REPORTS AND ENQUIRIES

Statistics of Industrial Accidents in Italian Industry and Agriculture in 1924

Comprehensive statistics of accidents on the basis of the experience of the compulsory insurance systems have recently been published for the year 1924 by the General Department of Labour, Social Welfare, and Credit in the Italian Ministry of National Economy.[1]

Prior to 1924 statistics of industrial accidents had only been published occasionally, the compilation having met with two main difficulties : insufficiency of data on the one hand and lack of financial means on the other. [2]

These difficulties, the report states, have not disappeared. When, however, by Decree of 23 March 1922 the Accident Register Office (*Casellario Centrale Infortuni*) was founded, which is entrusted with the task of collecting the individual forms regarding accidents entailing permanent incapacity, the problem of accident statistics again came to the fore, as statistics could now be based partly on information compiled according to uniform methods and criteria.[3] Data on permanently disabling accidents could now be derived from individual forms which can be readily sorted and classified according to the objects of accident statistics.

The Ministry has considered the possibility of completing the data in the possession of the Register Office by data on fatal cases and cases of temporary incapacity.

For fatal cases a circular of 8 June 1924, completed by one of 31 March 1925, requires such casualties to be registered by means of individual forms. For cases of temporary incapacity, the great majority of all cases, the Ministry has examined whether their registration could be effected by the aid of copies of the accident

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[1] MINISTERO DELL' ECONOMIA NAZIONALE. DIREZIONE GENERALE DEL LAVORO, DELLA PREVIDENZA E DEL CREDITO : *Statistica degli Infortuni nelle Industrie e nella Agricoltura — Anno 1924*. Rome, 1928. 257 pp.

[2] The first official statistics of accidents go back to 1901-1902. In 1909 some notes on accidents in industry were published for the years 1903-1908, and in 1911 statistics on accidents of seamen for the years 1906-1908 followed. Both these statistics were compiled on the basis of quarterly lists submitted by the insurance institutions, and not on the basis of the individual forms, as was partly done for 1901-1902, the latter being too elaborate and difficult to classify. In 1922 some statistical information on the financial results of agricultural insurance was published, and finally in 1923 some statistics on industrial accidents, which were compiled from the tables filled in by the accident insurance institutions.

[3] At the request of the insurance funds or *ex officio* the Register Office supplies information on permanently disabling accidents, in order to avoid duplication in the liquidation of claims to compensation.

registers furnished by the funds or by means of individual forms. Both solutions appear, at least for the present, impracticable, considering the great amount of work that would be involved for the insurance funds, many of which do not collect the statistical data at their disposal in a systematic and regular way.

In order to render the task less onerous, the Ministry, by a circular of 25 January 1927, requested the funds to supply only collective information on temporarily disabling accidents, with specification of the more important criteria. Consequently the more detailed tabulation of fatal and permanently disabling accidents made possible by the system of detailed forms could not be extended to cases of temporary disability, the statistics of which are therefore confined to the main classifications—by industry, cause, district, month, and duration.

LEGISLATION

Industry

The law on compulsory accident insurance, which was codified by an Act of 1904, applies generally to mining, quarrying, building and allied occupations; undertakings connected with the production of gas and electricity, and the installation, etc., of electrical conductors; the manufacture and use of explosives; arsenals and shipyards, telephone undertakings, etc. Undertakings connected with railway and other transport, loading and unloading, and the construction and repair of ships, bridges, roads, railways, etc., are covered if they employ more than five workers. Manufacturing undertakings are included on the same condition, if machinery is used which is not driven directly by the worker using it. Finally, workers minding machinery driven by mechanical power, or engines, are included if the machinery is used for industrial or agricultural purposes.

For the purpose of the Act the term "worker" includes any persons employed permanently or casually, at time or piece rates, on work not carried on in their own home; apprentices; and any persons supervising the work of others, provided that their regular earnings are not more than 20 lire a day, and that they are paid at intervals of not more than one month. Persons engaged in agriculture are included if employed in minding machinery. Insurance is compulsory also for workers employed by State and municipal undertakings of the kinds enumerated.

Five types of insurance institution may carry on compulsory insurance: the National Accident Insurance Fund, established in 1883, in which State or municipal undertakings, or those under concession or lease from the State, municipality, etc., must insure; the State Railway Accident Fund; authorised private societies and companies; employers' accident funds; and trade associations for mutual insurance formed for the purpose. The Government may declare the formation of a mutual insurance association in any particular industry compulsory.

As regards the risks covered by compulsory insurance, the employer must insure his workers against "all cases of death or bodily injury arising from accident due to violent causes in connection with employment if the consequences last more than five days".

The statistics for 1924 include, however, all cases of temporary incapacity reported, not excepting those lasting less than six days. As the report points out, the returns of these cases are not complete, as the worker has less interest in notifying an accident which is not compensable. Comparability of statistics of cases of temporary incapacity for different districts and industries is thus impaired, as this cause of error is not of equal intensity in all industries. The returns of temporary cases are more defective in outdoor occupations, where the worker is often isolated or far away from medical aid ; in indoor occupations, on the contrary, information can be obtained directly from the head of the undertaking or the doctor in attendance on the case. Thus, for instance, in forestry accidents entailing incapacity of less than six days form 5.6 per cent. of all temporary cases only, while in engineering they amount to no less than 30.6 per cent. of all cases. This fact also accounts to a large extent for the apparently lower proportion of fatal cases in the industrial districts of the North, as compared with the agricultural southern districts. In the South outdoor occupations play a more important part ; the returns of temporarily disabling accidents are consequently more defective, and the percentages of fatal cases appear relatively higher, while in reality fatal cases might be expected to be more frequent in the industrial districts. The latter assumption is in fact confirmed by comparing the number of fatal industrial accidents with that of all deaths by accident. Taking the latter as equal to 100, the percentage of fatal industrial accidents is indeed far greater in industrial than in agricultural districts, ranging from 30.6 per cent. in Liguria to 5.0 per cent. in the Basilicata district.

Agriculture

Compulsory accident insurance in agriculture is of more recent origin. It was introduced during the war by a Legislative Decree of 23 August 1917 (amended by an Act of 24 March 1921 and a Legislative Decree of 11 February 1923), and came into force on 4 March 1919. Insurance is compulsory for agricultural and forestry undertakings. [1]

Auxiliary work such as irrigation, stockbreeding, and the transport, storage, and working up of the products of agriculture, stock-keeping and forestry is included.

The first experiences with agricultural insurance were made in an unfavourable political atmosphere. The dispersion of the insured

[1] Except undertakings for the felling and thinning of trees in forests, the transport of logs to storage places on rivers, etc., and for dumping logs from the storage places into rivers and streams, as well as the regulation of mountain rivers. These are covered by the industrial insurance scheme if they employ more than five workers.

population and the workers' lack of experience and education are still obstacles to its general and uniform application. A doctor is not always called in, and slighter injuries are still often treated by empirical remedies. The registration of temporarily disabling accidents in agriculture is therefore less regular than that of fatal and serious cases, as evidently the more severe the accident, the less probable is negligence on the part of the worker to report it. As this factor does not act with equal force in all districts, the differences in the proportions of temporarily disabling accidents reported are greater than the differences in the proportions of fatal and permanently disabling accidents reported. In addition, however, workers and doctors are not yet everywhere sufficiently acquainted with the law, as appears from the great differences between districts, even for fatal and serious cases, for which medical aid or treatment must have been called in.

For these reasons a considerable number of accidents still escape registration. Generally the records are more complete where prior to the introduction of compulsory insurance voluntary insurance had already gained ground.

The regulations for agricultural insurance differ considerably from those for industrial insurance, as follows :

(*a*) The age limits for admission to insurance are 12 and 65 years for agriculture, no limits being fixed in industrial accident insurance.

(*b*) In agricultural insurance compensation for temporarily disabling accidents is confined to wage earners ; landowners, tenants, share farmers, etc., are excluded from this form of benefit.

(*c*) Agricultural insurance funds pay no benefits for certain accidents for which compensation can be obtained under the national insurance system ; in fact, all cases of temporary incapacity lasting less than eleven days are excluded from insurance, and in general payment of benefits begins on the eleventh day after the accident only. Under the industrial insurance system, compensation is paid for accidents lasting at least six days, and is then due from the first day of incapacity.

As regards permanently disabling accidents, compensation in agriculture is only granted for a reduction of working capacity of more than 15 per cent.

For these reasons and in view of the defectiveness of the data on agricultural accidents, comparison of the data for agriculture and for industry is not feasible.

Accidents in Industry

The Measurement of Risk

Frequency Rates.

The calculation of accident rates is greatly hampered by the insufficiency of data with regard to the exposure to risk. It has not yet been possible to calculate man-hours. The insurance funds supply the Ministry of National Economy with information only

on the number of workers insured at the beginning and at the end of the year and on the total amount of wages paid.

An attempt to calculate hours worked and man-years by dividing the total amount of wages by the average wage of the injured as ascertained by the National Insurance Fund, is objected to in the report on the ground that the average wage of the injured does not necessarily coincide with the average wage of all insured persons, and that for two reasons: the risk varies (1) according to the age and sex of the worker, and (2) according to the status and ability of the worker. Further, there is said to be a tendency on the part of the employers to understate the amount of wages in their applications for insurance.

The calculation of the average number of workers insured during the year also meets with difficulties. For the National Accident Insurance Fund the average can be directly computed on the basis of the duration of the individual insurance policies. For the State Railways, the number employed can be fairly accurately determined from the payrolls of the permanent staff and the days of presence of casual workers. The average number of persons insured by the other insurance funds is calculated by taking the average of the numbers of workers insured, as ascertained at the beginning and at the end of the year. This last method may involve two kinds of error: the average may be too low, as no account is taken of seasonal fluctuations between the two dates, at both of which employment tends to be low; and it may be too high, owing to the system of collective policies, which permits a manufacturer who is a permanent member of the fund to insure workers who, at the time of application, are not actually working. It may be assumed that these errors partly compensate each other.

Frequency rates have been calculated only for all accidents, and have not been further employed. In the following table the average number of workers insured, the number of accidents, and the rates per 100 workers insured in 1924 are given separately for the different funds.

Insurance agency	Average number of workers insured	Accidents	
		Number	Per 100 workers insured
National Fund	908,222	159,348	17.6
Employers' funds, insurance societies, trade associations	1,836,808	246,207	13.4
State Railways	158,015	24,599	15.5
Total	2,903,045	430,154	14.8

For the reason stated, the rates of the National Fund and of the State Railways are more reliable than the rates for the other funds.

Accident Risk by Age and Sex.

While it is not conclusively proved that age has an influence on the frequency of accidents, the relation between age and severity of accidents has been established by various statistics. Unfortunately, no data on the age distribution of the insured workers are available. The report has therefore, on the one hand, utilised the age distribution of the Census population of 1911, and, on the other, has calculated the average age at the time of occurrence of the accident.

The average age at the time of occurrence of the accident was found to be as follows :

Sex	Permanent cases	Fatal cases
Men	35.4	38.0
Women	26.7	20.7
Total	34.7	37.5

These figures again confirm the thesis that the severity of accidents increases with advancing age, at any rate for men ; and that therefore the probability that an accident will lead to death also increases with age. On the other hand, a comparison of the percentage distribution of the male occupied Census population of 1911 with that of permanently disabling and fatal accidents shows the following results :

Age group (years)	Occupied Census population (male)	Accidents	
		Fatal*	Permanently disabling
Less than 21	25.2	12.60	13.46
21–31	23.5	24.06	30.19
31–46	25.8	32.97	33.92
46 and over	25.5	30.37	22.43
Total	100.0	100.00	100.00

It may be concluded that the risk of fatal accident and the risk of permanent incapacity increase with age up to 46 years and then diminish, both the rise and the fall being more pronounced for permanently disabling than for fatal accidents.

Consequences of Accidents.

The report distinguishes accidents according to their consequences i.e. according to whether they resulted in temporary incapacity, permanent incapacity, or death. Permanently disabling accidents are classified by the nature and location of the injury, and by the degree of permanent incapacity ; temporarily disabling accidents are classified by the duration of incapacity.

In view of the lack of precision in the data on exposure to risk, no severity rates are calculated. On the basis of the above classifications, however, an attempt was made to calculate the average case severity of all accidents by attaching certain weights to permanent and fatal cases, and computing the total number of days lost in consequence of accidents.

The report disapproves of the Swedish method of computing the total number of days lost by the formula [1]

$$\frac{300}{365}\,T + 75\,P + 7{,}500\,M.$$

The average number of working years lost on account of permanent incapacity cannot, the report argues, be assumed equal to the average number of days lost on account of death by accident, as the average age of the injured at the time of accident is lower for permanent cases (34.7 years) than for fatal cases (37.5 years).

Different weights for fatal and permanent cases are therefore calculated on the basis of the life tables and mortality rates for 1911. In order to arrive at an average weight, the working life expectancy—i.e. the interval between the average age at the time of accident and the average age at which the worker retires by reason of old age—must be determined. In order to determine the latter age limit account was taken of the provisions of the law on State employees' pensions, which fixes limits of 60 and 65 years for more strenuous and less strenuous work respectively, and to the law on invalidity and old-age insu rance, which grants pensions at the ages of 65 and 60 for compulsory and voluntary insurance respectively. In view of the fact revealed by a more detailed classification of accidents that a considerable number of workers are injured at ages over 65, the old-age limit has been fixed at 65 years.

By applying the death rates and life expectancy of the male population of 1911 the average working life expectancy between 34½ and 65 years for permanent cases was found to be 26.895 years, or 8,068 working days ; for fatal cases the average working life expectancy between 37½ and 65 years was found to be 24.395 years, or 7,318 working days. These figures are rounded off to 8,000 and 7,300 days. The average severity of accidents per case would therefore be calculated by the following formula :

$$\frac{\frac{300}{365}\,T + 80\,P + 7{,}300\,M}{N},$$

where T represents the total number of days lost by temporary incapacity ; P, the sum of the percentage degrees of the cases of permanent incapacity, total permanent incapacity being taken equal to 100 ; M, the number of fatal cases ; and N, the total number of accidents.

[1] Cf. *International Labour Review*, Vol. VIII, No. 3, Sept. 1923, p. 349.

These figures are computed in the following way (see table I). As regards temporary incapacity, cases lasting less than six days are altogether omitted as being imperfectly recorded. Cases of tem-

TABLE I. INDUSTRY. ACCIDENTS ENTAILING TEMPORARY INCAPACITY OF MORE THAN FIVE DAYS, PERMANENT INCAPACITY, OR DEATH, AND ESTIMATED SEVERITY PER CASE OF ALL ACCIDENTS, BY INDUSTRIES

Industry	Temporarily disabling accidents			Permanently disabling accidents			Fatal accidents	Estimated severity per accident (days)
	Number	Days lost		Number	Percentage degrees of incapacity			
		Total	Per case		Total	Per case		
Agriculture where machinery is employed	14,295	243,784	17.1	271	5,325	19.65	19	52.5
Forestry [1]	6,168	121,028	19.6	382	6,038	15.81	57	151.1
Food	16,931	290,326	17.1	1,132	16,640	14.70	61	111.2
Chemicals	8,385	136,913	16.3	796	10,857	13.64	92	178.2
Paper	3,626	61,036	16.8	242	3,866	15.98	13	117.1
Printing and bookbinding	2,281	42,775	18.8	192	2,658	13.84	6	117.6
Leather and skins	2,640	42,647	16.2	146	1,820	12.47	8	85.6
Rubber	941	15,817	16.8	168	1,939	11.54	3	170.9
Building	34,581	631,249	18.3	3,352	46,698	13.93	323	172.9
Hydraulic construction	5,802	98,353	17.0	224	4,109	18.34	30	103.8
Road, etc., construction	10,967	198,084	18.1	1,084	16,496	15.22	98	180.9
Electricity (generation, transformation, etc.)	5,980	103,444	17.3	214	3,188	14.90	56	119.8
Public services, gas, water	2,665	42,109	15.8	27	485	17.96	4	38.1
Ice manufacture	441	8,446	19.2	54	585	10.83	1	123.1
Working of building timber	3,960	68,043	17.2	231	2,931	12.69	23	108.8
Woodworking in general	9,879	181,737	18.4	1,225	15,347	12.53	21	137.6
Straw, horsehair, twigs, rushes, etc.	469	7,188	15.3	58	692	11.93	—	116.3
Various metal working	10,321	168,590	16.4	1,986	20,869	10.51	23	160.3
Engineering	46,253	711,355	15.4	4,207	43,275	10.29	69	90.1
Iron and steel (foundries, steel furnaces, forges)	23,826	393,808	16.5	1,636	17,544	10.72	71	87.9
Mining and quarrying	18,771	327,008	17.4	1,096	17,456	15.93	179	148.3
Mineral industry in general	620	11,721	18.9	378	5,131	13.57	11	496.0
Pottery, bricks, cement, etc.	14,281	235,199	16.5	738	10,871	14.73	67	102.9
Glass	5,279	75,678	14.3	175	1,914	10.94	4	44.8
Textiles	24,147	368,742	15.3	1,516	19,940	13.15	48	87.5
Clothing	5,963	92,160	15.5	147	1,506	10.24	4	36.9
Transport by land in general	36,090	583,875	16.2	1,808	24,984	13.82	231	109.2
Water transport	3,749	80,815	21.6	303	3,628	11.97	70	210.5
Warehouses in general	1,272	21,110	16.6	165	1,949	11.81	13	184.9
Others	11,399	193,044	16.9	162	2,329	14.38	10	36.1
All industries	331,982	5,556,078	16.7	24,115	311,070	12.90	1,615	115.3

[1] Tree felling, regularisation of mountain rivers.

porary incapacity are then classified by duration into six groups. [1] The average duration for each group is determined by graphical interpolation and not by taking the arithmetic mean of the limits for the group, as the frequency of accidents decreases with increasing duration of incapacity. The number of cases found for each group is then multiplied by the average case-duration of the group, and the sum of the products for all groups is the total number of days lost by temporary incapacity (T), which is 5,556,078 days.

The average duration of temporary incapacity per case is obtained by dividing the above sum by the total number of cases of temporary incapacity (5,556,078 divided by 331,982) and is equal to 16.7 days for all industries.

Cases entailing permanent incapacity are classified by degree of incapacity, the degrees being summarised into seven groups. For computing the total sum of percentages (percentage degrees) as well as the average degree for each group, however, a detailed classification by single degrees is utilised. The total sum of percentages (P) is obtained by multiplying the number of cases of a specified degree of permanent incapacity by that degree [2], and amounts for all industries to 311,070 per cent.

The average degree of permanent incapacity per case is then found by dividing this sum by the total number of cases (311,070 divided by 24,115) and is equal to 12.9.

The total number of fatal cases is 1,615.

For calculating the average case-severity, the number of days lost by temporary incapacity is then multiplied by $\frac{300}{365}$; the total sum of percentages of cases of permanent incapacity is multiplied by $\frac{8,000}{100}$; and the number of fatal cases by 7,300. The sum of the products thus obtained is then divided by the total number of accidents. The formula thus reads as follows:

$$\frac{\frac{300}{365} \times 5,556,078 + 80 \times 311,070 + 7,300 \times 1,615}{357,712}.$$

The average case severity is therefore 115.3.

The Distribution of Risk

Classification by Industries.

As no sufficient data are available on the distribution by industry of the persons exposed to risk, the value of the various other measures

[1] The groups are as follows: 6-10 days, 11-20 days, 21-30 days, 31-60 days, 61-90 days, and over 90 days.

[2] The percentages of the cases of unknown degree are estimated by taking the average degree of all unknown cases to be the average degree of all other cases, rounded off slightly in excess.

employed is considerably impaired. This is particularly the case with the proportional distribution of cases by industries, which depends in very large measure on the distribution by industry of the persons exposed to risk. Moreover, the proportional distribution of temporary, permanent, and fatal cases within each industry depends largely on the age and sex distribution within the industry. As noted above, the average age at the time of accident occurrence is lower for permanent than for fatal cases for men, but not for women, and the age curve of fatal and permanent cases is convex, culminating in the age group 31-46.

The latter considerations may also be assumed to hold good with regard to comparison of the average duration of temporary incapacity, the average degree of permanent incapacity, and the average severity of all cases, in different industries: a greater proportion of older workers must evidently tend to raise the average case severity.

The figures given in tables I and II ought therefore to be considered with reservations.

It will be noted that the various measures of severity, the percentages of fatal and permanently disabling accidents, the average duration of temporary incapacity, and the average degree of permanent incapacity, do not vary in unison ; a high general case severity in an industry may be due to high frequency of fatal accidents or of permanently disabling accidents, which may or may not coincide with long average duration of temporary incapacity or a high degree of permanent incapacity.

Thus by far the greatest average severity is found in the mineral industry (496.0). With regard to the proportion of fatal cases (10.6 per mille) the industry ranges second only ; the average duration of temporary incapacity (18.9) is exceeded by that of three other industries, while the average degree of permanent incapacity is not much above the general level (13.57). The great loss of working days appears therefore to be mainly due to the enormous proportion of cases of permanent incapacity (364.9). It must, however, be noted that absolute figures for the mineral industry are relatively small.

The next highest general case severity is found in water transport (210.5), which has by far the highest proportion of fatal cases (13.0) but a proportion of cases of permanent incapacity only slightly above the average for all industries (56.3). While the average case duration of temporary incapacity attains its maximum in water transport (21.6), the average degree of permanent incapacity is below the general average (11.97).

The minimum loss of working days per accident is recorded for the clothing industry which—together with the glass industry—has the lowest proportion of fatal cases (0.6) and the lowest average degree of permanent incapacity (10.24).

TABLE II. INDUSTRY. NUMBER OF ACCIDENTS IN DIFFERENT INDUSTRIES ENTAILING TEMPORARY INCAPACITY, PERMANENT INCAPACITY, OR DEATH, AND PROPORTIONAL DISTRIBUTION BY CONSEQUENCES OF ALL ACCIDENTS (= 1,000) IN EACH INDUSTRY

Industry	Number of accidents entailing				Proportion per 1,000 accidents in each industry of accidents entailing		
	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death
Agriculture where machinery is employed	17,370	271	19	17,660	983.6	15.3	1.1
Forestry	6,538	382	57	6,977	937.0	54.8	8.2
Food	19,398	1,132	61	20,591	942.0	55.0	3.0
Chemicals	9,629	796	92	10,517	915.6	75.7	8.7
Paper	4,790	242	13	5,045	949.4	48.0	2.6
Printing and bookbinding	2,799	192	6	2,997	933.9	64.1	2.0
Leather and skins	3,038	146	8	3,192	951.8	45.7	2.5
Rubber	1,290	168	3	1,461	882.9	115.0	2.1
Building	38,471	3,352	323	42,146	912.8	79.5	7.7
Hydraulic construction	6,275	224	30	6,529	961.1	34.3	4.6
Road, etc., construction	11,807	1,084	98	12,989	909.0	83.5	7.5
Electricity (generation, transformation, etc.)	6,959	214	56	7,229	962.7	29.6	7.7
Public services, gas, water	3,416	27	4	3,447	991.0	7.8	1.2
Ice manufacture	487	54	1	542	898.6	99.6	1.8
Working of building timber	4,574	231	23	4,828	947.4	47.8	4.8
Woodworking in general	11,070	1,225	21	12,316	898.8	99.5	1.7
Straw, horsehair, twigs, rushes, cork, etc.	547	58	—	605	904.1	95.9	—
Various metal working	13,732	1,986	23	15,741	872.3	126.2	1.5
Engineering	66,687	4,207	69	70,963	939.7	59.3	1.0
Iron and steel (foundries, steel furnaces, forges, etc.)	31,504	1,636	71	33,211	948.6	49.3	2.1
Mining and quarrying	20,467	1,096	179	21,742	941.4	50.4	8.2
Mineral industry in general	647	378	11	1,036	624.5	364.9	10.6
Pottery, bricks, cement, etc.	15,396	738	67	16,201	950.3	45.6	4.1
Glass	6,002	175	4	6,181	971.1	28.3	0.6
Textiles	28,815	1,516	48	30,379	948.5	49.9	1.6
Clothing	6,890	147	4	7,041	978.5	20.9	0.6
Transport by land in general	45,665	1,808	231	47,704	957.3	37.9	4.8
Water transport	5,006	303	70	5,379	930.7	56.3	13.0
Warehouses	1,463	165	13	1,641	891.6	100.5	7.9
Others	13,692	162	10	13,864	987.6	11.7	0.7
All industries	404,424	24,115	1,615	430,154	940.1	56.1	3.8

Among the other industries a high average case severity is found in warehousing, road construction, the chemical industry, various metal working, building, rubber, forestry, mining and quarrying, etc. Instances of industries with a low average case severity are public services, the glass industry, agricultural work where machinery is employed, iron and steel, engineering, leather and skins, and the textile industry.

If the average duration of temporary incapacity and the average degree of permanent incapacity are separately considered by industries, the order found is not the same as for the average case severity of accidents in general, nor is the order of industries the same for the duration of temporary incapacity and the degree of permanent incapacity.

The five industries with highest and the five with lowest average duration of temporary incapacity per case are the following :

Industries with highest average duration of temporary incapacity	Average duration of temporary incapacity per case	Industries with lowest average duration of temporary incapacity	Average duration of temporary incapacity per case
Water transport	21.6	Clothing	15.5
Forestry	19.6	Engineering	15.4
Ice manufacture	19.2	Straw industry	15.3
Mineral industry in general	18.9	Textiles	15.3
Printing and bookbinding	18.8	Glass industry	14.3

The ten industries with the highest and lowest average degrees of permanent incapacity, however, are not the same as those in the above lists, except engineering and clothing, which are among the industries with lowest figures in both cases.

Industries with highest degrees of permanent incapacity	Average degree of permanent incapacity per case	Industries with lowest degrees of permanent incapacity	Average degree of permanent incapacity per case
Agriculture where machinery is employed	19.65	Ice manufacture	10.83
Hydraulic construction	18.34	Iron and steel	10.72
Public services, etc.	17.96	Various metal working	10.51
Paper industry	15.98	Clothing	10.24
Mining and quarrying	15.93	Engineering	10.29

In making these comparisons, however, it must again be borne in mind that the average case severity in itself is only one measure of risk. No conclusions can be drawn as to the severity of accidents in relation to the exposure to risk : high case severity need not imply a high severity rate, nor, moreover, a high frequency rate ; both these may even be very low as compared with the general average rates or the rates in other industries, yet the case severity may be high if the severity rate is higher than the frequency rate. This may be illus-

trated by some examples from the Swedish statistics for 1925. The highest case severity was there found for employees in public administration, banking, insurance, schools, etc., the figure being 327 days per accident, as against 118 for all industries; the frequency rate, however, was 0.42 per hundred man-years only (general rate 6.505) and the severity rate 1.39 per man-year (general rate 7.647). On the other hand, in the manufacture of metals (blast and steel furnaces and other metal manufacture) the case severity was only 76 days, while the frequency rate was 16.05 and the severity rate 12.23, the severity rate, though high, being considerably lower than the frequency rate owing to a relatively short average case duration.

Classification by Causes.

The distribution of accidents by causes is shown by means of proportional measures only.

The general percentage distribution of all accidents by causes depends evidently to some extent on the distribution by industries of the persons exposed to risk, as many industries have their particular predominant causes of accidents. Proportions by causes, however, are not given for the separate industries.

It appears from table III that the highest proportion of all accidents is due to dust, nails, and splinters (164.3 per mille), the next highest to shocks, strains, and injuries due to animals ("other causes") (141.5) and to working machinery (128.5), while the lowest proportions are those of accidents due to transport by water (5.7), prime movers (6.6), and transport by motor vehicles (7.1). The first group evidently overlaps to a large extent with the industrial group "water transport".

The incidence of accidents for different causes is, however, not the same for temporarily disabling, permanently disabling, and fatal accidents. The highest proportion for temporarily disabling accidents (all temporarily disabling accidents = 1,000) is found for dust, nails and splinters (165.5 per mille), and high proportions for working machinery (123.2) and shocks, strains, and injuries by animals (149.0). These three groups together make up 437.7 per 1,000 of all temporarily disabling accidents. The highest proportions for permanently disabling accidents are found for working machinery (226.9), handling loads (163.4), and accidents due to dust, nails, and splinters (153.4); together 543.7 per 1,000 of all permanent cases. Finally, the greatest proportions of all fatal accidents are due to falls of objects (217.3), accidents on ladders and bridges, etc. (177.1), and accidents due to dangerous substances (107.7); together 502.1.

The distribution by consequences of all accidents due to a certain cause (= 1,000) differs considerably for the various causes. The greatest proportion of fatal cases as compared with all cases due to that cause is attained for accidents on ladders and bridges, etc., being 29.1 per mille. Very high proportions of fatal cases are also found for the following causes: railway, etc., transport (20.5), transport by

TABLE III. INDUSTRY, DISTRIBUTION OF ACCIDENTS BY CAUSES AND CONSEQUENCES, AND DISTRIBUTION BY CONSEQUENCES OF ACCIDENTS DUE TO EACH CAUSE

Cause	Number of accidents entailing				Proportional distribution by causes of accidents entailing				Proportion per 1,000 accidents due to each cause entailing		
	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death
Prime movers	2,787	46	4	2,837	6.9	1.9	2.5	6.6	982.4	16.2	1.4
Transmission	3,686	316	32	4,034	9.1	13.1	19.8	9.4	913.7	78.4	7.9
Working machinery	49,804	5,471	37	55,312	123.2	226.9	22.9	128.5	900.4	98.9	0.7
Transport by railway, tramway, ropes	6,318	920	151	7,384	15.6	38.2	93.5	17.2	854.9	124.6	20.5
Transport by motor vehicles	2,738	270	33	3,041	6.8	11.2	20.4	7.1	900.3	88.8	10.9
Transport by animals	3,383	547	77	4,007	8.4	22.7	47.7	9.3	844.3	136.5	19.2
Transport by water	2,353	37	49	2,439	5.8	1.5	30.3	5.7	964.7	15.2	20.1
Lifting machinery	5,032	174	5	5,211	12.4	7.2	3.1	12.1	965.6	33.4	1.0
Ladders, bridges, etc.	7,751	1,790	286	9,827	19.2	74.2	177.1	22.8	788.7	182.2	29.1
Tools	42,211	1,915	25	44,151	104.3	79.4	15.5	102.6	956.0	43.4	0.6
Handling loads (loading and unloading)	43,944	3,940	68	47,952	108.6	163.4	42.1	111.5	916.4	82.2	1.4
Falls of objects	42,389	2,011	351	44,751	104.8	83.4	217.3	104.0	947.2	44.9	7.9
Falls of persons	38,910	1,389	108	40,407	96.2	57.6	66.9	93.9	962.9	34.4	2.7
Dangerous substances (explosive, inflammable, corrosive, etc.)	21,288	976	174	22,438	52.6	40.5	107.7	52.2	948.7	43.5	7.8
Electric current	4,671	83	86	4,840	11.6	3.4	53.3	11.3	965.0	17.2	17.8
Dust, nails, splinters	66,912	3,700	50	70,662	165.5	153.4	31.0	164.3	946.9	52.4	0.7
Other causes	60,252	530	79	60,861	149.0	22.0	48.9	141.5	990.0	8.7	1.3
All causes	404,424	24,115	1,615	430,154	1,000	1,000	1,000	1,000	940.2	56.1	3.7

water (20.1), transport by animals (19.2), and electric current (17.8). High proportions also of cases of permanent incapacity are found for accidents due to ladders and bridges (182.2), transport by animals (136.5), and railway, etc., transport (124.6); while for electric current (17.2), prime movers (16.2), and transport by water (15.2) the proportion of cases of permanent incapacity is relatively small.

These figures can to some extent be considered as an indication of the degree of danger of each cause.

Accidents in Agriculture

The Measurement of Risk

Frequency Rates.

In order to calculate the frequency of agricultural accidents in general, the agricultural Census population of 1921 was taken as the exposed to risk. In the calculation of rates for temporarily disabling accidents, only wage earners are included, tenants, etc., being excluded because they do not receive compensation for temporary incapacity. For permanent and fatal cases rates are calculated by districts on the basis of the whole agricultural population of 1921 as exposed to risk (see table IV).

TABLE IV. AGRICULTURE. NUMBER OF AGRICULTURAL WAGE EARNERS, NUMBER OF TEMPORARILY DISABLING ACCIDENTS, AND RATES PER 100,000 WAGE EARNERS; AGRICULTURAL CENSUS POPULATION, NUMBER OF PERMANENTLY DISABLING AND FATAL ACCIDENTS, AND RATES PER 100,000 OF POPULATION, BY DISTRICTS

Province	Agricultural wage earners (permanent and casual) at 1921 Census	Temporarily disabling accidents		Agricultural population at 1921 Census	Permanently disabling and fatal accidents		Fatal accidents	
		Number	Per 100,000 wage-earners		Number	Per 100,000 of agricultural population	Number	Per 100,000 of agricultural population
Piedmont	265,606	4,938	1,859	1,030,013	865	84.0	231	22.4
Lombardy	545,080	6,718	1,232	1,043,214	1,107	106.1	154	14.8
Veneto	484,903	5,212	1,075	1,071,139	420	39.2	69	6.5
Liguria	50,601	583	1,152	198,209	219	110.5	33	16.6
Emilia	369,398	6,066	1,642	913,943	784	86.0	117	12.8
Tuscany	176,808	6,857	3,878	704,220	888	126.1	123	17.5
Marches	105,187	2,707	2,574	418,174	511	122.2	79	18.9
Umbria	66,925	226	338	250,854	427	170.2	34	13.6
Abruzzi and Molise	191,755	757	395	551,622	272	49.3	33	6.0
Latium	174,047	292	168	302,492	212	70.1	27	8.9
Campania	436,236	1,569	360	876,115	271	30.9	83	9.5
Apulia	421,077	1,301	309	614,573	242	39.4	53	8.6
Basilicata	113,641	593	522	187,584	80	43.0	28	14.9
Calabria	355,337	1,180	332	554,882	177	31.9	42	7.6
Sicily	526,871	1,565	297	867,400	391	45.1	116	13.4
Sardinia	127,915	642	502	197,205	165	84.8	35	17.7

The great differences in the district rates must be largely attributed to the defectiveness of registration referred to above. For temporarily disabling accidents, these differences are accentuated by the inaccuracy of the exposure to risk of the agricultural wage earners, due to the prevalence in some districts of mixed forms of employment, owing to which the classification by agricultural occupations at the Census is incomplete.

Accident Risk by Age and Sex.

Only permanently disabling and fatal accidents are classified according to age and sex. Rates for men and women are calculated on the basis of the agricultural Census population of 1921, including persons over ten years of age. The figures are as follows :

Sex	Number of accidents				Agricultural population of 1921
	Fatal	Permanently disabling	Total	Per 100,000 of population	
Men	1,114	4,447	5,561	80	6,806,084
Women	143	1,327	1,470	49	2,976,590

These figures, however, can only be regarded as approximate, as the Census population refers to an earlier date than the accidents registered, and includes also persons between 10 and 12 years of age and over 65 years, who are excluded from insurance. Moreover, the definition of agricultural workers is not the same for the Census and for the insurance.

As to the age of the injured, the average age at the moment the accident occurs, calculated by attributing to the injured of each age group the average of the lower and upper age limits of the group, was found to be 44.3 years for permanent cases and 43.9 years for fatal cases, for men. The average age is therefore considerably higher in agriculture than in industry. The report accounts for this divergence by the profound difference in the nature of the occupational life of the two categories of workers. In industry the comparative number of older workers engaged in the more dangerous work diminishes in the higher age groups, as the worker generally gains a better position in his industry with advancing age. In agriculture, on the other hand, the older workers do much the same work as the younger, and the average age at the time of accident must therefore be higher.

For women the average age at the time of accident was found to be 45.7 years for permanent cases and 42.4 years for fatal cases.

As for industry, an attempt is made to estimate the risk at different ages by comparing the age distribution of the Census population of 1911 with the age distribution of permanently disabled and killed workers. The percentage distribution is shown in the following table :

Age group (years)	Agricultural occupied Census population of 1911		Accidents			
			Permanently disabling		Fatal	
	Male	Female	Male	Female	Male	Female
12-16	11.4	12.3	2.2	1.4	6.0	4.1
16-21	14.3	16.8	6.0	5.7	7.6	11.9
21-31	20.0	23.2	12.4	9.3	12.5	11.9
31-46	25.5	24.1	27.6	28.3	20.1	21.7
46-65	28.8	23.6	51.8	55.2	53.8	50.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

For men the risk appears to increase with age, the percentage of permanent cases rising from one-fifth of the percentage of exposed workers at 12-16 up to nearly double the percentage of exposed workers at 46-65. For fatal cases the increase is less pronounced.

For women the increase of risk with advancing age is steeper for permanently disabling cases than it is for men, while the fatal risk shows much the same curve.

Consequences of Accidents.

The average case severity is not calculated for agricultural accidents, the data being not yet sufficiently reliable. Temporarily disabling accidents are however classified by the duration of disability, and permanently disabling accidents by the degree of permanent disability and also by the nature and location of the injury. The latter classifications are also made for certain kinds of work.

The apparent decrease in the proportional number of temporarily disabling accidents in the higher duration groups may be assumed to be less than it is in reality, owing to the fact already noted that the more serious the accident the more likely is it that the worker will have recourse to medical aid and compensation.

Moreover, the lowest groups of duration of temporary incapacity (up to ten days) and degree of permanent incapacity (up to 19 per cent.) are affected by the exclusion from right to compensation of cases entailing temporary incapacity lasting less than eleven days or permanent incapacity less than 15 per cent. of total permanent incapacity.

The Distribution of Risk

Classification by Nature of Work.

In agricultural statistics accidents are classified by the nature of the work (see table V). Proportions of all cases for temporarily dis-

TABLE V. AGRICULTURE. NUMBER OF ACCIDENTS IN DIFFERENT OCCUPATIONS AND PROPORTIONAL DISTRIBUTION OF ACCIDENTS IN EACH GROUP, BY CONSEQUENCES

Occupational group	Number of accidents entailing				Proportion per 1,000 accidents in each group of cases entailing		
	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death
Preparation of soil (tillage, drainage, etc.)	2,730	417	102	3,249	840.3	128.3	31.4
Cultivation of soil (sowing, planting, and raising plants)	5,308	589	90	5,987	886.6	98.4	15.0
Harvesting	8,421	1,710	266	10,397	809.9	164.5	25.6
Transport of products	4,158	702	188	5,048	823.7	139.1	37.2
Preparation and storing of products	1,759	115	33	1,907	922.4	60.3	17.3
Working up of products	849	40	21	910	932.9	44.0	23.1
Raising of livestock (breeding, keeping, and feeding of animals)	6,348	891	214	7,453	851.8	119.5	28.7
Forestry :							
Plantation and sowing	708	7	1	716	988.8	9.8	1.4
Lopping, pruning, and clearing of trees	3,137	697	102	3,936	797.0	177.1	25.9
Transport of products	856	123	36	1,015	843.3	121.2	35.5
Gardening, horticulture, and floriculture	374	13	5	392	954.0	33.2	12.8
Other transport	2,084	260	114	2,458	847.8	105.8	46.4
Construction and maintenance of buildings, etc.	333	88	24	445	748.3	197.8	53.9
Building, repair and maintenance of vehicles, etc.	525	52	6	583	900.5	89.2	10.3
Various work	2,542	42	25	2,609	974.3	16.1	9.6
Not specified	1,074	28	30	1,132	948.8	24.7	26.5
Total	41,206	5,774	1,257	48,237	854.2	119.7	26.1

abling, permanently disabling and fatal accidents only are calculated. By far the highest proportion of fatal cases will be found in the construction and maintenance of buildings (53.9 per 1,000). Then follow miscellaneous transport (46.4), transport of products (37.2) and transport of products of forestry (35.5). It will be seen that the highest proportions are found for work not of a specifically agricultural nature.

With regard to agricultural work in the narrower sense, the proportion of fatal cases is above the general average in the preparation of the soil (31.4), in the raising of livestock (28.7), in the lopping, pruning and clearing of trees (25.9), in harvesting work (25.6), and in the transport of products (23.1).

The proportion of permanently disabling accidents is also highest in the construction and maintenance of buildings (197.8). High proportions are found in the lopping, pruning, and clearing of trees (177.1), harvesting (164.5), the transport of products (139.1), etc.

The highest proportion of temporarily disabling accidents is found in the planting and sowing of trees (988.8).

Classification by Causes.

The classification by causes is somewhat different from that for industry, being adapted to the nature of agricultural work and its peculiar risks (see table VI). The greatest proportion of all accidents is nevertheless due to the same group of causes as in industry, namely, dust, nails, and splinters (177.6). These evidently are causes that may prevail in any occupation, whether industrial or agricultural. The next highest proportions of all accidents are in the groups: tools for cutting (162.6) and falls of persons on the ground (146.4). As regards

TABLE VI. AGRICULTURE. DISTRIBUTION OF ACCIDENTS BY CAUSES AND CONSEQUENCES, AND DISTRIBUTION BY CONSEQUENCES OF ACCIDENTS DUE TO EACH CAUSE

Cause	Number of accidents entailing				Proportional distribution by causes of accidents entailing				Proportion per 1,000 accidents due to each cause entailing		
	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death	Total	Temporary incapacity	Permanent incapacity	Death
Prime movers in general	221	—	8	229	5.4	—	6.4	4.7	996.5	—	3.5
Working machinery in general:											
Worked by animals	612	3	2	617	14.9	0.5	1.6	12.8	991.9	4.9	3.2
Worked by hand	644	80	4	728	15.6	13.9	3.2	15.1	884.6	109.9	5.5
Transport machinery; vehicles worked by:											
Mechanical power	96	12	28	136	2.3	2.1	22.3	2.8	705.9	88.2	205.9
Animal power	2,386	536	208	3,130	57.9	92.8	165.5	64.9	762.3	171.2	66.5
Hand power	466	2	—	468	11.3	0.3	—	9.7	995.7	4.3	—
Tools for:											
Cultivation	893	232	9	1,134	21.7	40.2	7.2	23.5	787.5	204.6	7.9
Cutting	7,571	249	21	7,841	183.7	43.1	16.7	162.6	965.5	31.8	2.7
Harvest	1,696	—	2	1,698	41.2	—	1.6	35.2	998.8	—	1.2
Handling loads	1,477	332	27	1,836	35.8	57.5	21.5	38.1	804.5	180.8	14.7
Falls of objects	1,625	145	113	1,883	39.4	25.1	89.9	39.0	863.0	77.0	60.0
Falls of persons:											
From trees or heights	3,704	1,130	315	5,149	89.9	195.7	250.4	106.7	719.4	219.5	61.1
Accidentally on ground	6,500	468	96	7,064	157.7	81.1	76.4	146.4	920.1	66.3	13.6
Dangerous substances	279	53	34	366	6.8	9.2	27.0	7.6	762.3	144.8	92.9
Dust, nails, and splinters	6,538	1,928	97	8,563	158.7	333.9	77.2	177.6	763.5	225.2	11.3
Other causes	6,498	604	293	7,395	157.7	104.6	233.1	153.3	878.7	81.7	39.6
All causes	41,206	5,774	1,257	48,237	1,000	1,000	1,000	1,000	854.2	119.7	26.1

fatal cases, accidents by falls of persons from trees and heights provide the maximum of 250.4 per thousand of all fatal cases, the next highest figure being reached for accidents due to vehicles drawn by animals (165.5). As regards cases of permanent incapacity, accidents due to dust, nails, and splinters account for 333.9 per 1,000 of all permanent cases, and a very high proportion is found for accidents caused by falls from trees, etc. (195.7). The greatest number of temporarily disabling accidents is due to tools for cutting (183.7), while high figures are again found for dust, nails, and splinters (158.7) and falls of persons on the ground (157.7).

As regards the distribution by consequences of all accidents due to each cause, conclusions may to some extent be drawn from these figures as to the degree of danger of each cause : among 1,000 accidents due to transport by mechanical power, for instance, no less than 205.9 cases are fatal, as against an average for all causes of 26.1. Fatal cases are of great importance also among accidents due to dangerous substances (92.9), transport by vehicles drawn by animals (66.5), falls of persons from trees, etc. (61.1), and falls of objects (60.0). On the other hand, certain kinds of risk are almost entirely represented by cases of temporary incapacity, such, for instance, as accidents due to handling tools for harvesting (998.8), to vehicles moved by hand (995.7), to tools for cutting (965.5), etc.

These measures, however, are but a very imperfect substitute for frequency and severity rates.

Labour Conditions in Wusih, Kiangsu [1]

Wusih, a *hsien* district lying to the north-west of Soochow along the Shanghai-Nanking Railway, Kiangsu Province, has rapidly become an important Chinese industrial centre since the introduction of modern manufacturing methods. A study of its labour conditions is therefore a reflection of modern economic and social conditions in China.

Labour in Wusih may be generally divided into two classes, the skilled and the unskilled. A detailed description of these two is given below.

Skilled Labour

Spinning and Weaving Workers. Most of the skilled workers in the city belong to this class, which numbers about 15,780 ; 20 per cent.

[1] Adapted from a report in *The Chinese Economic Bulletin*, Vol. XIV, No. 24, 15 June 1925 ; compiled and published by the Bureau of Industrial and Commercial Information in the Ministry of Industry, Commerce, and Labour of the National Government of the Republic of China.