INTERNATIONAL LABOUR OFFICE

METHODS OF STATISTICS
OF INDUSTRIAL INJURIES

Report prepared for the Sixth International Conference
of Labour Statisticians
(Montreal, 4-12 August 1947)

GENEVA
1947
CONTENTS

Preface ........................................ v

Introduction ................................... 1

Chapter I. General: Definition and Classification ..... 5
  Terminology .................................. 5
  Industrial Diseases ........................... 6
  Statistical Definition of Industrial Injuries ....... 7
  Classification of Accident Causes ............... 8

Chapter II. Specific: Proposals for Amendment of the 1923 Resolution 10
  The 1923 Resolution .......................... 10
  Proposed Amendments ......................... 10
    I. Basis for Frequency Rates ............... 10
    II. Types of Frequency Rates ............... 12
    III. Basis for Severity Rates ............... 15
    IV. Classification for Severity Rates ....... 16
    V. Alternative Bases for Frequency and Severity Rates 19

Chapter III. Proposed Resolutions ................ 21

Appendices

I: Resolution of the First International Conference of Labour Statisticians, Geneva, October 1923 23

II: American Recommended Practice for Compiling Industrial Accident Causes 26
PREFACE

The Sixth International Conference of Labour Statisticians was held in Montreal from 4 to 12 August 1947 under the auspices of the International Labour Organisation and adopted Resolutions setting international standards for the compilation and publication of statistics of employment, unemployment, and the labour force, cost of living and industrial injuries.

The present report on industrial injury statistics, including proposed Resolutions, was printed and circulated in advance to the Governments. As the report, although prepared primarily for the Conference, may be of general interest as a study of the subject, it has been reprinted separately from the account of the proceedings of the Conference itself. The present report is as submitted to the Sixth International Conference of Labour Statisticians except for a few minor corrections.

The Resolutions as finally adopted, together with a résumé of the discussions in the several Committees dealing with the different topics on the agenda of the Conference, will be found in the General Report of the Conference, which is issued in a separate publication. ¹

¹ Studies and Reports, New Series, No. 7, Part 4.
INTRODUCTION

The First International Conference of Labour Statisticians called by the International Labour Office in October 1923 had the subject of Industrial Accident Statistics on its agenda, and had for its guidance a document prepared by the Office on Methods of Statistics of Industrial Accidents.¹ This Conference adopted a Resolution on statistics of industrial accidents embodying recommendations for standard classifications for industrial injury statistics, according to industry, cause, extent and degree of disability, location of injury and nature of injury, and also recommendations on the form of calculation of frequency and severity rates. The text of this Resolution is given in Appendix I to the present report.

A first international compilation of industrial injury rates in 30 countries was published in an article in the International Labour Review for December 1931, including details of definitions and methods utilised in different countries.² A report on Industrial Accident Statistics³, issued in 1938, brought the figures up to date, gave additional figures and fuller descriptions of methods and presented and analysed the materials for coal mining, metal mining, all mining, quarrying, manufacturing industry, agriculture and railways.

Beginning with the 1940 issue of the Year Book of Labour Statistics, comparative tables of fatal accident rates in coal mining and all mining (including non-fatal rates in some countries), manufacturing industry, and railway transportation have been included in the Year Book.

It has appeared from the experience gained in attempting to compile these international statistics of injuries, that the recommendations adopted by the First International Confer-

¹ Studies and Reports, Series N, No. 3 (Geneva, 1923). For a report of the discussions at the Conference see: International Conference of Labour Statisticians, Report, Studies and Reports, Series N, No. 4 (Geneva, 1924), pp. 49-60.
³ Studies and Reports, Series N, No. 22 (Geneva, 1938).
ence of Labour Statisticians are in need of revision, particularly in respect of the methods of calculating industrial injury rates. The field of international standardisation is, of course, a difficult one, but the attempt by an international office to compile data on a comparable basis offers useful experience, and the compilation furnishes an objective for such standardisation. In this field, furthermore, there is also the experience of the American Standards Association, which has taken over and is continuing the work in standardising industrial accident statistics begun by the International Association of Industrial Accident Boards and Commissions (of the United States and Canada); these Associations over the course of years have developed a comprehensive and well thought out programme of definitions and classifications for industrial accident statistics. This work represents an especially important accomplishment in that field. Since their task related to the different States and Provinces in the United States and Canada, and was therefore somewhat similar to that of standardising the accident statistics of the different countries of the world, the results of their experience are of particular value for the work of the International Conferences of Labour Statisticians.

Reference should be made to Resolutions adopted by the First Sessions of the Metal Trades and the Iron and Steel Committees of the International Labour Organisation, relating to the subject of accident statistics. The Resolution of the Metal Trades Committee reads as follows:

The Metal Trades Committee of the I.L.O., meeting in Toledo, Ohio, 2-10 May 1946;
Considering that internationally comparable statistics would constitute a very valuable and important means for the prevention of industrial accidents and occupational diseases in all countries;
Recommends that the Governing Body of the International Labour Office consider the possibility of convening, at an early date, an international conference of labour statisticians or the taking of other appropriate measures with a view to the adoption by the International Labour Conference of an international Convention on the standardisation of statistics of industrial accidents and occupational diseases.

The Iron and Steel Committee (First Session, Cleveland, Ohio, 23-29 April 1946) adopted a proposal for a survey of safety measures based on material to be obtained from Governments and employers' and workers' organisations in the various countries, point 4 of the survey being as follows:
(4) Accident statistics, including causes, and the methods of compiling these statistics.

The Governing Body of the International Labour Office, at its 100th Session (Montreal, October 1946), authorised the Office to convene the Sixth International Conference of Labour Statisticians in Montreal in August 1947, and to include on the agenda, as its fourth item:

Amendments to the Resolution on statistics of industrial accidents adopted by the First International Conference of Labour Statisticians in October 1923; proposed restatement of methods of measuring industrial accident rates.

The present report contains three chapters and two appendices. Chapter I concerns general definition and classification; Chapter II contains the text of Section 2 of the 1923 Resolution, which concerns accident rates, together with the proposed amendments to that section; and Chapter III contains the text of the two Resolutions submitted to the Conference for its consideration, the first relating to injury rates and the second requesting the Governing Body to place the subject of the classification of causes of industrial injuries on the agenda of an early session of the International Conference of Labour Statisticians.

Appendix I contains, as already indicated, the complete text of the 1923 resolution, while in Appendix II is reproduced Part I of the *American Recommended Practice for Compiling Industrial Accident Causes* published by the American Standards Association.

* * *

A draft of the present report was submitted to a small group of statistical experts, at a preparatory meeting authorised by the Governing Body of the International Labour Office, for a preliminary discussion, with especial reference to the definition of the questions to be included. The report as presented has been revised in the light of the discussions at this preparatory meeting, and the Office would like to express its thanks to the experts who participated for their most helpful criticisms and suggestions. It should, however, be pointed out that the Office assumes full responsibility for the proposals submitted in this report to the Sixth International Conference of Labour Statisticians.
CHAPTER I

GENERAL: DEFINITION AND CLASSIFICATION

The subject for discussion, as it appears on the agenda of this Sixth International Conference of Labour Statisticians, is described as "proposed amendments" to the Resolution adopted at the First International Conference of Labour Statisticians in October 1923. In a brief note these proposals are specified as applying particularly to the methods of stating and calculating industrial accident frequency and severity rates. Before taking up these proposed amendments in Chapter II, certain general definitions and classifications should be discussed.

Terminology

In the first place, attention may be drawn to terminology. While "industrial accident" has been the time-honoured designation in English-speaking countries, this term has recently been replaced in certain official publications; for example, by "industrial injuries" in Great Britain, and by "work injuries" in the United States.

The adjective "industrial" is sometimes objected to as not clearly covering accidents in agriculture or accidents in transport, etc., although in its broader significance "industrial" may be held to cover the whole field of economic activity. One advantage of the term "industrial" as compared with "work accidents" is perhaps that it suggests by connotation that the responsibility for accidents belongs to industrial operations rather than to the work or to the worker.

The term "accident" is objected to because of the confusion between the event and the persons affected. In certain cases special statistics are made of "catastrophes" when a single accident involves many deaths and injuries, as in mass

---

1 This discussion is limited to English usage. The terminology in French is "accidents du travail" and in Spanish "accidentes del trabajo" corresponding in exact translation to "work accidents".
accidents in coal mining, for example; in other cases "accidents" in railroading may involve damage to property but not injuries to persons. But in all statistics of "industrial accidents" the basic unit is the person killed or injured; for statistical purposes the number of "accidents" is the number of persons involved.

To avoid this difficulty the term "injury" has been suggested. It always relates to the individual. On the other hand, a person may suffer multiple injuries in a single accident. A further objection to the term "injury" is that death is not appropriately to be termed an "injury" and the use of the phrase "persons killed and injured" is awkward. In any case, the number of injuries far outweighs the number of fatalities. Another difficulty arises from the extension of the terms to cover industrial diseases; in this respect, "injuries" seems preferable to "accidents", though industrial diseases are usually compensated, if at all, under workmen's compensation or accident insurance laws. In effect, neither term is wholly satisfactory. But the statistical concept is clear. Whichever term is used, the statistics are based on the number of persons involved (killed or disabled) in industrial or work accidents or through industrial or occupational diseases.

In any case, it hardly seems necessary to suggest a resolution on the subject. Each country will adopt the terminology it considers most apt. It seems clear that the terms "industrial injuries" or "work injuries" are tending to supplant the older terminology. The important point is that there is already agreement on the point that the statistics of "industrial accidents" or "industrial" or "work injuries" are based upon the number of persons involved.

**Industrial Diseases**

The question of the inclusion of industrial or occupational diseases deserves further comment. In numbers these are negligible as compared with the mass of industrial injuries and, consequently, the inclusion of industrial diseases in the statistics of injuries makes no difference in the injury rates. Their numbers are important, on the other hand, in measuring the incidence of such diseases. The question was covered in the Resolution of the First International Conference of Labour Statisticians in these terms:
In countries in which industrial diseases are compensated as accidents, they should, wherever possible, be distinguished separately in the tables.

This formulation leaves much to be desired. In principle, the statistics of industrial diseases should include all persons who die or are disabled by such diseases, rather than merely persons who are entitled to compensation on that account. But, in practice, the statistics are limited to diseases which are usually listed in compensation laws, and occupational diseases that are not listed as compensable in the laws of a given State or country are not likely to be reportable and hence are not covered in any statistical tabulations. In view of the variation and scope of these lists of industrial diseases, the statistics are in an unsatisfactory state. A first step might be to adopt a minimum list of diseases to be reported and tabulated for statistical purposes. But this involves important medical-statistical problems, and in view of the relatively small number of cases involved the Office makes no proposal on this topic at this time. It is agreed, in accordance with the Resolution of 1923, that the incidence of industrial diseases should whenever possible be distinguished separately in tables of industrial injuries, and in any case, because of their small numbers, their inclusion in, or exclusion from, the number of injuries, is of relatively little importance so far as accident frequency or severity rates are concerned.

Statistical Definition of Industrial Injuries

A third point is the question of the definition of injuries from the statistical rather than from the compensation point of view. For the purposes of statistics of work injuries, injuries should be defined in terms of death, disability or receipt of medical aid, rather than in terms of compensability. The former definition could be applied uniformly in all jurisdictions, while the latter imposes upon the statistics of industrial injuries the legal conditions governing compensability which are in force in the country concerned. In practice, the tendency has been towards the substitution of a statistical definition for that of the compensability. This has been effected by the adoption of laws requiring the reporting of accidents and prescribing a definition of injuries for purposes of reporting or tabulating. The point might be covered by a Resolution to
the effect that "in each country, industrial injuries should be defined in terms of death or disabling injury, or of medical aid extended, rather than in terms of compensability". In practice, there is little doubt that the compensation provisions affect the statistics to some extent, e.g. in the reporting of accidents occurring on the way to or from work, etc., which in some jurisdictions are compensable and in others not.

This question, however, is bound up with the definition of industrial injury in terms of the minimum duration of disability. On this point the greatest diversity exists from country to country, and even in some cases within the same country for different industries, e.g., coal mining, manufacturing industry, railway transport. There is much to be said in favour of the adoption of a Resolution defining industrial injuries as including all injuries where disability lasted beyond the calendar day on which the accident occurred. In view of the difficulty of reaching agreement on a standard definition, however, the Office presents no resolution on this question at this time. The point is raised again later in connection with the problem of obtaining greater comparability in frequency rates.

Classification of Accident Causes

The last point, a most important one, is that of the classification of accident causes. In general, this subject has been receiving increased attention, since the identification of causes is of prime importance for purposes of accident prevention. One difficulty with regard to the classification of causes is that an accident may have more than one cause and can often be prevented in more than one way. A number of different approaches to prevention are possible. The classification of causes as adopted by the First Conference is regarded by many experts as inadequate. On the other hand, no sufficient experience with proposed new classifications has yet been made and as yet no agreement has been reached in regard to the best method of statistical procedure. While no proposal is made for the adoption by the present Conference of a new Resolution specifying the details of classification by causes, attention is called to the unsatisfactory character of the present Resolution, and material relating to proposed new classifications of causes is presented in Appendix II to the present
These new classifications are being tried out, for example, in the U.S. Bureau of Labor Statistics, and are recommended by the American Standards Association.\(^1\)

The Office proposes a Resolution on the subject, as follows:

The Sixth International Conference of Labour Statisticians:
Recognising the need for a revised classification of accident causes for purposes of accident prevention;
Requests the Governing Body of the International Labour Office to place the subject of the classification of causes of industrial injuries on the agenda of an early session of the International Conference of Labour Statisticians.

For the rest, the proposals are limited to the questions of statement and measurement of the industrial injury frequency and severity rates.

---

\(^1\) The scheme incorporated in the resolution adopted by the First Conference corresponds approximately to the classification by "agency" in the proposed new classifications.

\(^2\) See also, for example, Industrial Safety Survey, Vol. XXII, No. 3, July-Sept. 1946, pp. 81-87: "The Discovery and Analysis of Multiple Accident Causes", by Roger J. Desnoyers.
CHAPTER II

SPECIFIC: PROPOSALS FOR AMENDMENT OF THE 1923 RESOLUTION

The 1923 Resolution

The section concerning accident rates contained in the Resolution on statistics of industrial accidents adopted by the First International Conference of Labour Statisticians, in October 1923, reads as follows:

2. Accident Rates

For industrial and international comparison, it is essential to calculate frequency rates and severity rates.

(a) The frequency rate should, if possible, be calculated by dividing the number of accidents (multiplied by 100,000) by the number of hours of working time.

(b) The severity rate should similarly be calculated by dividing the number of working hours lost (multiplied by 100,000) by the number of hours of working time.

Where practical difficulties prevent the calculation of the number of hours of working time, this number should be replaced by the number of full-time workers (i.e. the number of working days divided by 300) or the average number of workers, as may be best suited to the economic and social needs of the country or industry concerned.

Proposed Amendments

Five proposals of amendment are submitted for consideration by the Sixth International Conference of Labour Statisticians.

I. Basis for Frequency Rates

It is proposed to amend (a) by substituting the figure 1,000,000 for the figure 100,000. With this change, which affects merely the decimal point in the published rates, the
rate will show the frequency of accidents per 1,000,000 man-hours of working time exposure to the risk of industrial accidents.

The purpose of this change is to produce a somewhat more convenient figure for the rate. Frequency rates are subdivided into fatal and non-fatal rates. The fatal rates are more comparable internationally than non-fatal, and hence for purposes of international comparison the fatal rate is the more significant item.

A study of the fatal frequency rates indicates that 1,000,000 hours gives more conveniently usable rates than the 100,000 basis. In mining, for example, the rates run from 0.30 to 1.50 per million man-hours; in railway transport around 0.30; and in industry around 0.08 per million man-hours. If these rates are stated in terms of 100,000 hours, they become respectively 0.030, 0.150, 0.030 and 0.008. These latter are distinctly less convenient for use or reference.

A second point to be considered is that the figure of 1,000,000 man-hours of exposure has been adopted by the International Association of Industrial Accident Boards and Commissions (United States and Canadian) and the American Standards Association, as the standard basis for rates. Since this figure was adopted after long study of the question and has evidently the preponderance of argument in its favour on its intrinsic merits, at least so far as fatal rates are concerned, it would promote international standardisation to modify the I.L.O. Resolution in this direction.

In practice few countries have adopted the figure of 100,000 hours. Only New Zealand appears to have adopted 100,000 hours systematically as a basis for its published accident rates, but in the case of New Zealand fatal rates are not shown separately. Some rates in the case of the United Kingdom are published per 100,000 hours; this is, of course, only possible when exposure is available in terms of man-hours, and in most cases the figures are not given to show fatal rates separately.1

In the interests of uniformity, therefore, 1,000,000 man-hours is recommended as the basis for calculation of accident frequency rates.

---

1 In the case of coal-mine accidents in Great Britain and Germany, rates are shown per 100,000 man-shifts. Assuming the shift to be eight hours, the time unit basis for the rates is then approximately 800,000 man-hours.
II. Types of Frequency Rates

It is proposed to add a sub-paragraph under (a) as follows:

3. (1) Frequency rates should be calculated separately for fatal injuries and non-fatal injuries.
(2) In the case of non-fatal injury rates an indication should always be given of the minimum duration of disability which defines the injuries included in the computation.
(3) Whenever practicable, frequency rates should be calculated separately for minimum durations of disability of one day, two days, three days, four days, one week, two weeks, and for permanent partial disabilities and permanent total disabilities, in order that comparisons may be made with similar rates for other industries and other countries.
(4) Separate frequency rates for cases requiring medical aid only should also be shown wherever practicable.

For international comparisons, over-all or total injury frequency rates are of little value. Over-all rates may be of value to indicate changes in injury frequency within a country; but as between countries they are so greatly affected by differences in definitions governing the inclusion of minor injuries that their value for purposes of international comparisons is limited. Fatal injury rates, on the other hand, are relatively comparable. For purposes of comparing rates internationally, therefore, the separate calculation of fatal injury rates is indispensable.

The failure of the First International Conference of Labour Statisticians to include a clause on this point in the Resolution adopted in 1923 may be partly responsible for the failure of a number of countries to show fatal injury rates separately in their accident statistics and thus to provide figures in the form most useful for international comparisons.

Thus, as already noted, the otherwise excellent statistics of New Zealand do not publish separately frequency rates for fatal injuries, although in this case such rates can be easily calculated from the data supplied. In the case of Palestine, however, over-all rates are available in manufacturing industries, but the figure of fatal injuries required for the calculation of fatal rates is unfortunately omitted. If it were recognised that, for purposes of international comparisons, fatal rates should be shown separately, a long step would have been taken toward greater comparability.

With regard to non-fatal frequency rates, the minimum duration of disability which defines the injuries included in
the statistics should always be indicated in the tables. With regard to the minimum duration of disability, the greatest divergence is found in the different countries. For example, in coal mining, while a majority of countries define injuries in terms of minimum disabilities of one day, two days, three days, or four days, a number of countries have minima of one week or two weeks.\footnote{See Industrial Accident Statistics, op. cit. passim. See also Year Book of Labour Statistics, 1943/44, pp. 236-237. Here non-fatal rates are shown for a number of countries for mining accidents. In this compilation, however, rates are shown only where the minimum duration is four days or less; even though these rates are subject to considerable variation owing to the differences in minimum disability, they may suffice for certain conclusions, as when rates are lower in a country with shorter minimum duration of disability than in another country with a longer minimum duration of disability.}
Obviously such rates, without consideration of the influence of differences in minimum disabilities, are not comparable from country to country.

To establish international comparability of accident rates, three possibilities are open: (1) to recommend a single, standard definition after the adoption of which rates would be comparable; (2) to publish rates in terms of a series of standard minima each of which would be comparable in so far as data were available in the different countries; and (3) to adopt one or more standard minima and estimate the rates in countries where the data were incomplete for comparison with those in countries with full data.

The difficulties in the way of obtaining an agreement on a standard definition are serious. If a single standard definition is to be recommended, there is much to be said in favour of an all-inclusive definition, covering all injuries involving disability beyond the date on which the accident occurred.\footnote{For the proposals of the American Standards Association, see American Standard Method of Compiling Industrial Injury Rates, Approved 11 October 1945.} (In some countries injuries involving medical aid only are reported and tabulated in addition to those involving disability.) While it seems doubtful that this recommended definition would be readily adopted, since it would mean a change in the legislation and practice of a great many countries, it may nevertheless be useful in promoting the further development of internationally comparable accident statistics to adopt as a standard definition injuries involving disability beyond the date of the injury.
In the absence of a standard definition, or in order to supplement it, the obvious recourse is to publish non-fatal injury frequency rates (or the injuries) with a breakdown to show the different durations of disability, so that comparisons may be made between countries on the basis of similar rates so far as these are available. Thus, if a country which shows non-fatal rates for all injuries involving disability of one day or more indicates the number (or rates) of injuries with disabilities of one day, two days, three days, four days, one week, two weeks, etc., the separate frequency rates can be calculated for different minimum durations, for example for a minimum duration of three days for comparison with frequency rates for countries where the minimum duration is three days, or for a minimum duration of one week for comparison with the frequency rate for countries where the minimum duration is one week, etc. In this way, international comparisons can be made between countries on the basis of similarly constituted non-fatal frequency rates.

In addition, this procedure permits, if desired, the adoption of a standard definition for purposes of international comparisons, for example injuries with a minimum duration of disability of one day (or three days, or one week), and, with this as a starting point, short-time injuries not reported in countries where the minimum duration of disability is greater than that adopted in the standard definition could be estimated on the basis of injury frequency tables, and the injuries with duration of less than the standard definition in countries where the minimum duration of disability is less than that adopted in the standard definition could be eliminated, so as to establish comparable rates.

It is proposed, therefore, as a minimum: (1) to recommend that all non-fatal rates (as well as all rates which include non-fatal as well as fatal rates) should always be accompanied by a statement of the minimum duration of disability which defines the injuries included in the statistics; (2) to recommend that a series of standard minima for non-fatal injury frequency rates be set up and that comparisons be made between similar rates in the different countries so far as these permit. In this way, the maximum degree of comparability will be achieved, and in addition, evidence will be accumulated on the basis of which estimates can be made of non-fatal injuries of short durations; (3) to include minimum durations of one day as well
as medical aid cases among the recommended frequency rates to indicate that such rates are to be regarded as desirable goals for the development of injury rates for purposes of accident prevention.

III. Basis for Severity Rates

In the case of paragraph (b), it is proposed to substitute the words “the number of days lost” for the present wording “the number of working hours lost”, and to replace the figure of 100,000 by the figure 1,000.

In regard to the first point, the objection to the present definition is that, by measuring the severity of injuries in terms of the working hours lost, international comparisons or even comparisons within a country are vitiated by differences or changes in the number of hours worked per day. With the same frequency of industrial injuries of each type per hour of work, a country with a short work day would appear to have a smaller severity rate than another country with a longer work day, if working hours lost are used to measure the severity of the injuries. Obviously the severity rate should measure the risk of disability, independent of the legislation or practice governing the length of the work day. The duration of disability is a medical fact to be measured in days and not to be confused with the regulations governing hours of work.

The purpose of the calculation of severity rates is to give to each accident a weight in proportion to its “severity”, such that an identical time charge is assigned to each injury of a given degree of severity. The time charge obviously should not vary with the length of the work day.

In order to avoid variations in the time charge for injuries involving identical disabilities which might arise from variations in the length of the work week or in the day of the week on which the accident occurred, it is essential that the time charge be measured in calendar days rather than in working days actually lost. Otherwise a country with a five-day week may appear to have lower injury rates than a country with a six-day week, owing solely to the difference in the length of the work week.¹

¹ The time charge should be stated in terms of calendar days. In practice it is often stated in terms of working days, the latter calculated from calendar days lost by multiplying by 300/365. This is done, for example, in Finland, Norway and Palestine. The conversion from calendar
So far as existing practice is concerned, seven countries publish regularly severity rates of industrial injuries in one or more branches of economic activity: United States, Finland, New Zealand, Norway, Palestine, Sweden and Switzerland. In two of these countries severity rates are calculated in terms of man-hours of exposure: United States and New Zealand. In other cases, man-years of exposure are available. Comparisons can be made of all these only by assuming a standard man-year, for example, of 2,400 hours, e.g. 300 days, of 8 hours each. In only one case, New Zealand, is any calculation made of severity (cost) rates in terms of working hours lost, and in this case, data are given which permit the calculation of true severity rates in terms of days lost.

For purposes of ensuring comparability of severity rates, therefore, it is proposed that days be substituted for working hours lost in calculating the severity rates.

Secondly, in place of 100,000 it is proposed to substitute the figure 1,000. The severity rate as measured per thousand hours of working time varies around 5.0, which gives a convenient figure for comparative rates. This change would bring the method of calculation into conformity with the formula recommended by the American Standards Association, and the International Association of Industrial Accident Boards and Commissions, and with the practice followed in six of the seven countries which publish severity rates.

IV. CLASSIFICATION FOR SEVERITY RATES

It is proposed to add, immediately after this paragraph, a new paragraph to read as follows:

In publishing severity rates classifications should be given according to the major groups of disability—death, permanent total, permanent partial and temporary—in order to permit recalculation of the rates on an internationally comparable basis.

days is necessary, since otherwise the number of working days lost would depend upon the day of the week on which the accident occurred as well as upon whether the work week was five or six days. An accident, for example, on a Friday of a five-day week with disability lasting two calendar days would have no actual working days lost, while an exactly similar accident occurring on a Monday would be assessed as involving two working days' lost time. Hence the necessity of using calendar days as a basis for the calculation even when the time lost is restated in working days. The factor used should be specified in the accident reports. Most countries use 300/365. In case a different factor is used, the rates could be converted to a common basis for comparisons.
The chief differences in the method of computing severity rates in the seven countries which publish them is the time charge assigned to death or permanent total disability. This figure is 6,000 days in the United States, Finland, and Palestine; 7,500 in Norway, Sweden and Switzerland; and 60,000 hours in New Zealand.\(^1\)

The time charge for permanent total disability affects in practice the time charges for permanent partial disabilities, wherever these latter time charges are expressed as percentages of the former.\(^2\)

So far as these differences in the time charge for death or permanent disability are concerned, international comparability can be obtained either by the adoption of an agreed figure for the time charge, or by recalculation of the rates on a standard basis. This recalculation can be made provided the severity rate data are classified according to the type of case—fatal, permanent total disability, permanent partial disability with percentage of impairment, and temporary disability; the time charge for death or permanent total disability affects the first three of these types.

The proposals made in the proposed Resolution provide for the detail necessary to make possible recalculation of the rates on a standard basis.

It will be for the Conference to consider whether it wishes to recommend any single standard time charge for death or permanent total disability. Two points are involved. First, as to the numerical value of the time charge itself. The principal arguments are: (1) accepting the fact that death and disability should receive a relatively heavy time charge, if the charge is too heavy, it tends to overweight the chance elements

\(^1\) The figure of 6,000 may probably have been derived from the calculation, 20 years of 300 working days each; 7,500, from 25 years of 300 working days each; while the figure of 60,000 hours may have been derived perhaps from 6,000 working days at 10 hours each, or more likely from 7,500 working days at 8 hours each. In practice, 60,000 hours is set equal to 9,545 calendar days lost. Thus the New Zealand time charge in fact is in terms of calendar days lost and does not vary with changes in the actual length of the work week.

\(^2\) As in Sweden, Norway, Finland, Palestine, and New Zealand. In the case of the United States a fixed schedule is applied for specific types of permanent impairments—which in effect is the same as a percentage scale—while in Switzerland the actual degree of impairment is assessed by the Insurance Fund, taking into account in each case the occupation of the injured person. The method of assessing the percentage of impairment is not identical in the different countries.
that produce in a particular accident a serious or fatal outcome; (2) if the time charges are in fact based on the length of disability or its equivalent loss of expected working life, the larger figure probably corresponds more nearly to such loss in the advanced countries; (3) as mortality rates fall and the length of the working life increases, there will be a tendency toward a lengthening of the expected loss of working life, which, however, may be offset by the shortening of the work week and earlier retirement; and (4) in any case, for purposes of comparable severity rates, the time charges must be uniform, and uniformity is of far greater importance than the particular figure which may be adopted to measure the time charge. In addition, for purposes of practical international standardisation, the requirement that the proposed standard shall be such as to be readily adopted is of course essential.

On balance, the evidence appears definitely to favour the larger time charge, and on this basis, 7,500 days should be preferred to 6,000 days.

The second point concerns the interpretation of time charge as calendar or working days. In the American Standards Association practice the time charge of 6,000 days for death is added to time charges in terms of calendar days for temporary disability, that is, the 6,000 days are calendar days. A death as compared with an injury causing a week’s disability is thus given a weight corresponding to 16 1/2 years. In the Swedish practice, on the other hand, with a time charge of 7,500 (working) days, a death as compared with an injury causing a week’s disability is given a weight corresponding to 25 years.

If, then, 7,500 is recommended as a standard time charge for death or permanent total disability, the question must also be decided whether this is to be regarded as consisting of working days or calendar days. If the former, all figures of calendar days lost from temporary disabilities should be converted into working days by multiplying by a standard factor (300/365) before adding in the time charges for deaths and permanent total disabilities at the rate of 7,500 working days per case. If the latter, the figures for calendar days should not be converted to working days, but should be added to the time charges for deaths and permanent total disabilities at the rate of 7,500 (calendar) days per case. If calendar days lost through temporary disabilities were left untouched, the
alternative might be considered of raising the time charge for
deaths to the equivalent in calendar days of 9,125, correspond­
ing to 7,500 working days, or 9,545 calendar days, the figure
used in New Zealand, or to roughly 10,000 days. The point
in favour of using working days, and 7,500 as working days,
is that this procedure is already the standard one in three
countries. The only arguments against it are that the adop­
tion of calendar days would tend to simplify the procedure,
and that the adoption of, say, 10,000 days would give a round
figure. On balance, the Office favours the use of the procedure
adopted in Sweden of converting calendar days lost to equi­
valent working days and of adopting the figure of 7,500 working
days for deaths and permanent total disabilities. If all coun­
tries can agree on this procedure, a long step will have been
taken towards standardising the severity rates as between
different countries.

If the Conference favours such a proposal, the following
can be added just preceding the paragraph given above:

In calculating severity rates, calendar days lost through tem­
porary disabilities should be converted to working days lost by multi­
plying by the fraction 300/365 and deaths and permanent total
disabilities should be assessed at the figure of 7,500 working days
lost.¹

In any case, whether a standard figure is recommended or
not, the Office proposes the amendment as given previously,
in order that reasonably comparable severity rates can be
calculated from the figures as published.

V. ALTERNATIVE BASES FOR FREQUENCY AND SEVERITY RATES

In the final paragraph it is proposed that an alternative
method of calculation in terms of hours per year be inserted,
so that the paragraph shall read as follows:

Where practical difficulties prevent the calculation of the number
of hours of working time for all industries, this number should be
replaced for purposes of comparisons between industries or between
countries by the number of full-time workers (calculated wherever pos­

¹ This should be regarded, however, as a standardised procedure and
not be interpreted in the sense of actual working days lost. In other
words, a change from a six-day week to a five-day week in a particular
country should not be regarded as justifying any change in the percent­
age of conversion 300/365, except by international agreement on a new
factor of conversion.
sible at the rate of 2,400 hours per year, or the number of working days divided by 300) or, if no more accurate measure is available, by the average number of workers during the year or by the number of workers on a given day.¹

With these changes, the final paragraph would prescribe alternative bases for the calculation of approximately comparable rates in terms of full-time workers, first, for industries where the hours of exposure are available by conversion to full-time workers at the rate of 2,400 hours per year; secondly, for industries where the exposure is available only in terms of days worked; and thirdly, for industries where the only measure of exposure is the average number of employees or the number of employees on a given day. The adoption of the figure of 2,400 hours per year does not imply that this should be a standard number of working hours per year, but merely that, at present, in the countries for which comparisons of industrial injury rates can be made, this is probably the most representative estimate of the average length of the work year. Assuming that this is the best available figure, the rates of industrial injuries expressed in terms of full-time workers, of 2,400 hours, or 300 days, or in terms of average number of workers during the year or of the numbers on a given day, are then as nearly comparable, so far as exposure to risk is concerned, as can be accomplished by any arbitrary definition of the mode of calculation of the rates.

¹ Proposed additions to text in italics. The following words have been deleted at the end of text: “as may be best suited to the economic and social needs of the country or industry concerned.”
CHAPTER III

PROPOSED RESOLUTIONS

I

The Sixth International Conference of Labour Statisticians:

Having been convened by the Governing Body of the International Labour Office, and

Having met at Montreal from 4 August 1947 to

and

Having considered the problem raised by the lack of comparability of industrial injury frequency and severity rates, and

Recognising the importance of an adequate statistical basis for the analysis of industrial hazards and the appraisal of progress made in accident prevention,

adopts, this day of August 1947 the following Resolution concerning industrial injury rates:

1. For industrial and international comparison, it is essential to calculate frequency rates and severity rates.

2. The frequency rate should, if possible, be calculated by dividing the number of injuries (multiplied by 1,000,000) by the number of hours of working time.

3. (1) Frequency rates should be calculated separately for fatal injuries and non-fatal injuries.

   (2) In the case of non-fatal injury rates an indication should always be given of the minimum duration of disability which defines the injuries included in the computation.

   (3) Whenever practicable, frequency rates should be calculated separately for minimum durations of disability of one day, two days, three days, four days, one week, two weeks, and for permanent partial disabilities and permanent total
disabilities, in order that comparisons may be made with similar rates for other industries and other countries.

(4) Separate frequency rates for cases requiring medical aid only should also be shown wherever practicable.

4. The severity rate should be calculated by dividing the number of days lost (multiplied by 1,000) by the number of hours of working time.

5. In publishing severity rates classifications should be given according to the major groups of disability—death, permanent total, permanent partial and temporary—in order to permit recalculation of the rates on an internationally comparable basis.

6. Where practical difficulties prevent the calculation of the number of hours of working time for all industries, this number should be replaced for purposes of comparisons between industries or between countries by the number of full-time workers (calculated wherever possible at the rate of 2,400 hours per year, or the number of working days divided by 300) or, if no more accurate measure is available, by the average number of workers during the year or by the number of workers on a given day.

7. This Resolution replaces Section 2 (Accident Rates) of the Resolution concerning statistics of industrial accidents adopted by the First International Conference of Labour Statisticians.

II

The Sixth International Conference of Labour Statisticians:

Recognising the need for a revised classification of accident causes for purposes of accident prevention, requests the Governing Body of the International Labour Office to place the subject of the classification of causes of industrial injuries on the agenda of an early session of the International Conference of Labour Statisticians.
APPENDICES

APPENDIX I

Resolution of the First International Conference of Labour Statisticians, Geneva, October 1923

STATISTICS OF INDUSTRIAL ACCIDENTS

1. Classification of Industrial Accidents

Industrial accidents should be classified according to the industry of the injured worker, the cause of accident, the extent and degree of disability, the location of the injury, and the nature thereof.

(a) The classification of industrial accidents according to the industry of the injured worker should conform to the list indicated in paragraph 4 of the resolution concerning the Classification of Industries, with such subdivisions as will allow special consideration to be given to industries with a relatively high accident rate.

(b) The classification of accidents according to the cause of accident should as far as possible be in accordance with the table given below, with such subdivisions as may be considered necessary.

(i) Machinery:
   (a) prime-movers;
   (b) transmission machinery;
   (c) lifting machinery;
   (d) working machinery.

(ii) Transport:
   (a) railways;
   (b) ships;
   (c) vehicles.

(iii) Explosions; fire.
(iv) Poisonous, hot, or corrosive substances.
(v) Electricity.
(vi) Falls of persons.
(vii) Stepping on or striking against objects.

(viii) Falling objects.  
(ix) Falls of ground.  
(x) Handling without machinery.  
(xi) Hand tools.  
(xii) Animals.  
(xiii) Miscellaneous.

(c) In the classification of accidents according to the extent and degree of disability a distinction should be made between fatal and non-fatal accidents and between temporary and permanent disabilities.

Temporary disabilities should be classified according to duration, and uniformity should be obtained by using the following groups: (i) 2 weeks or less; (ii) over 2 and up to 4 weeks; (iii) over 4 and up to 13 weeks; (iv) over 13 weeks and up to 6 months; (v) over 6 months and up to 1 year; (vi) over 1 year and up to 2 years; (vii) over 2 years and up to 3 years.

Permanent disabilities should be classified by degree, and uniformity should be obtained by using the following groups: (i) under 20 per cent. disability; (ii) 20 and under 40 per cent.; (iii) 40 and under 60 per cent.; (iv) 60 and under 80 per cent.; (v) 80 and under 100 per cent.; (vi) 100 per cent.

Permanent disabilities should be classified at the time they are recognised as such.

(d) The location of injury should be clearly distinguished from the nature of the injury. The most suitable classification is that of the common anatomical divisions of the body, namely: (i) head; (ii) trunk; (iii) upper extremities; (iv) lower extremities; (v) general. Each of these groups should be subdivided if necessary.

(e) The nature of injury should be classified as follows: (i) contusions and abrasions; (ii) burns and scalds; (iii) concussions; (iv) cuts and lacerations; (v) punctured wounds; (vi) amputations; (vii) dislocations; (viii) fractures; (ix) sprains and strains; (x) asphyxiation; (xi) drowning; (xii) other injuries.

Note. In publishing the above statistics a note should be added on the following points:

(1) the scope of the legislation;
(2) the system of insurance (compulsory or optional);
(3) the nature of the accidents included;
(4) the methods of reporting the accidents and of compiling the statistics;
(5) a summary of the benefits given to the injured or to their dependants.

In countries in which industrial diseases are compensated as accidents they should, wherever possible, be distinguished separately in the tables.

2. Accident Rates

For industrial and international comparison, it is essential to calculate frequency rates and severity rates.
(a) The frequency rate should, if possible, be calculated by dividing the number of accidents (multiplied by 100,000) by the number of hours of working time.

(b) The severity rate should similarly be calculated by dividing the number of working hours lost (multiplied by 100,000) by the number of hours of working time.

Where practical difficulties prevent the calculation of the number of hours of working time, this number should be replaced by the number of full-time workers (i.e., the number of working days divided by 300) or the average number of workers, as may be best suited to the economic and social needs of the country or industry concerned.
APPENDIX II

American Recommended Practice for Compiling Industrial Accident Causes

PART I — SELECTION OF ACCIDENT FACTORS

Introduction

The principal criticism directed by safety men towards present-day accident statistics is that they fail to answer the query: What was wrong that should have been corrected? Because of this limitation, present statistics have a limited usefulness.

The method of analysis and classification presented here was developed to fit directly into the technique of investigation used by safety men. The purpose is to provide a statistical method of recording the accident facts which are essential for accident prevention. Pains have been taken to restrict the analysis to only those factors which are commonly recognised by safety men as being most closely related to the accident, and which are of most value in practical prevention work. Obscure causative factors have been disregarded. The rules for the analysis and selection of accident factors are simple and should provide a large degree of uniformity in statistical presentation.

The outstanding feature of the proposed method is its flexibility. It was found desirable to develop a method of classification and recording which would meet needs varying all the way from those of a small industrial establishment, with only a few accidents a year, to those of a State industrial commission handling annually more than 100,000 disabling injury cases.

Section 1. The Accident and its Causal Factors

The purpose of this classification is to provide a statistical method of recording the essential facts of accident occurrence, from which can be compiled information essential for accident prevention. Provision is made for the recording of only such factors as are commonly recognised by safety engineers as being most closely related to the accident, and as being of most value in practical prevention work. The classification is not intended to deal with obscure causative factors, or factors too far removed in the accident sequence to be definitely ascertainable.

1American Standards Association, Approved 1 August 1941: Z16.2-1941 Part I.
Each essential point of information about an accident is referred to in the classification as an accident factor. These accident factors are grouped into six major classifications:

1. the agency (i.e., defective object or substance most closely related to the injury);
2. the agency part;
3. the unsafe mechanical or physical condition;
4. the accident type;
5. the unsafe act;
6. the unsafe personal factor.

Certain single occurrences, such as explosions, may result in injuries to a number of persons. This classification requires that an accident be tabulated for each person injured. The term "accident" is intended to include the factors leading to industrial (occupational) diseases.

**Section 2. Definitions of Accident Factors**

The agency. The agency is the object or substance which is most closely associated with the injury, and which in general could have been properly guarded or corrected.

The agency part. The agency part is the particular part of the selected agency which is most closely associated with the injury, and which in general could have been properly guarded or corrected.

The unsafe mechanical or physical condition. The unsafe mechanical or physical condition is the condition of the selected agency which could have been guarded or corrected.

The accident type. The accident type is the manner of contact of the injured person with an object or substance; or the exposure, or the movement of the injured person which resulted in the injury.

The unsafe act. The unsafe act is that violation of a commonly accepted safe procedure which resulted in the selected accident type.

The unsafe personal factor. The unsafe personal factor is the mental or bodily characteristic which permitted or occasioned the selected unsafe act.

**Section 3. Classification of Accident Factors**

The lists of accident factors given here are major classification groups, omitting detail, for all factors except accident type. Detailed classifications are given in Part II, Detailed Classification of Accident Factors.\(^1\) The purpose of listing the major groups here is (1) to indicate the general scope of the classification, and (2) to permit a selection of the degree of detail which may be adequate to meet

---

\(^1\) Not reproduced here.
specific needs. To facilitate the use of these major classifications, some of the items falling into each are shown in parentheses, indicating the scope of the particular classification item. The method of classification proposed here is both elastic and flexible. By necessity, the list of classification items had to be large because the classification is applicable to all industrial and business activities. Individual establishments, however, may find that some of the detailed items listed in Part II have no application for them and that these, therefore, can be omitted. On the other

The Accident Type.

Striking against (refers generally to contacts with sharp or rough objects, resulting in cuts, slivers, punctures, etc., due to striking against, kneeling on or slipping on objects).

Struck by (falling, flying, sliding or moving objects).

Caught in, on, or between.

Fall on same level.

Fall to different level.

Slip (not fall) or over-exertion (resulting in strain, hernia, etc.).

Exposure to temperature extremes (resulting in burning, scalding, freezing, heat exhaustion, sunstroke, frostbite, etc.).

Inhalation, absorption, ingestion (asphyxiation, poisoning, drowning, etc., but excluding contact with temperature extremes).

Contact with electric current (such as results in electrocution, shock, etc.).

Accident type not elsewhere classified.

Unclassified—insufficient data.

The Unsafe Act.

Operating without authority, failure to secure or warn.

Operating or working at unsafe speed (too slow, too fast, throwing materials, etc.).

Making safety devices inoperative (removing, misadjusting, disconnecting, etc.).

Using unsafe equipment, hands instead of equipment, or equipment unsafely.

Unsafe loading, placing, mixing, combining, etc.

Taking unsafe position or posture (under suspended loads, lifting with bent back, etc.).

Working on moving or dangerous equipment (cleaning, adjusting, oiling, etc.).

Distracting, teasing, abusing, startling, etc. (quarrelling, horseplay, etc.).

Failure to use safe attire or personal protective devices (goggles, etc.).

Unsafe acts not elsewhere classified.

Unclassified—insufficient data.

No unsafe act.

The Unsafe Personal Factor.

Improper attitude (disregard of instructions, failure to understand instructions, nervous, excitable, etc.).

Lack of knowledge or skill (unaware of safe practice, unskilled, etc.).

Bodily defects (defective eyesight or hearing, fatigue, intoxicated, existing hernia, weak heart, etc.).

Unsafe personal factor not elsewhere classified.

Unclassified—insufficient data.

No unsafe personal factor.
Section 4. Rules for Selection of Accident Factors

The Agency.

Select the unsafe object, substance, or exposure which resulted
in the injury and which could have been guarded or corrected.

In the absence of an agency as described in the preceding paragraph,
select as the agency that object, substance, or exposure which is most
closely associated with the injury. (The term "closely associated"
requires consideration of both location and time as well as cause.
If more than one agency is related to the injury, select the one on,
in, or about which the person was injured. If two or more agencies are
remotely located from the place of injury, select the one nearest
to the injury in point of time.)

Select a person as the agency only when he is most closely associated
with the injury and if no other agency can be selected according to the
rules laid down in the two preceding paragraphs.

No object or substance shall be named as the agency when it is
structurally and physically a part of some other object or substance
at the time of the injury or when it flies or breaks off the parent
object or substance immediately prior to the injury. For example:

(a) a flywheel is properly a part of an engine. It may be named
as the agency itself, however, if it was not an integral part of the
engine immediately prior to the injury;

(b) a fragment of a burred chisel flies off and causes injury;
the chisel is to be named as the agency.

The Agency Part.

Select the unsafe agency part which resulted in the injury and
which could have been guarded or corrected.

In the absence of an agency part which was unsafe and subject
to corrective action, select the agency part most closely associated
with the injury. (The term "closely associated" requires consideration
of both location and time as well as cause. If more than one agency
is related to the injury, select the one on, in, or about which the
person was injured. If two or more agencies are remotely located
from the place of injury, select the one nearest to the injury in point
of time.)

The Unsafe Mechanical or Physical Condition.

Select the unsafe mechanical or physical condition of the agency
part (or agency, if no agency part is identified) which was chiefly
responsible for the injury and which could have been guarded or
corrected.

Name the unsafe mechanical or physical condition, if one existed,
whether or not an unsafe act was committed.

The Accident Type.

Select the accident type most closely associated with the selected
agency.
The Unsafe Act.

Select that violation of a commonly accepted safe procedure which resulted in the selected accident type. (The unsafe act may have been committed by the person injured, a fellow worker, or some other person.)

If more than one unsafe act was committed, select the one most closely associated with the selected accident type.

Name the unsafe act, if one existed, whether or not an unsafe mechanical or physical condition existed.

The Unsafe Personal Factor.

Select the unsafe personal factor which resulted in the selected unsafe act.
INDUSTRIAL SAFETY SURVEY

An illustrated quarterly publication intended primarily for specialists in the field of accident prevention and presenting information relating to all parts of the world.

In addition to articles by experts on specific aspects and problems of accident prevention, the Survey contains notes on the activities of safety associations, new laws and regulations relating to safety precautions, extracts from official reports dealing with accidents, reviews of books and periodicals, and reproductions of new safety posters issued in different countries.

Recent issues include the following articles:

*Table of Common Hazardous Chemicals* . . April-June 1946

*Protection of Portable Grinding Machines,*
  by M. HELFENSTEIN . . . . . . . . . . . . . . April-June 1946

*The Discovery and Analysis of Multiple Accident Causes,* by Roger DESNOYERS July-September 1946

*Safety Work in the Netherlands During the War,* by N. C. WINKEL . . . . October-December 1946

*Labour Protection in the Swedish Logging Industry,* by Oscar WALLNER . . . January-March 1947

*The One-Man Driving of Self-Propelled Railway Vehicles,* by F. STRAUSS . . . . April-June and July-September 1947

A specimen copy of the Safety Survey will be sent on application.

*Price per Number: 50 cents; 2s. Annual Subscription: $1.50; 7s. 6d.*

*(Also published in French and Spanish)*
YEAR BOOK
OF LABOUR STATISTICS
9th Issue, 1945-46

This annual publication, now issued in a trilingual edition (English, French and Spanish), presents in tabular form the most complete data obtainable in the principal countries of the world relating to:

- Gainfully Occupied Population
- Employment and Unemployment
- Hours of Work
- Wages
- Cost of Living and Retail Prices
- Family Living Studies
- Migration
- Industrial Accidents
- Industrial Disputes
- Economic Statistics

The tables cover the last fifteen years. They are compiled from the official statistics of more than 60 countries in all parts of the world, supplemented in some cases by data obtained from private sources. Recent enquiries of the I.L.O. on wages, hours of work and cost of living in various countries are reproduced in full.

An introductory note to each chapter calls attention to the principal questions of method to be borne in mind in interpreting the data, especially when utilising them for international comparisons. The statistics are presented in a systematic way with this object in view.

"Indispensable to statisticians of all countries . . . Illustrates the wealth and complexity of the knowledge collected for experts to interpret . . . Through the co-ordination and, so far as possible, comparison of the official figures published by different countries it is possible to gauge world economic trends in a way which was out of the question twenty years ago."—The Times, London.

"The eighth issue of the Year Book is a noteworthy achievement, especially when viewed in the light of wartime difficulties. The editor modestly credits the surprisingly small wartime impairment of statistical data to the increased consciousness of the need for adequate statistics in many fields important to the war and to post-war activities. A reviewer may properly note, however, the evidence of diligence in obtaining and skill in compiling the information, which is highly diversified alike in national origins, in subject matter, and in degree of comparability."—The Journal of Political Economy, Chicago, Illinois.

"The Year Book continues to be invaluable to those interested in international comparisons of labour conditions."—Economic Record, Melbourne, Australia.