STATISTICAL AND SOCIAL INQUIRY SOCIETY OF IRELAND.

MORTALITY EXPERIENCE AMONG THE LOWER INCOME FAMILIES IN ÉIRE.

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(Read on Thursday, 25th October, 1945.)

Life Assurance for Weekly Wage-earners.

In September, 1939, a scheme was completed for the amalgamation of a large volume of the life assurance business transacted in this country.* Life Assurance business is divided between two classes: (1) the Ordinary life assurance and (2) the Industrial life assurance. Under group (1) the amalgamation was, with the exception of a small number of existing policies among four Irish Offices, only concerned with the placing of future new assurance policies with the newly established Irish Office. Within group (2), apart from the potential new policies, a very large number of existing current industrial assurance policies came under the control of the amalgamation company. The business taken over was as follows:—

	Number of Policies.	Amount of Assurances.	Accrued Liability.
Ordinary	18,000	£2,291,000	£830,000
Industrial	1,092,000	21,085,000	3,846,000

The scheme presents many unique features which touch upon the social and economic welfare of this country. I propose to direct the attention of members to certain statistics which I have before me relating to group (2).

Industrial life assurance comprises assurances upon human life where the premiums in respect of such assurances are payable at intervals of less than two months and are collected by means of collectors. The convenience of weekly collection of premiums has enabled the benefit of life assurance protection and allied thrift plans to be extended to persons of modest means and the experience under this class of life assurance business is confined to the lower income industrial workers and their families. A wide range of statistical investigations are required for the efficient conduct of industrial assurance business and extensive data is accumulated dealing with the mortality experience of the lives assured. I shall confine myself to offering for the members' consideration the results I have obtained from my investigations of the mortality experience of Irish industrial workers and their families who are insured in this group.

Industrial Assurance Statistics.

The data examined is limited to current policies on single lives issued under weekly premiums providing for a sum assured in the event of death. The actual deaths arising among these policies during

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* Insurance (Amendment) Act, 1938.

the years 1943 and 1944 are compared with the years of life exposed
to risk in the same period at each individual age over the whole range
of ages. The period of two years provided a sufficient body of data
to form a reliable guide, the total figures being :—

<div align="center">

Actual Deaths (Policies)   63,636
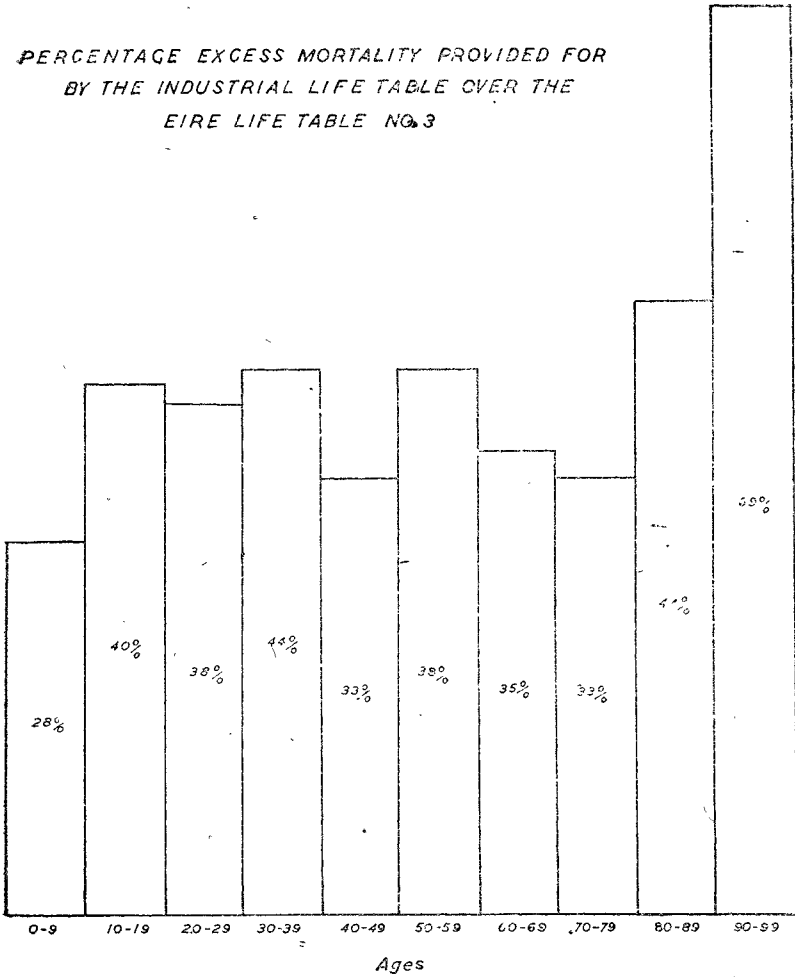Years of Life exposed to Risk   1,597,000

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The data not included comprised mainly the lives assured under
Endowment Assurances which is not readily classified according to
ages attained.   The possibility of a lighter mortality in the Endow-
ment classes is a factor which must be taken into account and this
awaits further investigation.   Such differences as do exist may very
well be regarded as due to selection of a type and I consider that the
Whole of Life policies, many of them existing from an early age, will
give a better picture of the class as a whole.   The data examined com-
prised about 75 per cent. of the current policies.
   The variation in mortality experience between calendar years is
often considerable but I consider that the two years, 1943-44, taken
together offer a reasonable average of recent experience, perhaps
somewhat lighter than the average of the five years 1940-44.   War
deaths have no significant effect on this experience.   The ages of lives
assured are taken as established at the time of the issue of the policy.
The experience, being based on policies, includes a considerable
number of duplicates of two or more policies on the same life in the
data at the older ages.   The three-quarters of a million policies under
observation are spread over approximately not more than half a
million lives.   Males and Females are mixed throughout all ages in
proportion roughly about half and half.   There is probably a greater
weight of data drawn from the Urban areas than would be repre-
sented by weekly wage-earners in the whole population.
   Under National Health Insurance about 40 per cent. of the popu-
lation is insured and I would have liked to incorporate this experience
with my own data.   The Society has detailed records of the experience
of insured members, but a brief examination of the figures shows
that some deaths may not be reported and further consideration would
be required before a mortality experience could be extracted from
this source.
   The life tables constructed from the previous Census returns are
usually taken as a representative basis for the mortality rates among
industrial class lives.   It is considered that the mortality among this
class lags behind the general population table by about ten years
and a table based on 1931 would be appropriate.   The fit between
the actual and expected deaths on such a basis is not really satisfac-
tory and some actuaries, still in search of an established standard
table, have adopted one or other of the more recent sectional tables
constructed from the Census returns.   I have taken the Urban Areas
Life Table (1940-42) as the most likely table to represent this experi-
ence.   To conform with the data I have taken $\frac{1}{2}qx$ (Males) + $\frac{1}{2}qx$
(Females).   The ratios of Actual deaths to the Expected deaths on
this basis are shown by the continuous line in Graph 1.   The diver-
gencies are quite considerable but these can be accounted for and
expressed with reference to this standard more easily than under any
other table I have tested.   At this stage of our experience I do not
wish to produce an entirely new table with an independent gradua-

PERCENTAGE EXCESS MORTALITY PROVIDED FOR
BY THE INDUSTRIAL LIFE TABLE OVER THE
EIRE LIFE TABLE NO. 3

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                                                                          59%

                                                                    47%

      40%           45%                          38%
              38%                  33%     35%    33%

28%


  0-9    10-19  20-29  30-39  40-49  50-59  60-69  70-79  80-89  90-99
                                Ages
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tion.   I think it preferable to suggest suitable adjustments of an
existing standard table which has some kind of an official blessing.
The Urban Area (Males and Females combined) Table is suitable for
this purpose I believe, and I offer the results for your consideration.

Ages 0 to 40.

From the graph you will see that the Industrial experience shows
an increasing excess of deaths rising to a maximum around age 34
and decreasing thereafter up to age 40.   When you consider the
effect of housing conditions and the standard of living in all its
aspects, especially with regard to nutrition and medical attention, I
think this extra mortality may be put down to certain diseases being
of particular effect.   The actual numbers of deaths at these ages are
not large but if a greater proportion of the total deaths of the whole
population, say three-quarters of the tuberculosis deaths, are occur-

ring among 40 per cent. of the population, then the resulting percentage increase in the mortality rate is considerable. This type of extra mortality over a range of ages may be properly represented as a percentage addition to the standard rates. We may follow the graph quite closely by taking the Industrial rates as the qx of the Urban Areas (Males and Females) table with 1½ per cent. addition for each year of age from 1 rising to 48 per cent. at age 32, and then a constant rate of mortality from this age up to age 41. By using a constant rate of qx we are making a reduced addition up to age 41 to the standard rates and the Industrial rate is brought back nearer to the standard rate until at age 41 the rate is equal to the standard rate for one year older. The dotted line on the graph shows the relation between the adjusted Urban rates and the actual Industrial experience.

Ages 0-16.

At the juvenile ages there has been a marked improvement in the control of the principal diseases, diphtheria, measles, whooping cough and scarlet fever. The excess deaths among the poorer classes would reflect the difference in the degree of medical attention available. I have no ready explanation of the recovery in the industrial experience around age 15, and whether it is some cause in the data or in the Urban Table remains to be seen. The Urban Females Table appears to run rather heavy compared with the Urban Males at 9 to 16. For the present I have only given partial effect to this feature as the number of deaths involved is small.

Ages 17-40.

In this section the excess deaths may be mainly attributable to tuberculosis, pneumonia, heart diseases and accidents. The deaths in 1943 at ages 15 to 35 for a section of the experience were classified as follows:—

TABLE I.

Cause	Males	Females	Total
	No.	No.	No.
Tuberculosis	27	44	71
Heart Disease	3	10	13
Other Causes	11	16	27

In 1942 similar results were shown. The high values shown by the graph arise from the preponderance of deaths due to tuberculosis in the working-class families. Figures given to the Society in a recent paper suggested that within some sections of the community the death rate for tuberculosis would be very high.[1] The experience is not affected by adverse types entering into life assurance as the rates are even heavier among the longer duration policies. The Population Statistics[2] revealed an increase in the death rate from tuberculosis

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[1] *Journal*, 1943. Counihan and Dillon. Table V.

[2] *Statistical Abstract*, 1943, p. 6056, p. 28.

from 1·24 in 1941 to 1·44 per thousand population in 1942. The industrial experience showed a similar rise in 1942 but in 1943 and 1944 the rates are lower, and could correspond to a rate of 1·30 in the general population.

Ages 41 and over.

Ages 41-70.

The extra mortality revealed by a particular class of lives at older ages may usually be represented as an addition to the age. The difference is equivalent to treating the experience rates as equal to the standard rates shown by persons some years older in age. The excess mortality of the industrial classes suggested that in the first place an addition of one year should be made to the age under the Urban (Male and Female) rates from 41 continuing this as far as 70 when an increased rating would be required. A full 1 year rating on the Urban rates would rather overstate the experience mortality between ages 50 and 65 and I have taken a lower rating of ½ year only over this range of ages.

Ages 71 and over.

After age 70 the experience is progressively heavier than the Urban rates and an increased rating on the age is required. At these ages the excess deaths from cancer, pneumonia, heart disease, nephritis and cerebral hæmorrhage become increasingly apparent. The age rating required to follow the experience rises gradually by a fraction at each age to a maximum of 5½ years at age 80. After age 90 the experience is not significant but in order to follow the Urban rates the rating is gradually reduced.

Consideration must be given to the problem of misstatements of ages under policies for industrial assurance which have been effected at the old ages, around or over age 70, say. Since 1939 strenuous efforts have been made to see that the correct ages are given on new assurances, but prior to this date it was not the practice to seek evidence of age at the date of entry. Consequently, many policies exist in the experience at incorrect ages and as the understatements far outnumber the overstatements the resulting mortality experience will appear heavier than in reality. It is not possible as yet to assess the effect of these misstatements and I cannot calculate the exact modification which would be required. I would suggest that the rating up of the age might be restricted to a maximum of 3½ years, which would apply between ages 75 and 93 as shown in the graph. Undoubtedly there will also be some excess mortality included in the adjusted rates immediately below age 75 but the extent of this may not be significant. In the case of a table required for the valuation of liabilities under industrial assurance policies it might not be advisable to allow any modification unless in the experience or in the adjustments which can be made under claim payments it can be shown that such differences will be recouped. For purposes where such misstatements will not apply, as for instance under policies entered at younger ages or in proved ages the lower rated values could be taken. Finally, further small adjustments in the rates were made to obtain better smoothness in the series at a few points.

Test of the Adjusted Urban Rates.

In the following table I show the actual and expected deaths and the differences, in age groups, between the experience and the adjusted Urban rates. A full table of the adjusted rates appears in the qx column of the tables at the end of the paper.

TABLE II.

Age group	Actual deaths	Expected deaths Adjusted Urban table	Difference Actual— Expected
	No.	No.	No.
0— 4	1,015	960	55
5— 9	146	134	12
10—14	102	122	—20
15—19	264	271	— 7
20—24	358	373	—15
25—29	376	393	—17
30—34	524	507	+17
35—39	506	˙520	—14
40—44	604	615	—11
45—49	960	954	+ 6
50—54	1,616	1,649	—33
55—59	3,169	3,195	—26
60—64	5,727	5,991	—264
65—69	9,686	9,656	+30
70—74	14,198	14,316	—118
75—79	14,537	14,511	+26
80—84	8,193	8,245	—52
85—89	1,585	1,542	+43
TOTAL	63,566	63,954	—388

At two ages, 61 and 62, there is a fall in the actual deaths compared with the expected, as shown by the dip in the graph, but I have treated this as a fluctuation in the experience. Up to age 44 the aggregate difference between actual and expected deaths is zero. The existence of a large number of duplicates at the older ages complicates the test of the experience rates as a likely sample of the adjusted Urban rates. The χ^2 value is 127·68 based on the range of ages 5-89, which would mean the adjusted rates are highly improbable. Allowing for the considerable number of duplicates, however, the χ^2 value would be reduced to a value well within the probable range.

TABLE III.

Range of ages	Degrees of freedom* f	χ^2	Judgment
5—29	23	27·11	Good fit, ·05<P<·5
30—59	27	32·28	Good fit, ,,
60—89	27	68·29	Subject to duplicates

* As the adjusted Urban rates were partly based on the experience a deduction should be made from the permitted degrees of freedom. Dr. Geary suggested to me that a deduction of 2 or 3 degrees would allow for the "fitting" of the theoretical rates and I have reduced the values of f accordingly.

For the range of ages 5 to 89 there are 34 plus and 47 minus signs with 4 at Zero in the difference between Actual and Expected deaths at each age.

Comparison of Industrial Mortality rates with other tables.

In the United States the Insurance Commissioners have issued a table which they consider should be used as a basis for the valuation of life contingencies among the industrial wage-earning families. These rates are shown in the following table but as these have been subject to some adjustment to allow for a safety margin I also show the original rates deduced from the experience of 1925-1937 which formed the basis of their table.

TABLE IV.

Mortality rates per 1,000 lives.

Age	UNITED STATES		Irish Industrial Table
	Industrial Experience 1925–1937	Industrial Standard Table 1941	
5	—	3·63	2·90
10	1·25	2·60	1·47
15	1·54	2·86	2·92
20	2·61	3·93	5·06
25	3·43	4·73	5·68
30	4·33	5·39	6·22
35	5·62	6·58	6·94
40	7·73	8·71	7·07
45	11·19	12·32	9·80
50	15·89	17·55	14·06
55	22·65	24·75	20·50
60	32·33	36·08	30·72
65	48·35	53·33	44·18
70	68·68	74·56	68·67
75	98·05	106·26	103·85
80	138·87	153 65	177·96 (143·70)
85	—	221·79	259·36 (186·81)
90	—	316·83	359·98 (234·78)

The Irish table shows heavy rates around 20 and 30, but this is not surprising when we compare the reduction in the United States tuberculosis death rates for industrial class lives[1] with our own for the general population.

TABLE V

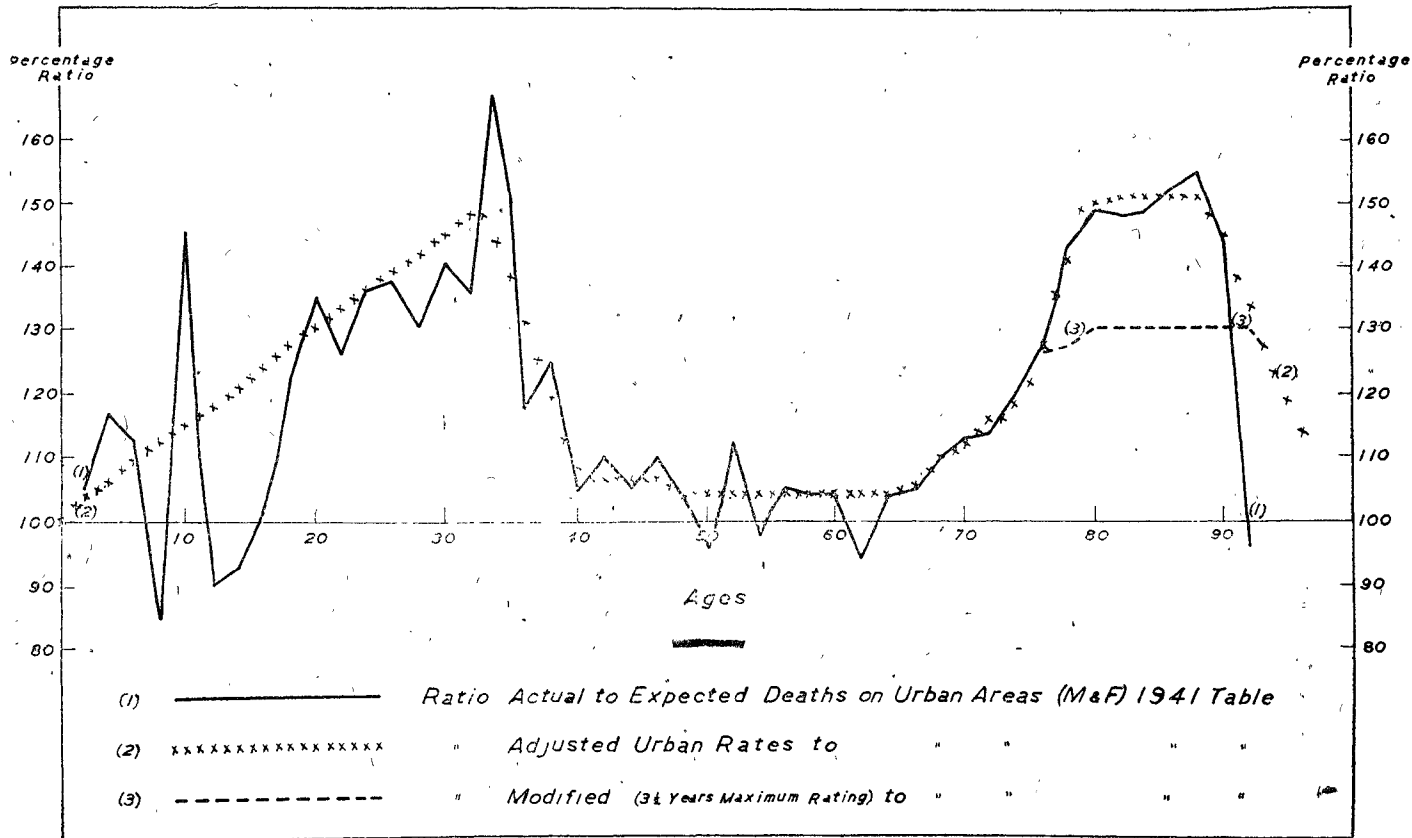*Tuberculosis Death Rates (per 100,000 Population).*

	1911	1926	1936	1941
United States Males Industrial Classes, 2–75. Females	284	106	57	46
	172	77	35	24
Eire Population ..	211	150	121	124

From age 40 to 75 the Irish rates are comparatively light, probably due to the different occupations of the adult lives. After 75 it may be that the understatements of age are of greater significance in the Irish experience. The differences existing between these tables might also be compared with the rates derived from population statistics[2] but adjustment must be made for the proportion of Males and Females and the numbers living at each age.

[1] Metropolitan Life Insurance Company.
[2] *Journal,* 1944. Honohan. Table VI.

COMPARISON OF MORTALITY EXPERIENCE OF LOWER INCOME FAMILIES
WITH THE URBAN AREAS 1941 TABLE

Mortality Experience Among the Lower Income Families in Eire

Ages

(1) ———————— Ratio Actual to Expected Deaths on Urban Areas (M&F) 1941 Table

(2) xxxxxxxxxxxxxxx   "   Adjusted Urban Rates to   "   "   "   "

(3) ------------   "   Modified (3½ Years Maximum Rating) to   "   "   "   "

The expectation of life by the industrial table and the latest standard tables are given below. I have taken $\overset{o}{e}_x$ (persons)$=\frac{1}{2}\overset{o}{e}_x$ (Males)$+\frac{1}{2}\overset{o}{e}_x$ (Females).

TABLE VI.

Comparison of Expectation of Life.

Age	Irish Industrial Tables		Urban Areas 1941	Eire Life Table 1941
	(1)	(2)		
0	54·2	54·3	56·4	60·0
10	52·0	52·1	54·4	56·6
20	43·3	43·4	45·6	47·6
35	31·6	31·8	33·0	35·3
55	16·4	16·6	17·6	19·3
75	5·7	6·1	7·4	7·7

Column (1) based on adjusted Urban table with full age rating.
Column (2) based on adjusted Urban table with maximum age rating of $3\frac{1}{2}$ years.

Finally, I have included Graph II to show the extra mortality revealed by the Industrial Table compared with the Éire Life Table No. 3. Each sector measures the extra mortality within decennial age groups from a uniform number of persons living at each age.

Comparison of Mortality Rates for higher income families.

There is no data available up to the present for a direct comparison of better-class mortality. If 40 per cent. of the population is assumed to be subject to the Industrial Mortality Table then residuary rates may be obtained for the remainder of the population from the 1941 Census Table. These rates are given below and compared with the mortality of assured lives in British Life Offices. This table is, however, subject to the assumption above, and it is offered only as a rough answer to the question :—" If so many deaths occur among this section of the community then what is left for the rest of the people?"

TABLE VII.

Comparison of Mortality Rates (per 1,000).

Age	Éire Life Table excluding working class families	British Life Offices* experience
10	1·02	1·48
20	2·66	2·19
30	3·12	2·28
40	4·75	3·42
50	7·73	6·33
60	17·05	16·41
70	37·45	36·16
80	98·07	92·63

* These rates are the A 1924–29 modified to allow for the inclusion of 50 per cent. females, adopting the ratio of male and female mortality of the E.L.T. No. 10. From age 70 the rates are based on the a^m and a^f tables as the A 1924–29 table is not representative.

Monetary Functions.

In the Appendix I give the values of 1 payable at death and 1 per annum throughout the lifetime of the persons subject to the mortality rates under the adjusted Urban Areas Table with the rating up limited to a maximum of $3\frac{1}{2}$ years. I believe these values would form a fair basis for calculating liabilities affecting the ordinary working-class families subject to the interest rate involved and in the absence of age misstatements. If the liabilities must include provision to cover improvements under future mortality experience then regard should be given to the divergencies between the experience and other standard rates, as these are gaps which can be closed without any further advance in medical science. There is known to be great scope for improving the mortality rates among the families of the lower wage-earning sections of the community. From periodical samples of the experience we can see what remains to be done.

In Conclusion.

I am very conscious of the limitation upon the value of the statistics I have been privileged to present this evening. I have drawn attention to the main defects of the data as a true picture of present-day mortality among the lower-income families. Until opportunity permits of the examination of similar experience I felt it would be better to confine myself to general features which might be of some value. I cannot claim that my figures are to be taken as conclusive in any particular respect and I look forward to developing these statistics in conjunction with other similar data based on the same groups. It appeared to me that there was enough material to offer for the consideration of the members and if this has not been sufficiently developed by way of comparison with existing material I must plead the limitation in the data available and also in the time at my disposal.

APPENDIX.

IRISH INDUSTRIAL LIFE TABLE.

x	q_x	Interest at 3 per cent.			x
		$\bar{a}_x$	$\bar{A}_x$	$\infty\bar{P}_x$	
0	·09406				0
1	·01358	26·352	·22107	·00839	1
2	·00587	26·498	·21674	·00818	2
3	·00429	26·437	·21855	·00827	3
4	·00348	26·330	·22171	·00842	4
5	·00290	26·198	·22561	·00861	5
6	·00244	26·047	·23010	·00883	6
7	·00212	25·877	·23510	·00909	7
8	·00184	25·694	·24051	·00936	8
9	·00161	25·498	·24630	·00966	9
10	·00147	25·290	·25247	·00998	10
11	·00147	25·071	·25893	·01033	11
12	·00172	24·846	·26559	·01069	12
13	·00203	24·619	·27228	·01106	13
14	·00244	24·394	·27895	·01144	14
15	·00292	24·170	·28555	·01181	15
16	·00347	23·952	·29201	·01219	16
17	·00409	23·740	·29828	·01256	17
18	·00444	23·535	·30434	·01293	18
19	·00478	23·332	·31033	·01330	19
20	·00506	23·130	·31630	·01367	20
21	·00529	22·928	·32228	·01406	21
22	·00543	22·724	·32832	·01445	22
23	·00557	22·515	·33447	·01486	23
24	·00563	22·303	·34075	·01528	24
25	·00568	22·084	·34722	·01572	25
26	·00573	21·859	·35388	·01619	26
27	·00582	21·627	·36074	·01668	27
28	·00594	21·388	·36780	·01720	28
29	·00608	21·143	·37505	·01774	29
30	·00622	20·892	·38245	·01831	30
31	·00642	20·636	·39003	·01890	31
32	·00666	20·374	·39778	·01952	32
33	·00685	20·107	·40565	·02017	33
34	·00692	19·835	·41371	·02086	34
35	·00694	19·554	·42200	·02158	35
36	·00694	19·263	·43061	·02235	36
37	·00694	18·961	·43953	·02318	37
38	·00694	18·648	·44878	·02407	38
39	·00694	18·323	·45839	·02502	39
40	·00707	17·986	·46835	·02604	40
41	·00741	17·640	·47859	·02713	41
42	·00790	17·285	·48908	·02830	42
43	·00846	16·926	·49968	·02952	43
44	·00910	16·563	·51040	·03081	44
45	·00980	16·198	·52122	·03218	45
46	·01059	15·828	·53214	·03362	46
47	·01125	15·457	·54310	·03514	47
48	·01196	15·082	·55421	·03675	48
49	·01298	14·702	·56544	·03846	49
50	·01406	14·320	·57673	·04028	50
51	·01520	13·937	·58804	·04219	51
52	·01640	13·554	·59935	·04422	52
53	·01766	13·170	·61072	·04637	53
54	·01900	12·784	·62211	·04866	54
55	·02050	12·398	·63353	·05110	55
56	·02216	12·012	·64495	·05369	56
57	·02402	11·626	·65636	·05646	57
58	·02608	11·241	·66772	·05940	58

APPENDIX—*continued.*

IRISH INDUSTRIAL LIFE TABLE.

| x | q_x | \multicolumn{3}{c}{INTEREST AT 3 PER CENT.} | x |
		$\bar{a}_x$	$\bar{A}_x$	$\infty\bar{P}_x$	
59	·02832	10·860	·67898	·06252	59
60	·03072	10·482	·69016	·06584	60
61	·03324	10·108	·70123	·06938	61
62	·03582	9·736	·71221	·07315	62
63	·03847	9·367	·72313	·07720	63
64	·04124	8·998	·73402	·08157	64
65	·04418	8·630	·74490	·08631	65
66	·04820	8·261	·75581	·09149	66
67	·05275	7·899	·76651	·09704	67
68	·05788	7·546	·77696	·10297	68
69	·06322	7·203	·78709	·10927	69
70	·06867	6·870	·79692	·11599	70
71	·07442	6·545	·80652	·12322	71
72	·08068	6·228	·81591	·13101	72
73	·08738	5·918	·82507	·13941	73
74	·09478	5·616	·83401	·14852	74
75	·10385	5·321	·84271	·15836	75
76	·11424	5·042	·85096	·16877	76
77	·12272	4·783	·85863	·17952	77
78	·13201	4·530	·86610	·19119	78
79	·14214	4·284	·87338	·20388	79
80	·15315	4·045	·88044	·21767	80
81	·16506	3·814	·88728	·23267	81
82	·17796	3·590	·89388	·24899	82
83	·19191	3·375	·90023	·26672	83
84	·20697	3·169	·90634	·28603	84
85	·22319	2·971	·91218	·30703	85
86	·24064	2·782	·91777	·32990	86
87	·25936	2·602	·92307	·35469	87
88	·27938	2·432	·92813	·38170	88
89	·30076	2·270	·93289	·41092	89
90	·32349	2·119	·93737	·44240	90
91	·34759	1·978	·94154	·47603	91
92	·37305	1·849	·94535	·51130	92
93	·39982	1·740	·94857	·54517	93
94	·41353	1·657	·95103	·57409	94
95	·42785	1·565	·95374	·60941	95
96	·44217	1·467	·95662	·65190	96
97	·45704	1·336	·96051	·71897	97
98	·47192	1·161	·96567	·83153	98
99	·48729	·920	·97279	—	99
100	·50266	·414	·98776	—	100

$\bar{a}_x$ is the present value of an annuity of 1 per annum, with payments evenly spread over each year, and payable throughout the lifetime of a person now aged

$\bar{A}_x$ is the present value of 1 payable at the death of a person now aged x.

$\infty\bar{P}_x$ is the net premium per annum, with payments evenly spread over each year, payable throughout the lifetime of a person now aged x to secure a payment of 1 at death.

The values in this table have been constructed by the same formulae as employed by Honohan in the *Journal*, 1944, Appendix A, Éire Life Tables No. 3.

DISCUSSION ON MR. SHAW'S PAPER

Proposing a vote of thanks to Mr. Shaw, **Mr. Honohan** said that it was gratifying to be presented with some information as to what was going on in the insurance world, a field in regard to which—as he had pointed out in a recent paper—there was a wide gap in our knowledge. To the average person insurance was a mystery and the speaker thought that the more that was known about it, the better for everyone generally. The principle of "freedom with publicity" had from the beginning been the basis of Government interest in insurance business and he felt that, as a general proposition, the greater the publicity the greater would be the freedom. He congratulated Mr. Shaw on his first paper to the Society and was pleased to note his references to further researches.

Industrial insurance had, of course, nothing to do with industry directly. The term seems to have arisen because it was a form of life assurance designed to attract the weekly (industrial) wage-earners but in this country it was doubtful whether industrial workers formed such a large element in the business as they did in Great Britain. There must surely be a large business done among commercial and other employers, in agriculture and among small shopkeepers in country towns, etc., so that it was perhaps somewhat misleading to say that "the experience under this class of life assurance is confined to the lower industrial workers and their families." Incidentally, Mr. Honohan said that for this reason he had some qualms about the title "Irish Industrial Life Table" in the Appendix. One difference between this type of insurance and what was called ordinary insurance—in which premiums were usually remitted by post (not collected at the door)—was that the latter usually covered a better class of life.

The paper dealt with about $\frac{3}{4}$ths of the in-force policies of the Terminating Company—involving about $1\frac{1}{2}$ million years of exposure—quite a substantial body of data comparing not unfavourably with the experience on which the widely-used A 1924-29 tables were based *viz.*, about 11 million years (of Ordinary Assurance) derived from 50 or 60 offices in Great Britain, covering a period of 6 years.

Mr Shaw had constructed a life table from this experience for 1943 and 1944, by framing a synthetic table from a mean of the Éire Urban Males and Females Life Tables (1941). It was hard to believe, on account of the more level deviations from the Éire Life Table No. 3 indicated in Graph II that that Table would not provide at least as good a base line. The only special feature of the table itself is the sequence of constant values for q at ages 35 to 39, but it should be noted that this does not affect the smoothness of the annuity, assurance or premium values. The testing of the results is good, as was to be expected, seeing that the object was to fit the curve as closely as possible to the data. It is rather curious in the circumstances, however, to regard the deviations at ages 61 and 62 as a "fluctuation in the experience"; is it not likely that it could be removed by a somewhat more refined rating than the $\frac{1}{2}$ age allowed? By the way, the use by actuaries of the more recent sectional tables constructed from the Census returns referred to by Mr. Shaw has relation, presumably, to British tables.

With regard to Mr. Shaw's comments on the features of the experience from age it would be well to emphasise that more should not be inferred than what was actually shown to be true by the statistics themselves. The sentence at the bottom of page 492 to the effect that "the experience

is not affected by adverse types entering into life assurance as the rates are even heavier among the longer duration policies seems to require elaboration as its meaning is not clear.

The question of misstatement of age was mentioned in the section "Ages 71 and over." It seemed curious to the speaker to confine the remarks on this point to these ages, as there must surely be a considerable understatement at all ages in view of the apparent pecuniary advantage and the temptation at connivance on the part of agents anxious to secure business. In general, it was not possible to check ages when effecting industrial insurance business but, of course, Mr. Shaw's company may have some special methods. If not, then we are virtually left guessing as to what part of the extra mortality is due to this age factor and what due to real excessive mortality. Of course, it should be remembered that the Census ages on which the Éire and Urban Life Tables depend are also subject to this defect and it is a moot point to what extent the error exists there as compared with that in industrial assurance. While the pecuniary interest is absent in the Census, there may be other factors present, e.g. the case of which the speaker had heard in which the common form filled up for a girls' " digs " was left open to inspection by all with the result that the ages entered were just a joke. Little could be done about such a matter and it was only to be hoped that advancing education would serve to remove these " personal irrationalities," as they had been described by the late Sir Alfred Watson, British Government Actuary.

Mr. Honohan said that he had to confess to an uneasiness about Table IV, the value of which Mr. Shaw had himself discounted considerably. While the precise method of treatment had not been stated, it would appear likely that the industrial percentage of 40 had been applied to the whole range of ages, notwithstanding the fact that if this element in the population were subjected to such a different degree of mortality as the remainder of the population, its age-distribution within the population as a whole. [The 40 % of course, comes from the proportion of persons must surely be considerably different from that of the population insured under the National Health Insurance Acts. As Mr. Shaw points out the mortality experience of this class is not available : this is because there is no financial incentive to report deaths—there being no mortality benefit.]

The Appendix, containing monetary functions, was very welcome as there was far too little material of this kind. Comparisons between the annuity values given and those for the Éire Life Table No. 3 in the speaker's paper of last session indicated that differences of as much as 12% might arise. This is an important matter where monetary transactions are involved and it was to be hoped that the furnishing of additional tables would in due course frighten the amateur and the dabbling solicitor and others out of the use of ancient expectations-of-life obtained from old Whitaker's Almanacs and the like. On a small point, is the Life Table not the column of l's—not the q's ?

There is no published British experience of industrial assurance business and to that extent Mr. Shaw's table is a pioneer. It is doubtful, however, if the table will be much utilised outside his own office where it should be eminently suitable. In particular, the annuity values would—because of the heavy mortality—be unsafe for capitalising annuity payments.

The main value of Mr. Shaw's paper was in disclosing to us the nature of the mortality experience in this particular sphere. For proper social study it is not sufficient to consider only the whole population, however

necessary that might be at times. Just as in the long run we are all dead, too much attention should not be paid to the " average " man, and studies of representative classes, as here, were often more valuable in the understanding of human affairs than those of wider scope.

Dr. Geary said that as a hardened maker of life tables he was specially interested in Mr. Shaw's paper. It struck many chords of memory and a minor discord or two but, as in the case of some modern music, he hoped the discords would not sound too unpleasant. In regard to the method of smoothing used by Mr. Shaw, Dr. Geary would have preferred some more regular method than that adopted by Mr. Shaw, *e.g.* the least squares or some such other. There seemed an element of arbitrariness about Mr. Shaw's technique. Dr. Geary would have much preferred that Mr. Shaw should have made a completely new life table, having regard to the very considerable number of lives exposed to risk in the organisation with which Mr. Shaw was associated. In saying this Dr. Geary was aware that life table makers were prone to make rather a fetish of smoothing and smoothing technique.

Dr. Geary hoped that in his future studies the Lecturer, with such a vast experience at his disposal, would produce life tables for definite social grades.

Dr. Geary could not agree with Mr. Honohan that the excess shown in Mr. Shaw's first chart at ages 25-34 was due to misstatement of ages. It was much more probably due to the high tuberculosis mortality experienced by the low social grades to which Mr. Shaw's experience extended. No disease was more closely associated with social grade than tuberculosis : in this connection, it might be observed that in Dublin in the years 1901-10 mortality standardised for ages from TB. was more than three times as great amongst the labouring class than amongst the professional classes. Accordingly, even a slight weighting of the labouring classes in the group exposed to risk would lead to a significant mortality excess at 'the tuberculosis ages. Even at the ages over 70 Dr. Geary thought the excess was due rather to the low income grade of the group than to misstatements of ages, though the latter fact undoubtedly had an influence.

Mr. Shaw professionally could not be primarily concerned with the social implications of his figures : his object was merely to produce tables which would be useful to actuaries and in this he had been success-ful. In his future studies, Dr. Geary hoped that Mr. Shaw would also produce life tables for a population in which the ages of the insured population were fully checked for accuracy. Inaccuracy of age statement was such a bugbear in making life tables in this State that the organisa-tion with which Mr. Shaw was associated would be performing a useful public service if it could produce q 's which could be deemed to be abso-lutely accurate for a group of specified occupational constitution.