCE.**—Messageries Dawson, 4, Rue du Faubourg-Poissonnière, Paris (Xe).

**GERMANY.**—Messrs. A. Asher & Co., Behrenstrasse 55-57, Berlin, W.8.

**HOLLAND.**—N. V. Martinus Nijhoff' Boekhandel, Lange Voorhout 9, 's-Gravenhage.

**JAPAN.**—Maruzen Co., Ltd., 6, Nihonbashi, Tori-Nichome, Tokyo.

**NORWAY.**—Cammarmeyers Boghandel, Karl Johans Gate 41-43, Oslo.

**SWEDEN.**—A-B, C.E. Fritzes Kungl. Hofbokhandel, Fredsgatan 2, Stockholm.

**U.S.A.**—The British Library of Information, 270, Madison Avenue, New York.