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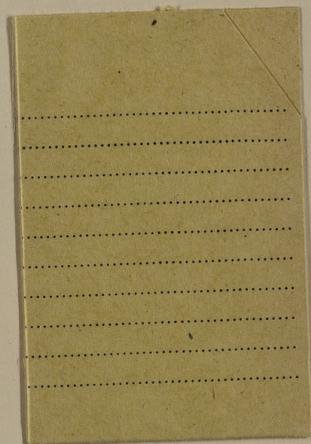
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TO THE

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FORTY-FIFTH ANNUAL REPORT

OF THE

REGISTRAR-GENERAL

OF

BIRTHS, DEATHS, AND MARRIAGES

IN ENGLAND.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

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LETTER

TO

THE REGISTRAR-GENERAL on the MORTALITY in the REGISTRATION DISTRICTS of ENGLAND and WALES during the TEN YEARS 1871-80 ; by WILLIAM OGLE, Esq., M.D.

*General Register Office, Somerset House.
28th February, 1885.*

SIR,

IN your Annual Reports account is given, among other matters, of the numbers of deaths registered, in successive years, in each of the districts into which England and Wales are divided for registration purposes. The comparatively small size and population of these districts causes no inconsiderable amount of fluctuation in their mortality, when thus recorded for single years; and consequently it is not thought worth while in your Annual Reports to reduce the figures for districts into the form of rates, though this is done in the case of larger areas, such as counties. Moreover, the calculation of death-rates for small areas, such as the registration districts, in single years would necessarily be untrustworthy, owing to the want of accurate knowledge as to the population of such small areas in each of the ten successive years that follow each Census. In the case of a large and populous area a sufficiently approximate estimate of the population can as a rule be formed, by supposing its growth to continue in the same ratio as prevailed in the interval between the two previous enumerations; but in the case of a small area with small population such an estimate would usually deserve but little confidence. These difficulties, however, and these sources of fallacy are to a very considerable extent obviated when the deaths in an entire decennium are taken into account, and when the period covered begins and ends with a Census, so that the mean population can be estimated with but slight risk of such an amount of error as would practically affect the result.

Considerations of this kind led my distinguished predecessor Dr. W. Farr, at the close of each of the two decennia that terminated respectively with 1860 and 1870, to compile with great labour a decennial supplement to the Annual Reports of the Registrar-General; and these decennial supplements have been found of the greatest use by all those whom business or scientific interest has led to study the vital statistics of this country. The volume, to which this letter forms a kind of introduction, is a continuation of the works of 1851-60 and 1861-70; and is supplemental to your Annual Reports for the years 1871-80.

The main portion of this volume has been drawn up in almost the same form as that adopted in the two previous decennial supplements. The figures, however, in the district Tables (pp. 1-370) now relate to persons, and are not given, as was previously the case, for males and females separately. This change has been made not merely to economise space, but to give a broader and therefore more secure basis for the calculation of rates, and also in order to meet the practical requirements of the Medical Department of the Local Government Board.

Another change introduced into this part of the volume is the addition to each District Table of a vertical column, in which the annual death-rate from each disease is entered; and of a horizontal column, in which is shown the annual death-rate at each age-period.

A further alteration in this volume is the incorporation with it of what had previously been a separate parliamentary* return, made at the instance and for the use of the Local Government Board. This addition to the volume (p. lxxxvi-c.) gives the death-rate of children under five years of age from each of several selected zymotic diseases; and the death-rates of males and females separately from phthisis and from diseases of the respiratory organs.

CHANGES IN THE DEATH-RATES.—The mean annual death-rate in England and Wales in the decennium 1871-80 was 21·27 per 1000, and was lower than in any preceding decennium since civil registration began. The decline in the rate was shared by both sexes, but unequally; the male death-rate having fallen by 4·24 per cent. and the female death-rate by 6·02 per cent., since the immediately preceding decennium.

The fall was also by no means equally shared by persons of all ages; and, speaking generally, the rates fell for the earlier age-periods, while they rose for the later periods of life. This was the case with both sexes, but with a notable difference; for, as is shown in the following table, the male death-rate was higher than in the previous decennium at each period after 35 years of age, while the female death-rate did not show an increase until after 45 years of age.

TABLE A.—Annual Mortality per 1000 of Males and Females in successive DECENNIA.

	Males.				Females.			
	1841-50.	1851-60.	1861-70.	1871-80.	1841-50.	1851-60.	1861-70.	1871-80.
All Ages	23·11	23·05	23·61	22·61	21·58	21·32	21·28	20·00
Under 5 years	71·20	72·43	73·16	68·14	61·09	62·74	63·43	58·10
5—	9·16	8·51	8·15	6·67	8·89	8·42	7·76	6·20
10—	5·12	4·88	4·46	3·69	5·42	5·06	4·48	3·70
15—	7·05	6·09	6·16	5·23	7·88	7·38	6·62	5·43
20—	9·50	8·83	8·45	7·32	9·08	8·53	7·96	6·78
25—	9·94	9·57	9·90	9·30	10·55	9·92	9·68	8·58
35—	12·85	12·48	13·46	13·74	12·91	12·15	12·03	11·58
45—	18·22	17·96	19·16	20·05	16·04	15·20	15·55	15·59
55—	31·81	30·85	33·00	34·76	28·44	27·01	27·77	28·54
65—	67·51	65·33	66·69	69·57	60·97	58·66	58·80	60·82
75 & upwds.	168·56	165·40	164·64	169·08	157·89	155·45	154·23	155·83

PROBABLE CAUSES OF THE CHANGES IN THE DEATH-RATES.—To what cause or causes are these remarkable changes in the death-rates—changes which it will be noted are only continuations of similar changes in the immediately preceding decennium 1861-70—to be ascribed? No certain answer can be given to this question; but there are some causes that can be pointed out as having at any rate contributed to the result, and as not very improbably having produced the whole of it. Let us in the first place consider the effects of the ever increasing efforts to improve the sanitary condition of the country. There can be no reasonable doubt that the very marked and progressive decrease in the general death-rate is due to these

* Usually known, from the name of the Member of Parliament who originally moved for it, as "Lowe's Return."

efforts; and that sanitation should have more distinctly affected the mortality of the young than of elder persons is only what might be naturally anticipated; for it is against noxious influences to which the young are more especially sensitive that the weapons of sanitary reform have been chiefly directed. That the death-rates, then, at the earlier age-periods of life should fall without any corresponding decline in the death-rates at the later ages is intelligible. But it is also not impossible, nor indeed improbable, that sanitation, while it has reduced the death-rates at the earlier, may actually have caused a rise in the death-rates at the later, stages of life. A vast number of children of permanently unsound constitutions, who under former conditions would have perished in youth, are now saved from early death by sanitary interference. These grow up to adult life and diminish the average healthiness of the adult classes, and so add to their death-rates.

Doubtlessly this tendency to a diminution in the average vitality of the adult classes is more or less counterbalanced by influences that act in a contrary direction and that tend to increase that vitality. For, in the first place, it must be remembered that sanitation, though its chief operation may be the preservation of young lives, does also, if in a less degree, act directly as a preservative of persons more advanced in life; for fevers and other preventible diseases are by no means exclusively confined to the young. Secondly, if it be true, as doubtlessly it is, that sanitation preserves a number of sickly children from death and so adds a contingent of weakly members to the adult population, it is also true that it prevents a number of children, who under the former conditions would have had their strength broken and have grown up into weak adults, from undergoing this physical deterioration, and, therefore, will thus add to the healthiness of the adult ranks. Still it is very possible that these counterbalancing influences may have been inadequate to make up more than partially for the first mentioned effect of sanitation, and that the mean vitality of the adult classes may really have been diminished in the way described.

A second cause which may be assumed with much confidence to have conduced to a rise in the adult mortality without producing a corresponding change in the mortality at the earlier age-periods is the increasing severity of competition among adults. That the struggle for existence is daily becoming more and more severe, and that feverish excitement and reckless expenditure of energy are rapidly encroaching on repose and leisure, are matters of common observation. The wear and tear of life are greater, and vitality is sooner exhausted.

A third cause may also be pointed out, as probably in some small measure raising the adult mortality without affecting the death-rates at the earlier ages; namely, the ever-increasing tendency of the adult population to migrate from the rural districts into the towns, where the mortality is always higher. The effect of this cause, however, on the aggregate mortality of the country can scarcely be very great. It is found, moreover, that the rise in the death-rates in the later age-periods of life has not been confined to the urban population, but has extended also to the purely rural communities. This latter fact may, however, be partly explained by the gradual deterioration of the rural population owing to the constant migration of its more vigorous adults to the towns.

WHETHER THE CHANGES IN THE DEATH-RATES HAVE BEEN ADVANTAGEOUS TO THE COMMUNITY.—It is a question fairly open to discussion whether the changes in the death-rates that have now been described have conferred any real benefit upon the community at large; for it may be said, that, if the mortality has only fallen for the earlier age-periods while it has actually risen for the later stages of life, the country will have been

no gainer on the whole, but the contrary; for the lives which it has gained will have been lives in the unproductive period of existence, while the lives which it has lost, though fewer in number, will have been lives at the most valuable and productive stage. This question, therefore, will now be examined, and in order to do so in a satisfactory way it is first necessary to construct a new Life Table for comparison with the former English Life Table, which was based on the mortality of the 17 years, 1838-54.

A NEW ENGLISH LIFE TABLE.—The Life Table (see Table B. pp. vii-viii), starts with a million males and a million females, all born at one and the same time; and shows in Columns 2 and 6 how many survivors there would be, with the death-rates of 1871-80, at the end of each subsequent year of life. For example, it shows that of the million males born there would be 630,038 still alive at the end of 30 years from birth; and that of the million females there would be 658,418 survivors at the same age. Side by side with these columns are two other columns 1 and 5, which give the survivors at each year according to the former English Life Table, based on the mortality of 1838-54.

In Columns 4 and 8 is given the Mean After-lifetime, or Expectation of Life, of males and females respectively at the end of each year of existence. For example, in Column 4 it is shown that the Mean After-lifetime of males who have completed their 35th year of life is 28.64 years; and in Column 8 it is shown that the Mean After-lifetime of females at that age is 30.90 years. Side by side with these columns again are two other columns, Columns 3 and 7, giving for comparison the Mean After-lifetime according to the former English Life Table.

Having now briefly explained the form of the Table, let us proceed to compare the old and the new Life Tables; and we will begin with Columns 1 and 2, which give the annual surviving males in the two Tables.

Male Life Table.—By the old Table one half of the million males would be dead before the end of the 45th year; by the new Table half would not have died till after the end of the 47th year.

Again, comparing the two columns with each other, year by year, it will be seen that the survivors at the end of each year by the new Life Table exceed the survivors at the same age by the old Life Table at every date up to the 67th year, and that at the end of this 67th year from birth the surviving males by the new Life Table would be 267,829, while the survivors by the old Life Table would be 267,160. After that date there is a change, and the survivors at the end of each subsequent year are more numerous by the old than by the new Table.

In other words a male infant, subject to the rates that prevailed in 1871-80, would have a better chance of living 67 years than a male infant subject to the rates that prevailed in 1838-54, but a smaller chance of living more than 67 years; and, by way of example, his chance of living to complete 90 years would be fully one ninth less than what it was previously, or more precisely would be only in the proportion of 8015 to 9321.

It will now be sufficiently plain that the mere fact that the male death-rate has increased after the 25-35 period of life must not be interpreted as implying that the number of males surviving from a given number at the start will be less after that age, as hasty reasoners might possibly suppose; for, as has been shown, the contrary is the case up to the end of the 67th year; the explanation, of course, being that the death-rates before the 35-45 period of life have gone down so greatly since 1838-54, and the survivors at the end of the 45th year are so much more numerous than they were under the older rates, that they can support the higher mortality of after years for a considerable period and yet retain their numerical superiority.

TABLE B.—Old and New English Life Tables, based respectively upon the Mortality in 1838-54, and in 1871-80.

AGE.	MALES.				FEMALES.				AGE.
	Of 1,000,000 Born, the Number surviving at the end of each Year of Life.		Mean Afterlifetime (Expectation of Life).		Of 1,000,000 Born, the Number surviving at the end of each Year of Life.		Mean Afterlifetime (Expectation of Life).		
	1838-54.	1871-80.	1838-54.	1871-80.	1838-54.	1871-80.	1838-54.	1871-80.	
Column	1.	2.	3.	4.	5.	6.	7.	8.	Column.
0	1,000,000	1,000,000	39.91	41.35	1,000,000	1,000,000	41.85	44.62	0
1	836,405	841,417	46.65	48.05	865,238	871,266	47.31	50.14	1
2	782,626	790,201	48.83	50.14	811,711	820,480	49.40	52.22	2
3	754,849	763,737	49.61	50.86	782,990	793,359	50.20	52.99	3
4	736,845	746,587	49.81	51.01	764,060	775,427	50.43	53.20	4
5	723,716	734,068	49.71	50.87	750,550	762,622	50.33	53.08	5
6	713,881	726,815	49.39	50.33	740,584	755,713	50.00	52.56	6
7	703,156	721,103	48.92	49.77	732,771	750,276	49.53	51.94	7
8	699,688	716,309	48.37	49.10	726,116	745,631	48.98	51.26	8
9	694,346	712,337	47.74	48.37	720,537	741,727	48.35	50.53	9
10	689,857	708,990	47.05	47.60	715,769	738,382	47.67	49.76	10
11	685,982	705,146	46.31	46.79	711,581	735,405	46.95	48.96	11
12	682,612	703,595	45.54	45.96	707,770	732,697	46.20	48.13	12
13	679,256	701,200	44.76	45.11	704,155	730,122	45.44	47.30	13
14	676,057	698,840	43.97	44.26	700,581	727,571	44.66	46.47	14
15	672,776	696,419	43.18	43.41	696,917	724,956	43.90	45.63	15
16	669,296	693,695	42.40	42.58	693,050	722,084	43.14	44.81	16
17	665,529	690,746	41.64	41.76	688,894	718,993	42.40	44.00	17
18	661,402	687,507	40.90	40.96	684,378	715,622	41.67	43.21	18
19	656,868	683,941	40.17	40.17	679,463	711,946	40.97	42.43	19
20	651,903	680,033	39.48	39.40	674,119	707,949	40.29	41.66	20
21	646,502	675,769	38.80	38.64	668,345	703,616	39.63	40.92	21
22	641,028	671,344	38.13	37.89	662,474	699,141	38.98	40.18	22
23	635,486	666,754	37.46	37.15	656,509	694,521	38.33	39.44	23
24	629,882	661,997	36.79	36.41	650,463	689,759	37.68	38.71	24
25	624,221	657,077	36.12	35.68	644,342	684,858	37.04	37.98	25
26	618,503	651,998	35.44	34.96	638,148	679,822	36.39	37.26	26
27	612,731	646,757	34.77	34.24	631,891	674,661	35.75	36.54	27
28	606,906	641,353	34.10	33.52	625,575	669,372	35.10	35.83	28
29	601,026	635,778	33.43	32.81	619,201	663,959	34.46	35.11	29
30	595,089	630,038	32.76	32.10	612,774	658,418	33.81	34.41	30
31	589,094	624,124	32.09	31.40	606,296	652,747	33.17	33.70	31
32	583,036	618,056	31.42	30.71	599,769	646,957	32.53	33.00	32
33	576,912	611,827	30.74	30.01	593,196	641,045	31.88	32.30	33
34	570,716	605,430	30.07	29.33	586,575	635,003	31.23	31.60	34
35	564,441	598,860	29.40	28.64	579,903	628,842	30.59	30.90	35
36	558,083	592,107	28.73	27.96	573,192	622,554	29.94	30.21	36
37	551,634	585,167	28.06	27.29	566,431	616,144	29.29	29.52	37
38	545,084	578,019	27.39	26.62	559,619	609,599	28.64	28.83	38
39	538,428	570,656	26.72	25.96	552,758	602,924	27.99	28.15	39
40	531,657	563,077	26.06	25.30	545,844	596,113	27.34	27.46	40
41	524,761	555,254	25.39	24.65	538,876	589,167	26.69	26.78	41
42	517,734	547,288	24.73	24.00	531,849	582,104	26.03	26.10	42
43	510,567	539,161	24.07	23.35	524,765	574,919	25.38	25.42	43
44	503,247	530,858	23.41	22.71	517,617	567,612	24.72	24.74	44
45	495,770	522,374	22.76	22.07	510,403	560,174	24.06	24.06	45
46	488,126	513,702	22.11	21.44	503,122	552,602	23.40	23.38	46
47	480,303	504,836	21.46	20.80	495,768	544,892	22.74	22.71	47
48	472,306	495,761	20.82	20.18	488,339	537,043	22.08	22.03	48
49	464,114	486,479	20.17	19.55	480,833	529,048	21.42	21.36	49

TABLE B.—Old and New English Life Tables, based respectively upon the Mortality in 1838-54, and in 1871-80—continued.

AGE.	MALES.				FEMALES.				AGE.
	Of 1,000,000 Born, the Number surviving at the end of each Year of Life.		Mean Afterlifetime (Expectation of Life).		Of 1,000,000 Born, the Number surviving at the end of each Year of Life.		Mean Afterlifetime (Expectation of Life).		
	1838-54.	1871-80.	1838-54.	1871-80.	1838-54.	1871-80.	1838-54.	1871-80.	
Column	1.	2.	3.	4.	5.	6.	7.	8.	Column.
50	455,727	476,980	19.54	18.93	473,245	520,901	20.75	20.68	50
51	447,139	467,254	18.90	18.31	465,572	512,607	20.09	20.01	51
52	438,099	457,022	18.28	17.71	457,814	504,188	19.42	19.34	52
53	428,801	446,510	17.67	17.12	449,966	495,645	18.75	18.66	53
54	419,256	435,729	17.06	16.53	442,027	486,973	18.08	17.98	54
55	409,480	424,677	16.45	15.95	433,331	477,440	17.43	17.33	55
56	399,408	413,351	15.86	15.37	424,239	467,443	16.79	16.69	56
57	389,088	401,740	15.26	14.80	414,761	456,992	16.17	16.06	57
58	378,481	389,827	14.68	14.24	404,895	446,079	15.55	15.45	58
59	367,570	377,591	14.10	13.68	394,636	434,695	14.94	14.84	59
60	356,330	365,011	13.53	13.14	383,974	422,835	14.34	14.24	60
61	344,744	352,071	12.96	12.60	372,895	410,477	13.75	13.65	61
62	332,789	338,820	12.41	12.07	361,387	397,644	13.17	13.08	62
63	320,451	325,256	11.87	11.56	349,436	384,319	12.60	12.51	63
64	307,720	311,368	11.34	11.05	337,031	370,495	12.05	11.96	64
65	294,588	297,156	10.82	10.55	324,165	356,165	11.51	11.42	65
66	281,064	282,638	10.32	10.07	310,833	341,326	10.98	10.90	66
67	267,160	267,829	9.83	9.60	297,048	325,988	10.47	10.39	67
68	252,901	252,763	9.36	9.14	282,819	310,170	9.97	9.89	68
69	238,328	237,487	8.90	8.70	268,177	293,899	9.48	9.41	69
70	223,490	222,056	8.45	8.27	253,161	277,225	9.02	8.95	70
71	208,453	206,539	8.03	7.85	237,822	260,207	8.57	8.50	71
72	193,297	190,971	7.62	7.45	222,230	242,934	8.13	8.07	72
73	178,114	175,449	7.22	7.07	206,464	225,497	7.71	7.65	73
74	163,003	160,074	6.85	6.70	190,620	208,003	7.31	7.25	74
75	148,076	144,960	6.49	6.34	174,800	190,566	6.93	6.87	75
76	133,453	130,227	6.15	6.00	159,126	173,316	6.56	6.51	76
77	119,251	115,986	5.82	5.68	143,722	156,392	6.21	6.16	77
78	105,592	102,359	5.51	5.37	128,711	139,927	5.88	5.82	78
79	92,587	89,449	5.21	5.07	114,229	124,065	5.56	5.50	79
80	80,343	77,354	4.93	4.79	100,394	108,935	5.26	5.20	80
81	68,946	66,153	4.66	4.51	87,323	94,662	4.98	4.90	81
82	58,471	55,842	4.41	4.26	75,119	81,305	4.71	4.63	82
83	48,970	46,489	4.17	4.01	63,862	68,966	4.45	4.37	83
84	40,471	38,132	3.95	3.78	53,615	57,723	4.21	4.12	84
85	32,979	30,785	3.73	3.56	44,419	47,631	3.98	3.88	85
86	26,476	24,436	3.53	3.36	36,284	38,710	3.76	3.66	86
87	20,926	19,054	3.34	3.17	29,202	30,953	3.56	3.46	87
88	16,268	14,576	3.16	2.99	23,135	24,338	3.36	3.26	88
89	12,428	10,926	3.00	2.82	18,027	18,788	3.18	3.08	89
90	9,321	8,015	2.84	2.66	13,802	14,225	3.01	2.90	90
91	6,859	5,748	2.69	2.51	10,376	10,553	2.85	2.74	91
92	4,946	4,025	2.55	2.37	7,650	7,658	2.70	2.58	92
93	3,492	2,749	2.41	2.24	5,526	5,429	2.55	2.44	93
94	2,411	1,828	2.29	2.12	3,908	3,756	2.42	2.30	94
95	1,628	1,183	2.17	2.01	2,704	2,533	2.29	2.17	95
96	1,071	742	2.06	1.90	1,827	1,661	2.17	2.11	96
97	688	452	1.95	1.81	1,204	1,057	2.06	2.03	97
98	430	266	1.85	1.72	774	653	1.96	1.83	98
99	262	151	1.76	1.65	483	389	1.86	1.73	99
100	154	82	1.68	1.61	295	225	1.76	1.62	100

Let us now look at Columns 3 and 4, which give the Mean After-lifetimes at each year by the old and new Tables respectively. The Mean After-lifetime of an average male at birth is by the new Table 41.35 years; by the old Table it was only 39.91 years, showing an average gain for each male of 1.44 years, or nearly a year and a half. Going on down the columns, year by year, it will be seen that the After-lifetime is longer by the new than by the old Table at each year till the 19th; at the close of this 19th year the Expectation of Life is exactly the same in each Table, viz., 40.17 years. From that time onwards the After-lifetime is shorter by the new than by the old Table. The individual male lives on an average a shorter time after his 19th year is over than he did formerly; but it must be remembered that the number of individuals, out of equal numbers at the start, who survive to live these shorter lives is so very much greater than before, that the aggregate life of the whole is very considerably increased.

Female Life Table.—Let us now turn to the figures relating to female life. In Column 5 it is seen that by the old Life Table half of the million women born would have died before the end of the 47th year from birth; whereas by the new Table half would still be surviving at the end of the 52nd year.

It is not until almost the very end of life that the surviving females by the new Table become fewer than by the old; and even at the end of the 92nd year of life there are as many survivors by the new as by the old Table; and this, notwithstanding the fact that the female death-rate has increased after the 45-55 years period. A female born in 1871-80 had a better chance of living to be 92 than one born in 1838-54, but a slightly less chance of living longer than that.

Turning to Columns 7 and 8, which give the Mean After-lifetime it will be seen that the Expectation of Life at birth for females is 44.62 years by the new Tables, and was only 41.85 by the old Table, a gain of 2.77 years on an average for each female. Going down the columns, year by year, it will also be seen that the After-lifetime by the new Table is longer than by the old Table at each year to the completion of the 45th. Then the expectation is exactly the same in the two tables, viz., 24.06 years. After this age the Expectation of Life is shorter in the new Table than in the old.

BALANCE OF LOSS AND GAIN FROM THE CHANGES IN THE DEATH-RATES.—The importance of these changes in the death-rates, and consequently in the expectation of life, in regard to insurance, is of course self-evident. It is manifest that if a series of insurance premiums were calculated on the basis of the older English Life Table, those premiums would according to the new Table be too high in the earlier years and too low in the later years of life. Insurance, however, is a matter with which we are not now concerned; the object of the present inquiry being merely to ascertain what amount of lifetime has been added to the community by the diminution in the death-rates since 1838-54, and to what age-periods or stages of life these additional years belong. The figures in the Table which we have been discussing supply a basis which enables us with a little calculation to answer this question in the following manner.

The mean life-time of males is by the new Life Table 41.35 years, whereas by the old Table it was only 39.91 years. According, therefore, to the new Life Table, a million males would live 1,439,139 more years than would be the case according to the old Table. Similarly a million females would live 2,777,584 additional years. The years thus gained would be divided between the different periods of life in the following manner shown in the following Table:—

TABLE C.—Additional Years lived by a Million Males and a Million Females.

Age Periods.	Males.	Females.
0-15 -	255,340	288,226
15-25 -	281,872	339,933
25-35 -	344,906	453,221
35-45 -	310,746	499,471
45-55 -	211,040	474,009
55-65 -	86,920	385,257
65-75 -	-10,464	239,617
75-85 -	-27,770	89,568
85 and upwards	-13,451	8,282
Total years gained -	1,439,139	2,777,584

This Table shows plainly how erroneous is the conclusion sometimes drawn that because the death-rates have fallen only in the earlier age-periods, while they have risen in the later age-periods, the aggregate gain to the community from the changes is confined to the unproductive years of life. We may fairly take the period which intervenes between 25 and 65 years of age to be the most valuable part of life, and of the aggregate years saved, 66 per cent. in the case of males and 65 per cent. in the case of females are lived in this period.*

Before finally quitting this subject one other calculation is desirable. The mean annual number of births in England and Wales in 1871-80 was 858,878; and of these births 437,492 were of male, and 421,386 of female, infants. The additional years lived by this annual number of children, if subject to the reduced rates in the new Life-Table, would be as follows:—

TABLE D.—Additional Lifetime of Children born annually.

Age Periods.	Additional Lifetime, in Years, of		
	437,492 Males.	421,386 Females.	858,878 Persons.
0-15 -	111,709	121,454	233,163
15-25 -	123,317	143,243	266,560
25-35 -	150,894	190,981	341,875
35-45 -	135,949	210,470	346,419
45-55 -	92,328	199,741	292,069
55-65 -	38,027	162,342	200,369
65-75 -	-4,578	100,971	96,393
75-85 -	-12,149	37,743	25,594
85 and upwards	-5,885	3,490	-2,395
—	629,612	1,170,435	1,800,047

* The question dealt with above has been already handled by Mr. Noel A. Humphreys in an interesting paper read before the Statistical Society in April 1883. Mr. Humphreys, however, took the death-rates for the quinquennium 1876-80 as his basis, whereas in the above calculation and new Life-Table the basis is supplied by the mortality for the decennium 1871-80. Moreover, when Mr. Humphreys' paper was written the results of the census of 1881 were not fully known, and these turned out somewhat differently from what had been anticipated; consequently the death-rates used by Mr. Humphreys were not quite correct. Essentially, however, the conclusion arrived at by Mr. Humphreys was the same as that arrived at above.

The changes in the death-rates therefore have given to the community an annual addition of 1,800,047 years of life shared among its members; and, allowing that the changes in the death-rates are the direct consequences of sanitary interference, we must regard this addition of nearly two million years of life as an annual income derived from money invested in sanitation.

INCREASE OR DECREASE IN THE MORTALITY FROM SPECIAL CAUSES SINCE THE PREVIOUS DECENNIUM.—In 1861-70 there were on an average 22,416 deaths annually to a million persons living; in 1871-80 the proportion of deaths was only 21,272, a saving of 1,144 lives annually to each million persons living. The following Table, which is a summary of the more detailed Tables given later on (pp. cxii-cxvi), shows under what headings this saving was effected.

TABLE E.—Annual Deaths per Million Persons Living.

	1861-70.	1871-80.	Annual Decrease in 1871-80.	Annual Increase in 1871-80.
Small-pox	163	236	—	73
Measles	440	378	62	—
Scarlet Fever	972	716	256	—
Diphtheria	185	121	64	—
Whooping-cough	527	512	15	—
Fever	885	484	401	—
Diarrhoeal Diseases	1,076	935	141	—
Cancer	387	473	—	86
Phthisis	2,475	2,116	359	—
Hydrocephalus	347	317	30	—
Other Tubercular Diseases	437	445	—	8
Diseases of the Nervous System	2,785	2,770	15	—
" Circulatory System and Dropsy	1,349	1,477	—	128
" Respiratory System	3,364	3,760	—	396
" Digestive System	981	978	3	—
" Urinary System	298	392	—	94
Puerperal Fever, Childbirth	165	167	—	2
Violence	765	733	32	—
All other and Unstated Causes	4,815	4,262	553	—
All Causes	22,416	21,272	1,144	787
Balance of Decrease and Increase	—	—	1,144	—

The mortality from zymotic diseases in the aggregate as shown in this Table fell very considerably.

There is, however, one zymotic disease which exceptionally shows an increase, namely, *small-pox*. Under this heading the mortality rose from 163 per million living to 236. This rise was entirely due to the very serious outbreak which marked the two first years of the decennium, 1871 and 1872, and which led to the compulsory appointment of vaccination officers by Boards of Guardians, and consequently to a more stringent enforcement of infant vaccination.* The question of vaccination and its results was discussed at length in the 43rd Annual Report, for 1880, and it was there shown that when the statistics of small-pox are given not by artificial periods, such as decennia, but by natural periods, that is to say, by

* The Act was passed in 1871, but did not come into operation until 1872.

periods that coincide with the successive improvements in the enforcement of the Vaccination Acts, there has been a gradual and notable decline in the mortality from this disease. It was further shown that this decline has been entirely due to diminished mortality of children, and especially of children under five years of age; and that in the later periods of life the mortality has not only not decreased but has actually risen, slightly among young persons between 10 and 15 years of age, but very greatly among persons older than this; and lastly, that this increase has been the greater the more advanced the time of life. It will be seen on referring to the table at p. cxii, that even when the decennial period is taken, instead of the natural period which only includes the years since the compulsory appointment of vaccination officers, the above statement referring to the changed incidence of small-pox upon the successive age-periods still holds good. There is still, notwithstanding the rise in the total mortality from this disease, a great fall in the deaths caused by it in the first age-period, and a rise, increasing with the advance of age, in the later periods. There is, as was pointed out in your 43rd Annual Report, only one adequate explanation of this curious alteration,—an alteration to which no parallel is furnished by the other zymotic diseases—and that explanation is that vaccination confers a considerable immunity from small-pox, but an immunity, which is not only less than that conferred by an attack of small-pox itself, but much less permanent; its protective influence gradually dying out and requiring renovation. The results of this difference between vaccination and small-pox itself, as regards their protective action, were stated in the 43rd Annual Report, which has already been cited, in the following words, which I cannot do better than repeat: “Before vaccination came into use, few persons escaped having small-pox at some or other time in their lives. The great majority had it when young, and of these a large proportion died, causing a very high death-rate in the earlier age-periods. But those who survived the attack enjoyed a practically complete immunity for the rest of their lives, and, as they formed a considerable proportion of the population at the later age-periods, the small-pox death-rates at these later periods of life were very low. But when vaccination came into use, and in proportion as its use became more and more general, the relative conditions of the different age-periods, as regards immunity, were materially altered and partially inverted. Childhood, previously altogether unprotected, now received a very considerable immunity; while the later ages, previously much protected, now had their immunity considerably diminished, and the more so the later the period of life and the more remote therefore the date of vaccination.”

The decline in the mortality from *scarlet fever* was very considerable, the annual deaths per million having fallen from 972 to 716. The decline under the heading *measles* was much less considerable, being only from 440 to 378. It can scarcely be doubted that a considerable share in these declines was attributable to sanitary measures, and especially to the improved facilities for separating the infected from the healthy, and to the removal of conditions which, though they may not actually generate the disease, yet add greatly to its virulence and largely diminish the chances of recovery from its attacks; but at the same time it must not be forgotten that these diseases appear in epidemics at irregular periods, determined by conditions as yet not ascertained, and that consequently the mortality in any one decennium as compared with another depends to a considerable extent upon what we may call the chance of its containing more or fewer of these irregular visitations. Thus, in the decennium 1861–70 there were two periods of such visitations from scarlet fever, namely, 1863–64 and 1868–70, covering between them half the entire decennium; whereas in the next ten years, 1871–80, the disease was only widely epidemic in a single year, namely 1874. It may of course be that the frequency with

which these epidemic years recur may itself be largely determined by sanitary conditions; but of this there is, at any rate at present, no certainty.

The registered deaths from *diphtheria* fell from an annual average of 185 per million to 121; but so much uncertainty attaches to the use of the term “diphtheria” by medical men, and there is such confusion in their certificates between diphtheritic and simple spasmodic croup, that the returns under this heading are extremely untrustworthy.

The mortality from *whooping-cough* remained practically unchanged from that of the preceding decennium, the fall being only from 527 to 512. Owing to the very early age at which whooping-cough usually occurs, and the consequent impossibility of removing the sick from the healthy, this disease is less amenable than most other zymotic ailments to sanitary control. As was said in speaking of measles and scarlet fever, the mortality from whooping-cough in a given decennium is determined mainly by the number of epidemical years that occur within the period; and there was one such year in each of the two last decennia, viz., 1866 in the earlier and 1878 in the later decennium.

The deaths from *fever*, including typhus, enteric fever, and ill-defined forms of continued fever, fell from an annual average of 885 per million to 484, a decline of no less than 45 per cent. This is the most satisfactory of all the declines shown in the table; not only because it is the greatest in amount, but because enteric fever, to which is due the main bulk of the deaths attributed to fever, is of all diseases, putting aside the effect of vaccination upon small-pox, the one which is most directly and largely affected by sanitary measures; so that the decline in mortality under this heading is the best test available of the efficacy of sanitary administration. Doubtless there are for typhus and for enteric fever, as for other zymotic diseases, epidemical years, when meteorological or other uncontrollable conditions favour the development of the specific virus to which these fevers are due; but on examining the figures in the successive Annual Reports, the irregular fluctuations of mortality caused by the recurrence of such years are almost entirely obliterated by the continuous and progressive fall which has been produced by more careful sewerage, better water-supply, and other sanitary improvements.

The deaths from *diarrhœa* fell from an annual rate of 1076 per million to 935, showing an annual gain of 141 lives for each million persons living. But as the mortality from diarrhœa is more directly and manifestly affected by meteorological conditions than that from any other zymotic disease, it may be questioned whether the decline was not due to a series of comparatively favourable summers in the one decennium as compared with the other, rather than to any sanitary measures that may have been adopted. In order to test this we must compare the summers of 1861–70 with those of 1871–80; and as the great bulk of fatal diarrhœa occurs in the interval between mid June and mid September, we may confine our comparison to that trimestrial period. Speaking generally, it appears from the returns of mortality in London that the diarrhœa mortality becomes high when the mean weekly temperature rises to about 63° F. Now in the ten years 1861–70 there were altogether 317 days in the three summer months in which the mean temperature recorded at Greenwich was above 63° F., while in the next decennium the number of such days was 325. Adding together the excesses above 63° F. of the 317 days in the first decennium, we have a total excess of 1153 degrees; while the total excess of the 325 hot days in the second decennium was 1178 degrees. Measured, therefore, in this somewhat rough manner, the two decennia were practically on an equality as regards such temperature as may be supposed to raise the mortality from diarrhœa; and such slight difference as the figures indicate is against the healthiness in this respect of the later decennium. We may,

therefore, infer with much probability that the decline in the diarrhoeal mortality in 1871-80, as compared with 1861-70, was not due to a lucky succession of cooler summers, but to improvement in cleanliness and other sanitary conditions.

The deaths ascribed to *malignant disease* in the decennium 1851-60 amounted to 317 annually per million persons living; in the next decennium, 1861-70, the mortality had risen to 387; and it again rose in 1871-80 to 473; so that in the course of twenty years the mortality under this heading apparently increased by nearly 50 per cent. The increase, moreover, as is shown in the successive Annual Reports, was steady and progressive; year by year the number of deaths under this heading has increased; and the increase, it may be added, is still going on. There can be very little doubt that a considerable part in this apparent increase is simply due to improved diagnosis and more careful statement of cause on the part of medical men. Year by year the number of deaths ascribed to tumour, abdominal disease, or other similarly imperfectly stated causes has been undergoing diminution, and there has been of course a corresponding addition to the mortality under the more definite headings. Moreover, the increase of mortality from cancer has been much greater among males than among females; the rate for males having risen 62 per cent. in twenty years, while the rate for females has only risen 43 per cent. Now, were the rise not merely apparent but real, being due to general physical deterioration of the people or other similar causes, there would seem no reason why the male sex should have suffered more than the female; whereas the difference is readily intelligible on the hypothesis that the rise has been at any rate in great measure only apparent, and due to better diagnosis. For the cancerous affections of males are in much larger proportion internal or inaccessible than are those of females, and consequently are more difficult of recognition, so that any improvement in medical diagnosis would add more to the male than to the female reckoning.

The mortality from *phthisis* showed a very remarkable diminution, there being an annual gain of 359 lives to a million living. This gain, however, was more than counterbalanced by a loss of 395 lives from *diseases of the respiratory system*. Knowing how vague has been the use of the term "phthisis," it is tempting to assume that the apparent changes were simply due to transference from one heading to the other, and that the mortality really underwent little change. And probably to some extent this is true, for the term phthisis or consumption is not now used in quite so vague a manner as it was in former years, when any undiagnosed chronic affection of the lungs was likely to be so designated. Still this can hardly be supposed to be the explanation of the whole matter, for while the registered mortality from phthisis fell at every one of the successive age-periods, the registered mortality from diseases of the respiratory organs remained practically unaltered in the periods of life between the 5th and 26th years of age, and only rose among young children under 5 and among persons over 25 years of age.

How much of the fall in the registered mortality from phthisis was real, and how much was merely due to transference, it is impossible to say; but it must be noted that the mortality ascribed to other forms of tuberculosis, with the exception of hydrocephalus, showed no decline. Under "other forms of tuberculosis" are comprised a certain number of deaths simply ascribed to tubercular disease without further specification, but the great bulk consists of deaths from *tabes mesenterica* and tubercular peritonitis.

The mortality ascribed to "*diseases of the nervous system*" remained practically without change in its total amount. It will be seen, however, on referring to the detailed table (p. cxv), that the age-incidence of the

mortality underwent very notable alterations. The deaths in the earliest age-period (0-5) fell very greatly, probably in great part because of the increasing carefulness in statement of cause by medical men, who are no longer so generally contented as they formerly were to refer the death of an infant to "convulsions," but prefer, when possible, to give the primary cause of which the convulsions were a symptom; but this diminution in the deaths at the earliest age-period was fully counterbalanced by the great increase of mortality in the more advanced stages of life, from 35 years of age onwards, an increase which, though in some slight degree to be accounted for by greater carefulness of statement, yet, doubtlessly, was in great measure real, and is probably to be explained by the constantly increasing strain upon the nervous system involved in the keener competition and other conditions of modern life.

There was a considerable increase of mortality under the heading *diseases of the organs of circulation*, with which, in order to make fair comparison with the preceding decennia, it was found necessary to combine *dropsy*. In the earlier age-periods, under 15 years of age, the mortality declined; between 15 and 35 years the mortality remained practically unaltered; while at each age-period after this there was a large increase, which was especially great in the last period of life, viz., after 75 years of age, when the rate advanced more than 18 per cent. Probably part of this increase was real, part only apparent and due to greater precision of statement in the certificates of deaths of aged persons, which it is no longer thought sufficient to ascribe generally to "old age" without further specification.

The mortality from *diseases of the digestive organs* remained unaltered. Under this heading are, however, included diseases that differ very greatly from each other when viewed ætiologically, and there is especially one group of diseases among them, viz., diseases of the liver, that is of great interest, inasmuch as the fluctuations in the mortality caused by it afford probably the best available measure of the extent to which alcoholic excess prevails in the country. The deaths attributed directly to chronic alcoholism or to delirium tremens supply a very unsatisfactory measure of such excess, not only because these deaths form a very insignificant proportion of the total mortality due to drink, but because the wish to spare the feelings of surviving relatives prevents the returns of such deaths being at all trustworthy.

But cirrhosis of the liver is a term which the certifying practitioner can use without fear of giving offence, and as this disease is one of the commonest consequences of alcoholic excess, and is also one of the chief contributors to the mortality from liver disease generally, the value of this group of diseases for the purpose mentioned is evident. It will be seen later on, when the mortality in different trades comes under review, that the mortality from liver disease among men engaged in the liquor trades is six times the average for males generally. It is, therefore, very desirable to separate, if possible, the mortality from liver diseases from the mortality from other diseases of the digestive organs. In this decennial supplement they have not been thus separated; by referring, however, to the separate annual reports it is possible to get the necessary data; and the following is the result as regards males.

TABLE F.—Annual Mortality of Males per Million living from Diseases of the Liver and Ascites at successive Age-periods.

PERIOD.	ALL AGES.	Under 5	5-	10-	15-	20-	25-	35-	45-	55-	65-	75 and upwds.
1861-70	435	342	37	34	49	79	203	529	993	1,638	2,281	2,030
1871-80	441	361	29	28	35	63	192	531	1,054	1,736	2,564	2,166

It appears from this table that the mortality at all ages together remained practically unaltered. There were, however, some alterations in the rates at the different age-periods; for while the mortality fell at each of the earlier periods of life, excluding infancy, it rose somewhat, but not very much, at each age-period after the 45th year of life; and, as these are the age-periods when the deleterious effects of alcoholic habits upon the liver would be most distinctly felt, it is not impossible that the rise of hepatic mortality at this end of life may indicate some increase of intemperance.

In the decennium, 1851-60, the deaths ascribed to *diseases of the urinary organs* were in the proportion of 214 annually to a million persons living; in the next decennium, 1861-70, the proportion rose to 298, again to be increased to 392 in 1871-80. Thus in the course of 20 years the registered mortality from these diseases rose no less than 83 per cent. The increase was common to each age-period, as is shown in the detailed Table (p. cxvi), but was proportionally greatest in the earlier stages of life, and notably among children under 5 years of age, where the increase of mortality in the 20 years was almost 200 per cent. Reference to the successive Annual Reports shows that the increase has been going on steadily year by year, in practically unbroken continuity, ever since civil registration began in 1837. That year was also the date of the publication by Dr. Bright of his discovery of the very common diseases which ever since have borne his name; and there can be no reasonable doubt that the apparent increase of mortality from renal disease is attributable to the gradual extension of the knowledge of Dr. Bright's discoveries, and the recognition of cases as renal that previously were attributed to other causes. It is possible of course that there may also have been some real increase; but there is no evidence whatsoever that such has been the case.

The mortality from *Puerperal Fever and Childbirth* per million persons living has remained practically unaltered for three successive decennia, having been 164 in 1851-60, 165 in 1861-70, and 167 in 1871-80. It is better, however, to measure the mortality from these causes by the proportion of the deaths to births, rather than by the proportion of the deaths to the total population, regardless of sex, age, and civil condition.

The general result, however, of this better method is much the same as that of the less accurate plan. In 1851-60 the deaths of mothers from these causes were 4.80 per 1000 children born alive, in 1861-70 they were 4.69, and in 1871-80 they were 4.75; rates which may be regarded as practically identical.

The deaths ascribed to *Violence*, including accidents, homicides, and suicides, were in the proportion of 733 per million persons living, whereas in the preceding decennium the proportion had been 765. On referring to Table 5 at page cxvi, it will be seen that the rate fell at each age-period under 55, whereas the mortality from violence after that age showed an increase at each age-period.

DIFFERENCES IN THE DEATH-RATES IN DIFFERENT PARTS OF THE COUNTRY.—The mean annual death-rate varied very greatly in different districts, the extreme limits having been 14.13 and 33.57 per 1000. Among the 647 districts into which England and Wales are divided there were 8 in which the mean annual rate was under 15.0 per 1000; 31 more in which it was under 16.0; and again 62 others in which it did not exceed 17.0. These 101 districts together constitute what are called in some of the Tables the Selected Healthy Districts, and form a convenient standard for comparison.

In 326 other districts the mean annual death-rate was between 17.0 and 20.0; in 195 it was from 20.0 to 25.0; in 23 from 25.0 to 30.0, and in the remaining 2 it exceeded this high figure.

The death-rate in a district is frequently raised unduly by the presence of a large hospital or asylum which receives patients from outside the district itself. In Table 1 (pp. lxxviii-lxxxv) notes will be found, making correction, so far as practicable, for such disturbing influences. Excepting, however, in some few cases, such correction does not make any very material alteration; and the differences between one district and another are not to be thus explained.

CAUSES OF THE DIFFERENCES IN THE DEATH-RATES.—To what cause or causes then are these wide differences between districts in regard to their death-rates to be ascribed? It is very common indeed to hear and to read statements in which the speaker or writer assumes without any appearance of doubt that the differences of mortality are simply and wholly due to differences in the thoroughness with which the sanitary authorities carry out the provisions of the Public Health Acts; and these persons would lead one to suppose that, if all sanitary authorities were equally vigilant, the death-rates would be in all parts practically equal, excepting that some slight differences might be caused by climatic and generally by geographical conditions.

That sanitary administration can do much to lower the mortality of a given place is indisputable. The very great general decline in the death-rates since the commencement of active efforts to ensure more efficient sanitation is sufficient evidence of this; as also is the further notable fact, that the decline in the death-rate has been greatest in those parts in which the sanitary administration has been most active, that is to say, it has been greater in the urban than in the rural districts. But to attribute the whole or even the greater part of the difference of death-rates between one district and another to this cause is to ignore factors of the very greatest importance, which exert influences over which sanitary authorities have practically little or no control. The evils and the diminished vitality that are caused by poverty, crime, personal uncleanness, drink, and excess of all kinds, as also by the close aggregation of human beings in places that offer the best chance of lucrative employment, and especially by the unhealthiness of certain occupations, are such as can at best be mitigated by the sanitary authorities, and often lie entirely outside their power of interference. Yet there is good reason to believe that these are the causes to which the main part of the difference between one part of the country and another, in the matter of mortality, is due.

EFFECT OF DIFFERENCES IN AGE AND SEX DISTRIBUTION UPON THE GENERAL DEATH-RATE.—Some of the above-mentioned causes, namely, the close aggregation of inhabitants in a given area, and the unhealthiness of certain occupations, will presently be considered. But before discussing these questions, it is necessary to point out that two places might be on a perfect equality with each other as regards their climate, their sanitary arrangements, their closeness of aggregation, as also the habits and the occupations of their inhabitants, and yet might have very different general death-rates, owing to differences in the age and sex distribution of their respective populations. Such a supposed case is, of course, scarcely likely to present itself; for when the prevalent occupations are the same in two places, the age and sex distribution is almost certain to be the same also. But in places where the prevalent occupations are not the same, there are often very great differences in the age and sex distribution of the populations, and such as seriously affect the general death-rates. It is unsafe, therefore, to base any comparison between two areas upon their general death-rates, until it has been first ascertained that the populations of the two are practically identical as regard their age and sex distribution.

The age and sex distribution in any town or other considerable area is determined mainly by the nature of the prevalent occupations, and as these are generally fixed and do not change materially even in long periods, the age and sex distribution also remains practically unaltered. The general

death-rate, therefore, of any town or other large area in one year is fairly comparable with the death-rate of the same town or area in other years, without correction for age and sex. But not so, as explained, when one town or area is compared with another. Here corrections are required; and, if strict accuracy be necessary, corrections must be made not only for age but for sex distribution. The differences, however, due to variations in sex distribution are usually so small that it is practically sufficient to correct merely for age distribution, and thus save half the labour. In the following table such correction has been made for the recorded death-rates in each of the registration counties. The rates in column 2 are the mean annual death-rates as recorded; the rates in column 3 are these death-rates corrected for age differences; that is to say, they are the death-rates that would have been recorded had the age distribution of the population in each county been identical with the age distribution of the whole population of England and Wales.*

The great differences in mortality that exist between one county and another, and between the individual counties and England and Wales as a whole, may perhaps be more readily apprehended if the mortality in England and Wales be represented by 1,000 and that in each county, after correction for age distribution, by its proportional figure. This has been done, and the figures are given in column 4.

TABLE G.—Mean Annual Death-rates per 1000 in Registration Counties, &c. during the Ten Years 1871–80, as recorded, and as corrected for Variations of Age Distribution.

Counties, &c., in Order of corrected Death-rate.	Recorded Death- rate.	Corrected Death- rate.	Com- parative Mortality Figure.	Counties, &c., in Order of corrected Death-rate.	Recorded Death- rate.	Corrected Death- rate.	Com- parative Mortality Figure.
Columns: 1.	2	3	4	Columns: 1.	2.	3.	4.
England and Wales -	21·27	—	1000	Middlesex (ex-met.)	17·93	18·29	860
Dorsetshire -	17·46	15·97	751	Worcestershire -	18·95	18·58	874
Sussex -	17·05	16·36	769	Northamptonshire -	19·56	18·71	880
Herefordshire -	18·36	16·40	771	Bedfordshire -	19·37	18·79	883
Rutlandshire -	18·46	16·44	773	North Riding -	19·68	18·88	888
Huntingdonshire -	18·47	16·45	773	Gloucestershire -	19·82	19·02	894
Westmorland -	17·72	16·63	782	North Wales -	20·59	19·04	895
Suffolk -	18·79	16·68	784	Cornwall -	20·32	19·08	897
Wiltshire -	18·60	16·77	788	Derbyshire -	20·54	20·40	959
Berkshire -	18·01	16·93	796	South Wales -	21·09	20·72	974
Cambridgeshire -	18·76	17·10	804	Nottinghamshire -	21·23	20·81	978
Lincolnshire -	18·53	17·10	804	Leicestershire -	21·61	20·83	979
Surrey (ex-met.) -	16·77	17·15	806	Cumberland -	21·49	20·86	981
Hertfordshire -	18·37	17·18	808	East Riding -	21·36	21·07	991
Shropshire -	18·80	17·21	809	Cheshire -	21·04	21·58	1015
Buckinghamshire -	18·62	17·24	811	Monmouthshire -	21·88	21·76	1023
Essex -	17·94	17·25	811	Warwickshire -	21·90	22·17	1042
Kent (ex-met.) -	17·81	17·27	812	Staffordshire -	22·44	22·73	1069
Somerset -	19·09	17·31	814	Northumberland -	22·74	22·96	1079
Norfolk -	19·80	17·50	823	London -	22·37	23·66	1112
Oxford -	19·00	17·56	823	West Riding -	23·24	24·29	1142
Hampshire -	18·26	17·75	835	Durham -	23·77	24·32	1143
Devonshire -	19·67	18·10	851	Lancashire -	25·17	26·87	1263

It will be noticed that in by far the greatest number of counties the corrected rate is somewhat lower than the recorded rate, but that in ten instances the contrary is the case, the corrected rates being the higher.

* For recorded death-rates in Registration Counties in the ten years 1871–80 (persons, males, and females), at various age-periods, see Table 3, pp. ci-iii.

It will be noticed moreover that these ten exceptional counties are all (save the extra-metropolitan portions of Surrey and Middlesex) industrial counties, where the death-rates even before correction were already extremely high, while all the agricultural counties are comprised in the majority, and have their death-rates, which already were low, made still lower by correction. Thus the differences of mortality between the several counties are greater after correction than before; the extreme limits of variation before correction being between 16·77 and 25·17, whereas after correction the rates range from 15·97 to 26·87. When a similar method of correction is applied to a great town and to a purely rural district respectively, the changes produced in the recorded rates are even greater than those produced in counties; and the general rule is that correction raises the rates of towns and industrial centres, but lowers the rate of rural districts; the explanation being that the population of a town or industrial centre contains a much smaller proportion of persons of advanced age, and a much larger proportion of persons in the prime of life than does a strictly rural population.

This question is of so much importance, and its right comprehension so necessary for those who would wish to avoid drawing false conclusions from comparisons of recorded death-rates, that it may be well to illustrate the statement that has been made still further.

England and Wales are divided out, as is well known, into urban and rural sanitary districts. We may take the urban sanitary districts in the aggregate to represent the towns, and the rural sanitary districts to represent the country. The age and sex distribution of the population of these contrasted groups of districts is given in the Census Returns for 1881. Now if we apply to each such constituted population the mean (1871–80) annual death-rates in England and Wales at each age-period, the death-rate in the urban population will be 20·40 per 1000, while the death-rate in the rural population will be 22·83. Such would be their respective death-rates on the hypothesis that the urban districts and the rural districts were equally healthy. We know, however, as a matter of fact that the urban death-rates instead of being lower than rural death-rates are much higher. The difference of healthiness, therefore, between the two is much greater than the difference as shown by their recorded death-rates.

Still one more example before finally quitting the subject. The general death-rate in England and Wales in 1881 was 18·9 per 1000 persons of all ages, while the general rate in France was 22·0, or no less than 3·1 higher than in England. But much of this difference was simply due to differences in the age-distribution of the two populations. For had the age-distribution of the French population been identically the same as that of the English population, the French general death-rate would have been 20·9 and not 22·0 as recorded. Thus of the 3·1 which was the difference between the general rates as recorded 2·0 was due to difference of health conditions, while 1·1 was due to difference in age-distribution.

In this Decennial Supplement the general death-rate given for each Registration District is of course the actual or recorded death-rate, without correction. Inasmuch, however, as the death-rates are given for each successive age-period in each district, the correction for age-distribution can be readily made by applying these death-rates to a population of 1000 persons having the same age-distribution as the population of England and Wales. The age-distribution of this 1000 persons is as follows:—

TABLE H.—Age-distribution of Population (PERSONS) of England and Wales. (Mean of 1871 and 1881.)

All Ages.	AGE-PERIODS.										
	Under 5	5–	10–	15–	20–	25–	35–	45–	55–	65–	75 and upwds.
1000	136	120	107	97	89	147	113	86	59	33	13

RELATION OF AGGREGATION OF POPULATION TO DEATH-RATES.—It is notorious that the mortality is far higher in towns than in rural parts; and it has been shown in the preceding section that the difference between the two is even greater than might be inferred from their recorded death-rates. Why should this be? Why are towns less healthy than the country? The most notable difference in the conditions under which the urban and the rural populations live is of course the difference they present in regard to aggregation; and consequently it will be well to bring out in greater detail the relation between such aggregation and mortality; a relation, be it said, that was put prominently forward by Dr. Farr in the two preceding decennial supplements.

In order to display this relation as fully as possible, all those districts in which the mean annual death-rate was under 15 per 1000 have in the following Table been grouped together, and the density of these populations in their aggregate areas has been determined. Another similar group has been made of the districts with death-rates over 15 but under 16, and so on for each successive unit of death-rate. If the death-rates were determined simply by density, the series of figures in Column 7 would of course increase regularly from the top downwards, as do the rates in Column 5; and it will be seen that this is actually the case for the last and much greater part of the Column, but that there is considerable irregularity in the first few terms of the series. It is not apparently until the density has reached a certain degree of intensity that it begins to exercise any appreciable effect. This indeed might have been anticipated. For though we can readily understand that in crowded communities it may be a matter of vital importance whether there are 500 or 1000, or 2000, or more persons living on a square mile, yet it can scarcely make any difference, so far as health goes, whether in rural districts there be two acres or three acres on an average to each inhabitant. The differences in the death-rates in these sparse populations are determined by other conditions than aggregation.

TABLE I.—Area, Population, Death-rates, and Density, in GROUPS OF DISTRICTS, 1871-80.

Annual Death-Rate per 1,000.	Number of Districts.	Area in Acres.	Ten Years 1871-80.		Mean Annual Death-rate per 1000.	Mean Density (Acres to a Person).	Persons to a Square Mile.
			Mean Population.	Deaths.			
Cols. - - -	1.	2.	3.	4.	5.	6.	7.
14 and under 15 -	8	432,480	171,244	24,804	14.48	2.53	253
15 " " 16 -	31	1,612,844	503,594	78,570	15.60	3.20	200
16 " " 17 -	62	3,423,169	1,379,250	229,301	16.63	2.48	258
17 " " 18 -	102	6,586,426	2,166,690	380,980	17.58	3.04	211
18 " " 19 -	129	9,197,922	2,787,836	516,671	18.53	3.30	194
19 " " 20 -	95	6,797,350	2,308,721	449,736	19.48	2.94	217
20 " " 21 -	50	3,421,448	2,450,483	503,702	20.56	1.40	458
21 " " 22 -	46	2,412,654	2,551,807	549,573	21.54	0.95	677
22 " " 23 -	42	1,324,840	2,692,101	607,008	22.55	0.49	1,301
23 " " 24 -	30	938,134	2,666,484	627,660	23.54	0.35	1,819
24 " " 25 -	27	617,059	2,088,340	509,661	24.41	0.30	2,166
25 " " 26 -	14	312,350	1,375,652	351,318	25.54	0.23	2,819
26 " " 27 -	5	76,227	350,681	92,092	26.26	0.22	2,944
27 " " 34 -	6	88,669	850,906	257,247	30.23	0.10	6,144

DIRECT AND INDIRECT EFFECTS OF AGGREGATION.—It must not be supposed that the higher death-rates, which go hand in hand with increased density of population, are simply the direct results of such aggregation. Doubtless where people are crowded together certain injurious conditions are produced which directly affect the mortality; the air, the soil, and often the water are liable to be fouled; and infectious diseases, having a shorter average distance to travel from individual to individual, are more readily spread abroad. But these direct consequences of close aggregation are probably as nothing in comparison with its indirect consequences or concomitants. The more crowded a community, the greater, speaking generally, is the amount of abject want, of filth, of crime, of drunkenness,* and of other excesses, the more keen is the competition, and the more feverish and exhausting the conditions of life; moreover, and perhaps more than all, it is in these crowded communities that almost all the most dangerous and unhealthy industries are carried on. It is not so much the aggregation itself, as these other factors which are associated with aggregation, that produce the high mortality of our great towns or other thickly populated areas. Our next business, therefore, should be to investigate the action of each of these several factors separately, and to see to what extent and in what manner they respectively add to the mortality of towns. There is, however, only one among them, but that the most important, that lends itself at all readily to statistical examination, namely, the influence of occupation, and consequently this is the only one of the factors with which it will be attempted to deal; the remaining and larger part of this introduction being devoted to its study.

MORTALITY OF MALES ENGAGED IN DIFFERENT OCCUPATIONS.

In each of the two former decennial supplements† an attempt was made to estimate the comparative mortality of males engaged in different professions and trades. The numbers of males engaged in each occupation and their ages were taken from the Census returns; while the numbers of deaths at each age-period were abstracted from the death-registers. The calculations in the Supplement for 1851-60 were based upon the Census numbers for 1861, and the deaths in 1860 and 1861; in the Supplement for 1861-70, upon the Census numbers for 1871, and the deaths in the same year. The attempt has been renewed on the present occasion, and on a larger scale, the deaths in combination with ages and occupations having been abstracted for three entire consecutive years, namely, 1880, 1881, and 1882. In order to ensure as great accuracy as was possible, the deaths in these three years were abstracted by the same clerks, and on occupation sheets of the same form, as had served for the abstraction of the living in the Census of 1881, and the same rules as to the details of the process were observed in each case.

The inquiry was limited, as on the previous occasions, to males, and for the same reason; namely, that the uncertainty attaching to the statement both of occupation and of age is very much greater in the case of women than of men. Males under 15 years of age were also excluded; inasmuch as the influence of occupation, which was the object of inquiry, is practically inappreciable at that early period of life.

The total number of males, 15 years of age or upwards, living in England and Wales at the date of the Census was 7,911,436, and the total number of deaths of males at those ages abstracted from the registers of the three years, of which the Census year was the centre, was 418,214. With so wide a basis of observation as this, and with the

* See 4th Report of Select Committee on Intemperance (1878), p. 585. "On the whole, in the towns where the drunkenness is greatest the population is most dense."
† Supplements to the 25th and 35th Annual Reports of the Registrar General.

precautions that were taken to ensure, so far as possible, uniformity in the abstraction of the living and the dead, a very high degree of trustworthiness may fairly be claimed for the results. There are, however, numerous difficulties and causes of error that practically interfere with what might at first sight appear to be a simple though highly laborious process; and some of these difficulties and causes of error it is important to set forth, so that each person who interests himself in the results may be able to form an estimate as to the amount of confidence he should place in them.

In the first place then, although the aggregate numbers, both of the living and the dead, that were abstracted were, as we have seen, very great, yet the numbers of persons in many of the individual trades, and still more the numbers at each age-period in such trades, were but small.

The amount of confidence in the results is of course, *ceteris paribus*, proportionate to the number of observations, which depends on the number of persons engaged in the occupation. The figures therefore which relate to small trades, or to age-periods where the numbers are few, should be received with due hesitation.

A second and still more serious difficulty and cause of error is due to the vagueness with which the occupation is oftentimes stated both in the returns made for the Census and in the death-registers, and especially in the latter. As the same rules for dealing with doubtful cases were adopted, as already mentioned, in abstracting the living from the Census returns and the dead from the death-registers, it might be supposed that this cause of error would be practically immaterial, as indeed it would be, were the vagueness of statement similar in amount and character in the two cases. But there is reason to believe that the vagueness of statement as to occupation was much more considerable in the death-registers than in the Census returns, inasmuch as special precautions had been taken in the case of the Census to ensure great precision in the statement of trade or profession, while no such special precautions had been taken in the case of the death-registers.

In order to obviate to some extent the evils arising from this vagueness, and also at the same time to increase the numerical basis of the calculation, occupations that are likely to be confounded with each other to any considerable extent have been grouped together, and in some cases it has been found necessary to do this, even when an occupation is of such a definite character that apparently it is not likely to be confounded with another. For instance, no occupation would seem at first to be more definite than that of a Coalminer; and as there were at the date of the Census no fewer than 355,363 male coalminers over 15 years of age, it might naturally be supposed that here at any rate was an industry in which the death-rate could be calculated with much certainty. But it was soon discovered that a very considerable number of Coalminers who die are simply described in the death-registers as Miners without further specification; and consequently it became necessary to group all miners together; or rather to divide them, as will be explained further on, geographically, and not directly by the character of the minerals. Again, in the death-registers there is often a confusion between General and Agricultural Labourer; and in consequence it was found necessary to group these together; while, in order to diminish the disturbing influence of the intermixture of general with agricultural labour, the calculation was based on the returns and registers for ten* selected counties, in which the great mass of labour was agricultural.

Similarly Hosiery-manufacture and Hosiery-selling were found to be practically indistinguishable in the death-registers, and have been therefore

* These counties were Hertfordshire, Oxfordshire, Bedfordshire, Cambridgeshire, Suffolk, Wiltshire, Dorsetshire, Devonshire, Herefordshire, and Lincolnshire.

grouped together, the effect of the intermixture being reduced, so far as possible, to a minimum, by basing the calculation on the returns and registers for the counties of Leicester and Nottingham, which are the main seats of the hosiery manufacture.

A similar process of grouping, with or without limitation to a special selected area, has been adopted in several other cases, as will be seen hereafter; while in those cases, where it was thought probable that the vagueness of statement as to occupation had seriously affected the results, these have been entirely discarded, and no statements as to the death-rates in such industries are given in the tables.

We come now to a difficulty of a different kind, and of a still more serious character, inasmuch as it appears to be one for which there is no remedy, and which must always occasion a great flaw in all calculations of the death-rates in different industries. There are many trades and occupations which require a considerable standard of muscular strength and vigour to be maintained by those who follow them; such occupations for instance as those of a Blacksmith, of a Miner, and the like; and, so soon as from any cause the health and strength of a man fall below this standard, he must of necessity give up the occupation and either take to some lighter kind of labour or, if his health be too much impaired for this, retire altogether from work. And even in those industries, where no excessive amount of muscular strength is required, there must nevertheless be always a certain line below which continuance in the business becomes an impossibility.

The weaker individuals, and those whose health is failing them, are thus being constantly drafted out of each industrial occupation, and especially out of those which require much vigour; and the consequence is that the death-rates in these latter occupations are unfairly lowered, as compared with the death-rates in occupations of an easier character, and still more as compared with the death-rates among those persons who are returned as having no occupation at all. A very considerable proportion of those who are forced to give up harder labour take to odd jobs of a more or less indefinite character, and are returned both on the Census schedule, and eventually in the death-registers, as General Labourers, as Messengers, or as Costermongers, Street-sellers, &c.; and thus it comes about that the death-rates of General Labourers, of Messengers, and of Street-sellers, as shown in the table, appear to be of appalling magnitude, as also do those of persons returned as having no occupation. Under these headings, however, are comprised the broken down and the crippled who have fallen out of the ranks from all the various industries, as well as those who have been throughout life debarred by natural infirmities or other causes from following any definite occupation.

Another very serious flaw in these death-rates, when taken as measures of the relative healthiness of different industries, is due to the fact that these several industries do not start on equal terms as regards the vitality of those who follow them. A weakling will hardly adopt the trade of a Blacksmith, a Miner, or a Railway Navvy, but will preferentially take to some lighter occupation such as that of a Tailor, a Weaver, or a Shopman. This defect in the death-rates, as measures of comparative healthiness of occupations, tells in the same direction as the defect previously noticed; it gives an unfair advantage to such industries as demand much strength or activity in those that follow them. Such industries are in fact carried on by a body of comparatively picked men; stronger in the beginning, and maintained at a high level by the continual drafting out of those whose strength falls below the mark.

It is plain then that much caution must be used in drawing inferences from the death-rates in different industries. The data are sometimes scarcely sufficient in amount or precise enough in character for full con-

fidence to be placed in the rigid accuracy of the rates based upon them; and, secondly, the differences presented by the rates, even when the accuracy of these is indisputable, are not invariably due to differences in the comparative healthiness of the occupations, but, often at any rate, to differences in the constitution of the groups of workmen severally engaged in them.

Still, after the fullest weight has been allowed to all the defects which have now been mentioned, there can be no reasonable doubt but that the death-rates do in reality furnish valuable indications of the comparative salubrity of different industrial occupations. Small differences between them must, it is true, be ignored, as falling within the limits of possible disturbing influences; but large differences, such as are presented in numerous cases, must be accepted as betokening real and substantial differences of healthiness.

The headings, under which the occupations of the living in 1881 and of those who died in 1880-1-2 were abstracted, numbered about 400. It has not, however, been thought worth while to print the figures for all those numerous headings. A selection has been made of those which seemed of most importance, and in which the distinctness of the occupation, and the number of persons following it, gave fair reason for believing that the results would be of closely approximate accuracy.

The figures relating to these selected occupations are given in Table 6., which will be found on pp. cxvii-cxxiii.

The rates have been calculated for five age-periods; but of these, the two which include the main working part of life, namely, the forty years which intervene between the 26th and 66th birthdays, are far more valuable and more trustworthy than the others; for not only are these the age-periods in which the numerical basis is as a rule the largest, but they are also the periods in which the influence of occupation is most marked. In the earlier age-periods the effect of occupation is not as yet fully developed; and the last age-period, 65 years of age and upwards, is that which is more especially affected by the disturbing cause previously noted, namely, the retirement from the industry of such men as have become too weakly to follow it. Although therefore the rates for each of the five age-periods are given in the fuller Table, pp. cxvii-cxxiii, in the following remarks and Tables (Tables J., K., L.) the rates for the two periods into which the great working part of life has been divided will alone be taken into consideration; and the differences presented by the several occupations within this restricted portion of life will be held to represent approximately the differences between them in regard to healthiness.

In the following Table (Table J.) the third and fourth columns of figures give the mean annual death-rates for these two age-periods for 1880-1-2. The first and second columns give for comparison the corresponding death-rates, as calculated from the data in the two previous decennial supplements.

The fifth column of figures, which is headed Comparative Mortality Figure, requires some little explanation. There was in 1880-1-2 an annual mortality in England and Wales of 1000 deaths per 64,641 males between 25 and 65 years of age; and of such 64,641 males, 41,920 were under, and 22,721 were over, 45 years of age. The figures in Column 5 are the numbers of deaths that would have occurred in the several occupations out of 64,641 males, of whom 41,920 were under, and 22,721 were over, 45 years of age. For instance 41,920 barristers and solicitors in the earlier age-period, and 22,721 in the later period would, with death-rates respectively of 7.54 and 23.13 per 1000, give 842 deaths. This figure is therefore set in the fifth column against the heading "Barrister, Solicitor," and represents the mean mortality of males in that profession between 25 and 65 years of age, as compared with the mortality of all males of similar ages in England and Wales, this latter being taken as 1000.

TABLE J.—Death-rates of Males, 25-65 YEARS of AGE, in DIFFERENT Occupations, in 1860-1-1871 and in 1880-2; and their COMPARATIVE MORTALITY FIGURES in 1880-2.

Reference Number.	OCCUPATION.	MEAN ANNUAL DEATH-RATES PER 1000 LIVING.				Comparative Mortality Figure, 1880-1-2.
		1860-1-1871.		1880-1-2.		
		Years of Age.		Years of Age.		Years of Age.
		25-45	45-65	25-45	45-65	
	ALL MALES - - - - -	11.27	23.98	10.16	25.27	1000
	OCCUPIED MALES - - - - -	—	—	9.71	24.63	967
	UNOCCUPIED MALES - - - - -	—	—	32.43	36.20	2182
	MALES IN SELECTED HEALTHY DISTRICTS*	—	—	8.47	19.74	804
1	Clergyman, Priest, Minister - - -	5.96	17.31	4.64	15.93	556
2	Barrister, Solicitor - - - - -	9.87	22.97	7.54	23.13	842
3	Physician, Surgeon, General Practitioner -	13.81	24.55	11.57	28.03	1122
4	Schoolmaster, Teacher - - - - -	9.82	23.56	6.41	19.84	719
5	Artist, Engraver, Sculptor, Architect - -	11.73	22.91	8.39	25.07	921
6	Musician, Music Master - - - - -	18.94	34.76	13.78	32.39	1314
7	Farmer, Grazier - - - - -	7.66	17.32	6.09	16.53	631
8	Labourer in Agricultural Counties† - - -	—	—	7.13	17.68	701
9	Gardener, Nurseryman - - - - -	6.74	17.54	5.52	16.19	599
10	Fisherman - - - - -	11.26	15.84	8.32	19.74	797
11	Cab, Omnibus, Service - - - - -	15.94	35.28	15.39	36.83	1482
12	Bargeman, Lighterman, Waterman - - -	14.99	30.78	14.25	31.13	1305
13	Carter, Carrier, Haulier - - - - -	—	—	12.52	33.00	1275
14	Groom, Domestic Coachman - - - - -	—	—	8.53	23.28	887
15	Commercial Traveller - - - - -	12.28	29.00	9.04	25.03	948
16	Brewer - - - - -	19.26	36.86	13.90	34.25	1361
17	Innkeeper, Publican Spirit, Wine, Beer-Dealer.	18.01	34.14	18.02	33.68	1521
18	Inn, Hotel, Servant - - - - -	21.91	42.19	22.63	55.30	2205
19	Maltster - - - - -	7.04	22.26	7.28	23.11	830
20	Law Clerk - - - - -	18.75	37.05	10.77	30.79	1151
21	Commercial Clerk and Insurance Service -	14.28	28.88	10.48	24.49	996
22	Bookseller, Stationer - - - - -	10.84	21.36	8.53	20.57	825
23	Chemist, Druggist - - - - -	13.92	23.56	10.58	25.16	1015
24	Tobacconist - - - - -	13.19	21.76	11.14	23.46	1000
25	Grocer - - - - -	9.49	17.15	8.00	19.16	771
26	Draper and Manchester Warehouseman -	14.34	26.33	9.70	20.96	883
27	Ironmonger - - - - -	10.38	22.95	8.42	23.87	895
28	Coal Merchant - - - - -	8.83	22.59	6.90	20.62	758
29	General Shopkeeper - - - - -	—	—	9.12	21.23	865
30	Cheesemonger, Milk, Butter-man} - - -	—	—	9.48	26.90	1009
31	Greengrocer, Fruiterer - - - - -	11.41	24.51	10.04	26.57	1025
32	Fishmonger, Poulterer - - - - -	15.62	29.21	10.53	23.45	974
33	Shopkeepers as represented by the above eleven (22-32).	—	—	9.04	21.90	877
34	Butcher - - - - -	13.19	28.37	12.16	29.08	1170
35	Baker, Confectioner - - - - -	10.72	26.39	8.70	26.12	958
36	Corn Miller - - - - -	9.32	26.65	8.40	26.62	957
37	Hatter - - - - -	12.81	31.76	10.78	26.95	1064
38	Hairdresser - - - - -	15.11	30.10	13.64	33.25	1327
39	Tailor - - - - -	12.92	24.79	10.73	26.47	1051
40	Shoemaker - - - - -	10.39	22.30	9.31	23.36	921
41	Tanner, Fellmonger - - - - -	10.43	26.57	7.97	25.37	911
42	Currier - - - - -	11.32	25.09	8.56	24.07	906
43	Saddler, Harness Maker - - - - -	12.29	25.21	9.19	26.49	987
44	Tallow Chandler, Soap-boiler - - - - -	11.75	27.24	7.74	26.19†	920
45	Tallow, Soap, Glue, Manure Manufacture	—	—	7.31	27.57	933
46	Printer - - - - -	13.02	29.38	11.12	26.60	1071
47	Bookbinder - - - - -	12.76	31.56	11.73	29.72‡	1167
48	Watch and Clock Maker - - - - -	10.78	24.90	9.26	22.64	903
49	Watch, Clock, Phil. Instrument Maker, and Jeweller.	—	—	9.22	23.99	932

* The selected healthy districts are all those Registration Districts in which the mean annual death-rates for persons (males and females together) was under 17.00 per 1,000 in 1871-80.

† Labourer in ten agricultural counties, viz., Hertfordshire, Oxfordshire, Bedfordshire, Cambridgeshire, Suffolk, Wiltshire, Dorsetshire, Devonshire, Herefordshire, and Lincolnshire.

‡ This rate is based on less than 5,000 years of life.

TABLE J. (continued). — Death-rates of Males, 25-65 Years of Age, in DIFFERENT Occupations, in 1860-1-1871 and in 1880-2; and their COMPARATIVE MORTALITY FIGURES in 1880-2.

Reference Number.	OCCUPATION.	MEAN ANNUAL DEATH-RATES PER 1000 LIVING.				Comparative Mortality Figure, 1880-1-2.
		1860-1-1871.		1880-1-2.		
		Years of Age.		Years of Age.		Years of Age.
		25-45	45-65	25-45	45-65	
50	Paper Manufacture	10.33	20.19	6.48	19.62	717
51	Glass Manufacture	13.19	29.32	11.21	31.71	1190
52	Earthenware Manufacture	12.59	41.75	13.70	51.39	1742
53	Cotton, Linen, Manufacture (Lancashire)	10.65*	27.00*	9.99	29.44	1088
54	Silk Manufacture	9.89	20.08	7.81	22.79	845
55	Wool, Worsted, Manufacture (West Riding.)	9.35*	23.26*	9.71	27.50	1032
56	Carpet, Rug-Manufacture	9.92	25.57	9.48	24.10	945
57	Lace Manufacture	—	—	6.78	20.71	755
58	Hosiery Manufacture (Leicestershire, Notts).	—	—	6.69	19.22	717
59	Dyer, Bleacher, Printer, &c. of Textile Fabrics.	11.19	25.99	9.46	27.08	1012
60	Rope, Twine, Cord-Maker	9.19	29.35	7.95	22.25	839
61	Builder, Mason, Bricklayer	11.43	27.16	9.25	25.69	969
62	Slater, Tiler	10.66	30.76	8.97	24.93†	942
63	Plasterer, Whitewasher	9.50	27.90	7.79	25.07	896
64	Plumber, Painter, Glazier	12.48	34.66	11.07	32.49	1202
65	Upholsterer, Cabinet Maker, French Polisher.	11.09	24.09	9.55	24.77	963
66	Carpenter, Joiner	9.44	21.36	7.77	21.74	820
67	Sawyer	8.67	21.27	7.46	23.74	852
68	Wood Turner, Box Maker, Cooper	11.80	26.13	10.56	28.55	1091
69	Coach Builder	10.43	29.57	9.13	24.72	944
70	Wheelwright	8.40	21.17	6.83	19.21	723
71	Shipbuilder, Shipwright	10.68	26.26	6.95	21.29	775
72	Locksmith, Bellhanger, Gasfitter	11.04	27.90	9.15	25.66	967
73	Gunsmith	10.62	25.32	10.62	25.78	1031
74	Cutler, Scissors Maker	—	—	12.30	34.94	1309
75	File Maker	16.27	42.30	15.29	45.14†	1667
76	Cutler, Scissors, File, Needle, Saw, Tool-Maker.	11.88‡	32.74‡	11.71	34.42	1273
77	Engine, Machine-Maker, Fitter. Millwright.	—	—	7.97	23.27	863
78	Boiler Maker	—	—	9.27	26.65	994
79	Last two together (Nos. 77-78)	10.61	23.81	8.23	23.89	888
80	Blacksmith	10.07	23.88	9.29	25.67	973
81	Other Iron and Steel Workers	—	—	8.36	22.84	869
82	Tin Workers	10.36	23.67	8.00	24.17	885
83	Copper, Lead, Zinc, Brass, &c. Workers	10.74	26.17	9.15	26.79	992
84	Metal Workers (Nos. 72-83)	—	—	8.80	25.03	938
85	Miner: Durham, Northumberland	11.30§	22.01§	7.79	24.04	873
86	Lancashire	—	—	7.91	26.30	929
87	West Riding	—	—	6.59	21.80	772
88	Derbyshire, Nottinghamshire	—	—	6.54	20.23	734
89	Staffordshire	11.33§	30.45§	7.81	26.50	929
90	South Wales, Monmouthshire	14.72§	29.66§	9.05	30.87	1081
91	Coal Miners as represented by the above six (Nos. 85-90).	—	—	7.64	25.11	891
92	Miner (North Riding and other Ironstone Districts).	—	—	8.05	21.85	834
93	Miner, Cornwall	11.94§	41.73§	14.77	53.69	1839
94	Stone, Slate Quarrier	10.88	28.67	9.95	31.04	1122
95	Railway, Road, Clay, Sand, &c. Labourer.	—	—	11.01	24.80	1025
96	Coalheaver	—	—	10.22	23.77	968
97	Chimney Sweep	17.53	42.87	13.73	41.54†	1519
98	Messenger, Porter, Watchman (not Government).	—	—	17.07	37.37	1565
99	Costermonger, Hawker, Street Seller	20.09	37.82	20.26	45.33	1879
100	General Labourer (London)	18.35	40.64	20.62	50.85	2020

* These figures relate to England and Wales, and not only to Lancashire and the West Riding respectively as do the figures for 1880-1-2.

† This rate is based on less than 5,000 years of life.

‡ In 1871 only.

§ These rates are based on a return made to the Commissioners appointed to inquire into the condition of all miners in Great Britain, of the miners living at the census of 1861, and of the deaths registered in the three years, 1860-2, in certain mining districts in the respective counties. See Appendix B. to Report of Commissioners, p. 164.

The death-rates in the several industries will come under special consideration later on; but there are certain general remarks to be made as to the preceding Table which it will be convenient to introduce here.

It will be seen that there are vast differences as regards mortality between the several industries, the comparative mortality figure being three or four times as high in some industries as in others; and it will also be noticed that those industries in which the death-rates were exceptionally high or exceptionally low in the three years 1880-1-2 showed, as a rule, similarly exceptional rates in the earlier experience.

Again, it will be noted that the death-rate at the first of the two age-periods, 25-45 years, has in almost every case declined. There are in the Table altogether 73 industries, for which rates are given both for 1880-2 and also for earlier experience. In 65 of these 73 industries the death-rate in the 25-45 age-period has fallen, in one it has remained stationary, and in only 7 has it gone up. In the second age-period, 45-65 years of age, the case is very different. Only in 35 industries has there been a fall, while in the remaining 38 the rate has risen. That some such difference as this should be found to exist between the two age-periods might have been anticipated, for it is in strict accordance with the fact already discussed, and shown, moreover, in the first line of figures in Table J., namely, that there has been a fall in the death-rate of all males independently of occupation in the earlier age-period, and a not inconsiderable rise in the later.

Another feature in the Table that requires notice is the fact that in more than three-fifths of the industries to which it relates the death-rates are below those of "All Males," that is to say, the comparative mortality figure is below 1000. The comparative mortality figure of "All Males" is, however, a very unsatisfactory standard by which to estimate healthiness, for among "All Males" is of course included an enormous number of persons who are permanently enfeebled in health and unfit for work of any kind. Even, however, if we exclude all such persons as are unemployed, and take the death-rates of those persons only who were returned at the Census as following some occupation, we still have a comparative mortality figure (967), which is higher than the figure in more than half the industries. It appears, therefore, that the comparative mortality figure of "Occupied Males" is very considerably raised by the inclusion of a minority of occupations with excessively high rates. Thus neither "All Males," nor "Occupied Males" furnish a good basis for comparison. The standard for comparison should be one of excellence; it should be taken either from the healthiest occupation, or, if a geographical basis be preferred, from the healthiest districts. If the former be preferred, as I think it should, we may take as our standard the mean of the mortality figures for farmers, agricultural labourers, and gardeners, which would be 644; if the latter be selected, we may take the figure for males in all those districts in which the mean annual death-rate for persons (males and females) of all ages in 1871-80 was under 17.00, which we call the "Selected Healthy Districts." These give a comparative mortality figure of 804, but it must be remembered that in this are included the deaths of those sick and unoccupied males who live in the selected districts. The excess of the comparative mortality figure of an industry above these standards measures its departure from the healthiness attainable, under present conditions, in this country.

Having ascertained and set forth in Table J. what is the comparative mortality from all causes in the various industries, the next step is to distribute this mortality to the registered diseases or causes by which it was occasioned, that is to say, to ascertain what is the comparative mortality in the several industries from each separate disease or group of diseases.

To do this thoroughly it would be necessary to go through the death-registers for the three years 1880-2, and abstract all the deaths of males by ages, occupations, and causes of death in combination, a task of such complexity and magnitude as to be practically impossible, and which, therefore, has not been attempted. It appeared possible, however, to obtain adequate data by a shorter plan, laborious enough, but still practicable, namely, by abstracting from the registers a considerable sample of the causes of deaths in each industry, and dividing out the total mortality in the industry to the several causes by the proportions existing in the sample. For, supposing the sample to be of sufficient size and to be fairly taken, there seemed no reason why it should not be considered truly representative of the bulk. This plan, therefore, was adopted.

The first question in regard to the sample is how large it should be. To this question no more definite answer can be given than that the larger the sample the better. It was, however, determined that 500 deaths with causes should be considered a minimum, and that when the number of deaths abstracted in any one industry fell short of this they should not be used as a basis for calculation. It will be seen in Table K., which gives the results of the abstraction, that in most cases this minimum was not only reached but considerably exceeded. In some industries, however, it was found impossible to get 500 recorded deaths of males between 25 and 65 years of age, without running through the registers for more than three years; in these cases, therefore, either the minimum was not reached and rates were not calculated, or the search was extended to the registers of additional years.*

More important than the mere size of the sample is its freedom from local peculiarities, which might detract from its representative value. It is very possible, for instance, that if 1000 deaths, say of tailors, were abstracted with the registered causes in the North of England, and a second 1000 similarly abstracted in the South, the distribution of the two samples by causes might be very different; there might, for instance, be a much larger proportion of diseases of the respiratory system in the Northern than in the Southern sample; and such differences would most certainly be found to exist, if one sample were taken from large towns and a second from rural districts. It was necessary, therefore, in order to ensure the sample being a fair one, that it should be taken from a considerable number of districts in different parts of the country, and especially necessary that town and country should in each case be represented in the sample in proper proportions, which proportions had first to be ascertained separately for each industry.

There are some industries, of course, from which the element of locality is inseparable, as they are only carried on in more or less circumscribed areas. Such for instance is the cotton industry of Lancashire, the hosiery manufacture of Leicestershire and Nottinghamshire, the manufacture of cutlery and files, practically confined to the West Riding, and other similar local industries. It is conceivable that if the cotton manufacture were carried on in some other totally different part of England, the mortality from all and several causes in that industry might be different from what it is at present; but, as things stand, whatever influence on mortality may belong to the geographical position of Lancashire attaches inseparably to the cotton industry. To meet this, as far as possible, the mortality figures for Lancashire are given in the same Table as contains the mortality figures for the cotton industry, and similarly with the other chief local industries, so that instead of comparing the mortality of such an industry with that of All England it may be compared, if such be desired, with that of the county in which it is carried on.

* This was done in the case of fishermen, file makers, hosiery manufacture, ironstone miners, and miners in Cornwall.

Another disturbing element which might interfere with the value of the sample for comparative purposes, and which it was therefore necessary to exclude, was seasonal influence. The causes of 500 deaths in any industry in winter would doubtlessly be different from those of 500 deaths taken in summer. This possible source of error, however, was easily guarded against. Whatever districts were chosen as suitable areas for examination, their death-registers were invariably gone through for the three complete years 1880-1-2, so that the seasons of the year were all equally represented, and the samples in all the industries were so far strictly on an equality. In the few cases where the registers for more than three years had to be searched, as before mentioned, the additional registers used were also registers for complete years, the years taken being 1879 and 1883.

The number of minute precautions that it was found necessary to observe in order to secure the fair character of the samples added very considerably to the difficulty of the task. It is believed, however, that their adoption has made the samples truly representative of the bulk. The samples themselves are given in Table K., while in Table L. the comparative rates of mortality based on these samples are given.

Clergy, Lawyers, Medical Men (Nos. 1, 2, 3).—Of the learned professions and indeed of all the occupations in our Table, the Church enjoys the lowest death-rate; its comparative mortality figure is even lower than that of agriculturists, being only 556. Moreover, the death-rates in the clerical profession have fallen considerably since 1860-61-71, and at both of the two age-periods. When, therefore, an insurance society states in its prospectus that of its assured a large proportion consists of clergymen, it doubtlessly states a fact much in its favour, supposing the premiums paid to be those based on the average lifetime of all professional men. The comparative mortality figure for the legal profession is much higher, being 842; and still higher again is that of the medical profession, which is no less than 1122, and exactly as high as that of slate and stone quarrymen. In each of these two professions, Law and Medicine, the death-rate in the earlier age period (25-45 years) has fallen from the previous record, while the death-rate in the second age-period (45-65 years) has gone up; changes, which, as already pointed out, are common to a very large proportion of the occupations.

Schoolmasters (No. 4).—The death-rates of schoolmasters and teachers are somewhat higher than those of the clergy, but considerably below those of the lawyers and still more below those of the doctors; their comparative mortality figure being 719. It must, however, be borne in mind that a very considerable proportion of these teachers are in the public service as certificated masters, and that these constitute a body of specially healthy men, inasmuch as many constitutional imperfections or infirmities are held to be positive disqualifications to persons entering into the profession through the training colleges. "I do not know," writes Dr. Crichton-Browne, "any profession that is more jealously protected against the intrusion into it of maimed or infirm persons or of those who have in them the seeds of constitutional diseases, than is that of a teacher in this country at present." The death-rates of teachers and schoolmasters have declined, and very considerably, since the previous record, at both age-periods, probably in consequence of the improved status which the profession has been gradually acquiring.

Artists, Musicians (Nos. 5-6).—Art is represented in the Table by two headings; viz., Artists, Engravers, Sculptors, Architects, with a comparative mortality figure of 921, and death-rates that follow the common rule of increase in the second and decrease in the earlier age-period; and Musicians, among whom there has been a decline in both age-periods, but whose comparative mortality figure is nevertheless still 1314. It must be remembered that under this heading are comprised all sorts and conditions of men, and

(continued on page xxxiv.)

TABLE K.—Causes of Deaths of Males, aged 25-65 Years, in DIFFERENT Industries; being samples abstracted from the Death Registers of 1880-1-2.

Reference Number.	Occupations.	Diseases of Nervous System.	Suicide.	Diseases of the Circulatory System.	Phthisis.	Diseases of the Respiratory System.	Diseases of the Urinary System.	Liver Diseases.	Other Diseases of the Digestive System.	Alcoholism.	Gout.	Plumbism.	Accident.	All other Causes.	TOTAL.
7	Farmer, Grazier - - - -	254	54	264	325	313	99	131	95	18	5	-	94	340	1,992
8	Labourer in ten Agricultural Counties - - - - -	274	32	332	418	533	74	68	147	3	2	-	111	400	2,394
9	Gardener, Nurseryman - - -	67	12	87	128	118	41	19	23	2	1	-	25	112	635
10	Fisherman - - - - -	56	9	106	75	62	10	22	24	3	-	-	105	80	552
11	Cab, Omnibus, Service - - -	86	10	103	231	219	42	35	20	21	7	-	54	125	953
15	Commercial Traveller - - -	97	22	70	168	103	31	43	18	16	4	-	25	66	663
16	Brewer - - - - -	63	5	72	146	103	24	42	20	11	4	-	28	77	595
17	Innkeeper, Publican, Spirit, Wine, Beer-Dealer - - -	164	21	115	242	178	68	197	30	45	11	-	37	138	1,246
22	Bookseller, Stationer - - -	23	1	19	51	28	12	4	2	3	-	-	3	23	169
23	Chemist, Druggist - - - -	35	4	27	48	37	10	18	10	6	2	-	7	38	242
24	Tobacconist - - - - -	13	2	12	38	19	3	10	9	4	1	-	5	25	141
25	Grocer - - - - -	109	17	109	170	118	49	53	32	10	2	-	14	102	785
26	Draper, Manchester Warehouse-man - - - - -	65	3	45	180	77	22	21	23	5	1	-	14	72	528
34	Butcher - - - - -	134	22	127	251	200	53	92	32	22	5	-	34	153	1,125
35	Baker, Confectioner - - -	89	17	86	139	122	26	30	17	10	1	-	14	78	629
37	Hatter - - - - -	24	6	18	40	24	1	9	1	3	-	-	3	20	149
38	Hairdresser - - - - -	57	15	45	98	53	14	17	20	13	2	-	11	26	371
39	Tailor - - - - -	157	18	139	311	208	49	53	46	12	4	-	20	137	1,149
40	Shoemaker - - - - -	217	31	208	451	278	79	57	54	7	1	-	30	227	1,635
46	Printer - - - - -	57	5	59	292	105	19	18	20	2	-	3	15	83	678
47	Bookbinder - - - - -	11	2	6	30	12	1	3	3	-	1	-	2	6	77
52	Earthenware Manufacture -	71	*	81	239	326	25	25	17	4	-	5	12	76	881

* The deaths from Suicide were in this case not separated from the deaths from Nervous Diseases.

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TABLE K.—Causes of Deaths of Males, aged 25-65 Years, in DIFFERENT Industries; being samples abstracted from the Death Registers of 1880-1-2—continued.

Reference Number.	Occupations.	Diseases of Nervous System.	Suicide.	Diseases of the Circulatory System.	Phthisis.	Diseases of the Respiratory System.	Diseases of the Urinary System.	Liver Diseases.	Other Diseases of the Digestive System.	Alcoholism.	Gout.	Plumbism.	Accident.	All other Causes.	TOTAL.
53	Cotton, Linen, Manufacture (Lancashire) - - - - -	167	*	131	320	319	38	51	37	3	-	-	35	177	1,278
55	Wool Manufacture (West Riding) - - - - -	157	19	176	318	254	44	45	49	5	-	-	33	178	1,278
58	Hosiery Manufacturer (Leicestershire & Nottinghamshire) - - - - -	84	16	77	124	85	31	12	17	1	-	-	12	70	529
61	Builder, Mason, Bricklayer - - - - -	142	22	183	405	323	79	48	55	8	5	-	72	217	1,559
64	Plumber, Painter, Glazier - - - - -	162	20	136	239	180	97	47	37	12	10	20	71	138	1,169
66	Carpenter, Joiner - - - - -	138	27	161	317	206	61	56	46	6	3	-	59	194	1,274
74	Outler, Scissors Maker - - - - -	135	*	79	263	276	25	21	22	2	-	-	12	93	928
75	File Maker - - - - -	83	*	57	137	111	39	13	10	1	-	13	2	62	528
80	Blacksmith - - - - -	85	10	108	194	183	39	28	31	7	-	-	44	143	872
85	Miner (Durham and Northumberland) - - - - -	140	8	167	216	195	42	53	54	6	-	-	313	200	1,394
86	Miner (Lancashire) - - - - -	89	*	103	134	246	26	19	34	3	-	-	213	131	998
87	Miner (West Riding) - - - - -	60	5	88	111	172	23	21	31	1	-	-	161	101	774
88	Miner (Derbyshire and Notts) - - - - -	49	4	45	90	105	14	13	26	3	-	-	124	85	558
89	Miner (Staffordshire) - - - - -	87	3	112	110	281	41	22	30	1	-	-	186	130	1,003
90	Miner (South Wales and Monmouthshire) - - - - -	46	3	92	127	224	26	18	27	4	-	-	175	84	826
92	Miner (North Riding, and other Ironstone Districts) - - - - -	37	8	47	103	150	17	10	10	6	-	-	150	70	608
93	Miner (Cornwall) - - - - -	59	2	56	348	231	19	20	28	1	-	-	59	104	927
94	Stone, Slate, Quarrier - - - - -	83	11	91	309	275	24	25	38	5	-	-	148	115	1,124
96	Coalheaver - - - - -	23	-	29	50	46	7	7	14	3	-	-	23	28	230
97	Chimney Sweep - - - - -	24	4	25	51	43	8	4	6	5	-	-	7	65	242
99	Costermonger, Hawker, Street Seller - - - - -	75	16	82	172	152	25	17	24	7	1	-	19	90	680

* The deaths from Suicide were in this case not separated from the deaths from Nervous Diseases.

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TABLE L.—Comparative Mortality of Males, 25-65 YEARS OF AGE, in DIFFERENT Industries; from ALL and SEVERAL CAUSES.*

Reference Number.	Occupations.	Diseases of Nervous System.	Suicide.	Diseases of the Circulatory System.	Phthisis.	Diseases of the Respiratory System.	Diseases of the Urinary System.	Liver Diseases.	Other Diseases of the Digestive System.	Alcoholism.	Gout.	Plumbism.	Accident.	All other Causes.	All Causes (Comparative Mortality Figure).
	All Males (England and Wales)	119	14	120	220	182	41	39	38	10	3	1	67	146	1,000
7	Farmer, Grazier - - - -	81	17	84	103	99	31	41	30	6	2	-	30	107	631
8	Labourer in ten Agricultural Counties - - - -	80	9	97	122	156	22	20	43	1	1	-	33	117	701
9	Gardener, Nurseryman - -	63	11	82	121	111	39	18	22	2	1	-	24	105	599
10	Fisherman - - - - -	81	13	153	108	90	14	32	35	4	-	-	152	115	797
11	Cab, Omnibus, Service - -	134	16	160	359	341	65	54	31	33	11	-	84	194	1,482
15	Commercial Traveller - -	139	31	100	240	147	44	61	26	23	6	-	36	95	948
16	Brewer - - - - -	144	11	165	334	236	55	96	46	25	9	-	64	176	1,361
17	Innkeeper, Publican, Spirit, Wine, Beer-Dealer - - -	200	26	140	295	217	83	240	37	55	13	-	45	170	1,521
25	Grocer - - - - -	107	17	107	167	116	48	52	31	10	2	-	14	100	771
26	Draper, Manchester Ware-houseman - - - -	109	5	75	301	129	37	35	38	8	2	-	23	121	883
34	Butcher - - - - -	139	23	132	261	208	55	96	33	23	5	-	35	160	1,170
35	Baker, Confectioner - - -	136	26	131	212	186	40	46	26	15	2	-	21	117	958
39	Tailor - - - - -	144	16	127	285	186	45	48	42	11	4	-	18	125	1,051
40	Shoemaker - - - - -	122	17	114	254	157	44	32	30	4	1	-	17	129	921
46	Printer - - - - -	90	8	93	461	166	30	28	32	3	-	5	24	131	1,071
52	Earthenware Manufacture -	140	†	160	473	645	49	49	34	8	-	10	24	150	1,742
53	Cotton, Linen, Manufacture (Lancashire) - - - -	142	†	112	272	271	32	43	32	3	-	-	30	151	1,088
55	Wool Manufacture (Yorkshire)	127	15	142	257	205	36	36	40	4	-	-	27	143	1,032
58	Hosiery Manufacture (Leicestershire & Nottinghamshire)	114	22	104	168	115	42	16	23	1	-	-	16	96	717
	<i>All Males - Ditto</i>	100	17	107	164	141	37	35	28	7	1	-	51	141	829

XXXII

* The figures in this Table are the numbers of deaths that would occur annually in each industry out of 64,641 males from 25 to 65 years of age, of whom 41,920 were under and 22,721 were over 45 years of age.
 † The deaths from suicide were not separated in this case from the deaths from nervous diseases.

TABLE L.—Comparative Mortality of Males, 25-65 YEARS OF AGE, in DIFFERENT Industries; from ALL and SEVERAL CAUSES*—continued.

Reference Number.	Occupations.	Diseases of Nervous System.	Suicide.	Diseases of the Circulatory System.	Phthisis.	Diseases of the Respiratory Organs.	Diseases of the Urinary System.	Liver Diseases.	Other Diseases of the Digestive System.	Alcoholism.	Gout.	Plumbism.	Accident.	All other Causes.	All Causes (Comparative Mortality Figure).
61	Builder, Mason, Bricklayer -	88	14	114	252	201	49	39	34	5	3	-	45	134	969
64	Plumber, Painter, Glazier - -	167	21	140	246	185	100	48	38	12	10	21	73	141	1,202
66	Carpenter, Joiner - - - -	89	17	104	204	133	39	36	30	4	2	-	38	124	820
74	Cutler, Scissors Maker - - -	190	†	111	371	389	35	30	31	3	-	-	17	132	1,309
75	File Maker - - - - -	262	†	180	433	350	123	41	32	3	-	41	6	196	1,667
80	Blacksmith - - - - -	95	11	121	216	204	44	31	35	8	-	-	49	159	973
85	Miner (Durham and Northumberland) - - - -	88	5	105	135	122	26	33	34	4	-	-	196	125	873
	<i>All Males - Ditto</i>	114	13	135	178	155	30	36	41	13	-	-	98	145	958
86	Miner (Lancashire) - - - -	83	†	96	125	229	24	18	32	3	-	-	198	121	929
	<i>All Males - Ditto</i>	142	15	133	250	307	43	42	45	17	1	-	82	172	1,249
87	Miner (West Riding) - - - -	60	5	88	111	172	23	21	31	1	-	-	161	99	772
	<i>All Males - Ditto</i>	118	16	126	235	213	36	37	39	7	1	-	63	140	1,081
88	Miner (Derbyshire and Nottinghamshire) - - - -	64	5	59	118	138	18	17	34	4	-	-	163	114	734
	<i>All Males - Ditto</i>	99	15	103	166	148	30	41	33	9	1	-	66	135	846
89	Miner (Staffordshire) - - -	81	3	104	102	260	38	20	28	1	-	-	172	120	929
	<i>All Males - Ditto</i>	117	13	119	174	226	37	43	39	9	2	-	75	153	1,007
90	Miner (South Wales and Monmouthshire) - - - -	60	4	120	166	293	34	24	35	5	-	-	229	111	1,081
	<i>All Males - Ditto</i>	97	8	114	202	209	39	37	39	7	1	-	123	130	1,006
92	Miner (North Riding and other Ironstone Districts) - - -	51	11	64	141	206	23	14	14	8	-	-	206	96	834
93	Miner (Cornwall) - - - -	117	4	111	690	458	38	40	56	2	-	-	117	206	1,839
	<i>All Males - Ditto</i>	99	13	89	203	165	29	27	36	4	1	-	59	162	887
94	Stone, Slate Quarrier - - -	83	11	91	308	274	24	25	38	5	-	-	148	115	1,122
99	Costermonger, Hawker, Street Seller - - - - -	207	44	227	475	420	69	47	66	19	3	-	53	249	1,879

XXXIII

* The figures in this Table are the numbers of deaths that would occur annually in each industry out of 64,641 males from 25 to 65 years of age; of whom 41,920 were under and 22,721 were over 45 years of age.
 † The deaths from suicide were not separated in this case from the deaths from nervous diseases.

that a large proportion of them are organ-grinders, ballad-singers, and street musicians generally, many of whom are of intemperate habits and exposed by their mode of life to cold and to want, while no few have merely taken to the occupation as a refuge, after their health has broken down in more regular occupations.

Farmers (No. 7); *Agricultural Labourers* (No. 8); *Gardeners, &c.* (No. 9).—The agricultural class is represented in the Table by three groups, Farmers, Gardeners, and Agricultural Labourers. In each group the death-rates are excessively low, the mortality figure being 599 for Gardeners, 631 for Farmers, and 701 for Agricultural Labourers. Probably the figure assigned to this last group is somewhat too high; for, owing to possible confusion in the returns between different kinds of labourers, it was thought safer to base the calculation of the death-rates upon all labourers, whether called agricultural or simply styled labourers without any prefix, in ten selected counties,* in which an overwhelming proportion of the labourers would indisputably be agricultural. Still even in these counties there must have been some intermixture of general labourers, and this intermixture would almost certainly raise the rates. Turning from the general mortality to the mortality from individual causes, it will be seen that the higher general mortality of the labourers, as compared with the farmers and the gardeners, is mainly due to their greater liability to phthisis with diseases of the respiratory system. Their mortality from these causes is represented by 278, that of farmers by 202, and that of gardeners by 232. This is what might have been naturally anticipated; seeing that the labourer is of the three the worst housed and the most exposed to cold and wet, while the farmer is in these respects far the best off, and the gardener intermediate to the two.

On the other hand, the farmer, less abstemious in his habits than the labourer or the gardener, as having more means for indulgence, suffers from a higher mortality under such headings as Gout, Alcoholism, and Liver Disease. That the mortality of farmers from these causes is not higher than is shown in the Table is probably due to the open-air life which they lead, and the amount of active muscular exercise which they take, conditions which enable them to indulge with comparative immunity in excesses, which would be much more deleterious to men of sedentary habits.

Another heading under which the mortality of farmers exceeds that of the two other agricultural groups is Suicide. Where the figures are small, as under this heading, too much importance must not be attached to them. But it may be noted that the differences in this case are such as might rationally be expected, for suicide increases generally with education, and is therefore comparatively uncommon among the labouring classes, and also increases with habits of intemperance—many suicides being committed during fits of alcoholic delirium.

Fishermen (No. 10).—The figures relating to fishermen must be accepted with some degree of hesitation, for some uncertainty attaches both to the number of living and to the number of deceased fishermen. The uncertainty as to the living arises from the fact that besides the regular and permanent fishermen there is also a considerable number of men who engage irregularly in the fishing industry, and there is no certainty how such men may have returned themselves at the Census. The uncertainty as to the fishermen who die arises from the possibility that some few of those who are drowned and whose bodies are not recovered may escape registration. It is not probable, however, that these causes will have affected the figures in any serious degree. Taking them as they stand in the Table, it will be seen that fishermen are a remarkably healthy set of men, rivalling in this respect the agriculturists, whom they resemble in their specially out-door life.

* See note on page xxv.

Indeed, if deaths from accident be put on one side, the death-rates of fishermen and their mortality from the several causes resemble very closely those of farmers. In both cases the mortality figures for nervous diseases, for phthisis, and for diseases of the respiratory organs, are remarkably low, the figures for the two latter causes together being 198 for fishermen and 202 for farmers, and considerably below the figure for any other occupation in the Table. The main differences between the two are these: the farmer, living a life of less exertion, and perhaps being of less abstemious habits, has the higher mortality from alcoholism, gout, liver diseases, and diseases of the urinary system, while the fisherman, probably because his occupation subjects him to sudden muscular efforts and strains, and exposes him to cold and wet and therefore to rheumatic affections, and perhaps also in consequence of the frequent and prolonged periods of anxiety that beset his life of peril, has a much higher mortality than the farmer from diseases of the heart and other organs of circulation. Indeed under this heading his mortality figure is 153, which is not only much above the average of all males, but higher than in most of the occupations in the Table.

The mortality of fishermen from accidents is exceedingly high, and rivals that of coal-miners, while it is higher than that of the Cornish tin-miners or that of quarrymen. The main form of accident to which fishermen are liable is, of course, drowning. Out of 105 deaths of fishermen from accident, 79 were thus occasioned. The remainder were mostly due to blows from spars, &c.

Cabmen, &c. (No. 11); *Bargemen* (No. 12); *Carters* (No. 13); *Costermongers, Street Sellers* (No. 99).—That life in the open air is not in itself sufficient to ensure healthiness, is shown by the death-rates of those who are engaged in traffic by land or water, in cab-driving, and in street hawking. In each of these occupations the rates are excessively high. The comparative mortality figure for bargemen, lightermen, watermen, is 1305; for carters, carriers, hauliers, 1275; for cab and omnibus service, 1482; and for hawkers, costermongers, and street sellers, 1879. As regards the first two of these groups our Tables give no further information, excepting that the high mortality of the bargemen and watermen, noted on the present occasion, tallies very closely with the record of previous experience. But as regards the cab and omnibus service, and the costermongers, particulars of causes are given in Tables K. and L. It should, however, be observed, before considering such particulars, that these two occupations do not start on equal terms with most other occupations in regard to the physical condition of the men engaged in them respectively. Doubtless, both among cabmen and among street hawkers, there are men of good health and steady habits who have taken to the occupations as their original means of living; but there is also most certainly in both of them a very considerable proportion of men who have only taken to the occupation as a refuge, having fallen from some superior status in consequence of ill health and evil ways. The high mortality, therefore, in these occupations is not attributable, or at any rate is not wholly attributable, to the nature of the occupation itself, which for all that appears to the contrary may be a very healthy one, but to the physical condition of the men who engage in it. Unhealthiness drives them into the occupation, not the occupation them into unhealthiness. In both these occupations the mortality due to drink is in great excess, as shown by the figures under the headings Alcoholism, Liver Diseases, and Diseases of the Urinary Organs, as also in the cab and omnibus service under the heading Gout, and among the street sellers under the heading Suicide. But the headings under which the greatest excess of mortality occurs are Phthisis and Diseases of the Respiratory Organs, which is doubtlessly attributable to the effect of exposure to all kinds of weather of bodies already enfeebled by previous disease and intemperance. The comparative mortality figures.

under these two headings together are, for cabmen 700, and for the street sellers 895, the corresponding figure for all males being only 402.

Cabmen are, of course, from the nature of their employment, specially liable to accident, and consequently their mortality figure for accident, which is 84, is higher than that of men in any other occupation in Table L., excepting miners, quarrymen, and fishermen.

Grooms, Private Coachmen (No. 14).—That the mere fact of having to do with horses and carriages, with the consequent liability to accident and to exposure, is not itself enough to cause any very high death-rate, is shown by the comparatively low mortality of grooms and private coachmen, for whom the comparative mortality figure is only 887.

Commercial Travellers (No. 15).—Another occupation of a very different kind, but so far resembling those we have now been considering as that it involves much out-of-door existence, is that of commercial travellers. The death-rates in this occupation have fallen very considerably since the previous experience, but still are high, the comparative mortality figure being 948, which is nearly 50 per cent. above that of those engaged in agricultural pursuits. A very considerable proportion of the mortality of commercial travellers is due to intemperance, as is at once visible in Table L., where it will be noted that under the headings Alcoholism, Liver Disease, Gout, and Suicide, the mortality figures for this occupation come very high up on the list. Indeed, under the heading Suicide the commercial traveller stands second on the list. The mortality from Nervous Affections is also in excess in this occupation, whereas the mortality from Tubercular Diseases and Affections of the Respiratory Organs together is somewhat below the mean; the mortality, however, from the former by itself being rather in excess, as is the general rule with occupations which are accompanied by much intemperance.

Brewers (No. 16); *Innkeepers, Publicans* (No. 17); *Inn, Hotel Servants* (No. 18); *Maltsters* (No. 19).—The mortality of men who are directly concerned in the liquor trade is appalling; the comparative mortality figure for brewers being 1361; for innkeepers, publicans, and generally all dealers in spirits, wines, or beer, 1521; and for inn and hotel servants no less than 2205; whereas for maltsters, who only are concerned with the materials and not with the liquor itself, the figure is only 830. The death-rates for inn and hotel servants were much higher in 1880-82 than in the former experience, whereas the death-rates of the brewers and the publicans, high as they are, nevertheless show a not inconsiderable reduction.

It is well, whenever the opportunity offers itself, to test the accuracy of our death-rates by comparison with data derived from independent sources, and in the case of the innkeepers and publicans such comparison is possible. By the experience of the Scottish Amicable Life Assurance Society* (1826-1876), the mortality of males occupied in this business was 68 per cent. in excess of the Actuaries or Healthy Male Table, and 49 per cent. in excess of the English Life Table (No. 2., Males). This result tallies very closely with the figures in Table L., where it appears that the mortality of the innkeepers and publicans is 52 per cent. above the present mortality of all males.

That this terrible mortality is attributable to drink might be safely assumed *à priori*, but the figures in Table L. render it incontestable. The mortality attributed to alcoholism itself is far higher for innkeepers and publicans than for any other industry, and more than five times as high as the average; that for brewers falls far short of this, but nevertheless is

* "On the Mortality among Publicans, &c.," by John Stott, Journal of Institute of Actuaries, 1876.

the next highest to that of innkeepers, with the single exception of cabmen. Under the heading Liver Diseases the mortality of innkeepers is no less than six times as high as the average, and more than twice as high as that of brewers and of butchers, who come next in order in this respect to innkeepers. The innkeepers, again, show the highest mortality in the Table from gout, and, putting aside trades in which there is lead-poisoning, from diseases of the urinary organs. The brewers also show great excess of mortality, though in a less degree, under these headings. So also is it under the headings Suicide, Diseases of the Nervous System, Diseases of the Organs of Circulation, Phthisis, and Diseases of the Respiratory Organs; there are, in short, no organs apparently that are not more or less seriously damaged by the excessive use of alcoholic drinks, though the liver appears to suffer most. The mortality of the brewers, from all causes, though greatly in excess of that of most industries, is considerably lower than that of the innkeepers and publicans. This is probably due to the fact that, whereas the brewers chiefly consume malt liquor, the innkeepers and publicans take not only beer but spirits. The occupation of the brewers, moreover, entails much more muscular exercise than does the sedentary business of the other occupation. This difference of mortality between brewers and innkeepers accords with the results of the inquiries and calculations made by Mr. Neison, who found that the annual mortality among persons who were given to intemperate indulgence in fermented liquors was very considerably less than among those who indulged similarly in distilled liquors.* It may also be worth noting that a comparison between Mr. Neison's figures† and our own comparative mortality figures shows that a large proportion of the innkeepers and publicans and the brewers must be of temperate habits; for whereas the comparative mortality figure of innkeepers in our table is 1521, and that of brewers is 1361, that for recognised intemperate persons, according to Mr. Neison's data, would be 3240. If we suppose innkeepers and publicans, as also brewers, to be entirely made up of such intemperate persons as were the basis of Mr. Neison's calculations and of persons resembling the average of all males, then it would follow that 23 per cent. of the innkeepers and publicans, and 16 per cent. of the brewers, were of intemperate habits.

Law Clerks (No. 20) *Commercial Clerks* (No. 21).—The death-rates of clerks, both commercial and law, and especially of the latter, are high; the comparative mortality for the former being 996, and for the latter no less than 1151. Clerks work in close offices, and lead an almost exclusively town life, with its attendant evils. High, however, as their death-rates are, they have declined very greatly since the previous record; probably because the increased competition for employment has enabled employers to fill their offices with a better class of assistants. The increased attention given to athletic sports and generally to out-door pursuits may also have had some part in this improvement.

Shopkeepers (No. 22-33).—Of the occupations in the Table, eleven may be taken as fairly representative of the great class of shopkeepers. The comparative mortality figure for the aggregate group thus formed is 877, which cannot be considered high, when it is borne in mind how large a proportion of shopkeepers live in towns, how little out-door exercise they get as a rule, and what long hours they spend in the more or less vitiated atmosphere of a shop. The mortality differs not inconsiderably in different shop businesses, and arranging the eleven in the order of their comparative mortality figures, we have the following sequence:—coal merchant 758; grocer 771; bookseller and stationer 825; general shopkeeper 865;

* "Contribution to Vital Statistics." F. G. P. Neison, 3rd edition, p. 218.

† Mr. Neison's figures are for all males over 15 years, whereas ours are for males between 25 and 65. He found that 357 deaths occurred among intemperate males, whereas there should, by the average of all males, only have been 110·2; in other words, there were 3240 instead of 1000.

draper 883; ironmonger 895; fishmonger and poulterer 974; tobacconist 1000; milk, butter, cheesemonger 1009; chemist 1015; greengrocer 1025. For nine of these 11 occupations we have death-rates from previous experience; and, if we calculate the comparative mortality figures by the previous death-rates, we find that in every one of the nine the figure has fallen, the decline being greatest in the cases of the drapers and of the fishmongers.

Samples of the registered causes of death were taken for five of these trades, and the figures are given in Table K.; but for only two, the grocers and the drapers, did the samples abstracted come up to 500 deaths, which was fixed as the minimum required for calculation of rates. Comparing the mortality from different causes in these two trades, it will be seen that the drapers suffer much more than the grocers from phthisis and diseases of the respiratory organs, and especially from the former; whereas the grocers have the higher rate of mortality from diseases of the organs of circulation, as also, in a smaller degree, from alcoholism, liver disease, diseases of the urinary organs, and suicide.

Independently of the fact that many grocers deal in spirituous drinks, they differ from drapers in a way which very possibly may account for the differences between their death-rates from those alcoholic causes and from diseases of the circulatory system. The grocers are as a body of men older than the drapers. A draper's assistant is required to be a young man, and so soon as he reaches a certain age he must go. This is at once seen on consulting the Tables in the Census Reports. It will be found on reference to these that for every 100 grocers between 25 and 45 years of age there are 54 between 45 and 65; whereas for every 100 drapers of the former age there are only 33 of the latter. But both cardiac and hepatic diseases become much more frequent as age advances; and consequently we should expect to find, as we in fact do find, a greater mortality under these headings among the grocers than among the drapers. For it must be remembered that our rates are but imperfectly corrected for differences of age distribution.*

The contrast between drapers and grocers in regard to their respective mortalities from phthisis and tuberculosis is not improbably referable in part to the very great differences observable between an ordinary draper's and an ordinary grocer's shop. The latter has, as a rule, the door wide open, and not being usually of great size, is thoroughly well ventilated. The drapers shop generally has the door shut, or at any rate not so widely opened as has the grocers, inasmuch as dust would damage the goods; it is of considerable depth and crammed with wares that are constantly being moved about, and that give off fluffy dust during the process; the air is further fouled by numerous gas-lights required to show off the goods; and this vitiation is in most cases distinctly perceptible to the nose. Thus probably it comes about that the drapers' mortality from phthisis is one of the highest, while the grocers' is one of the lowest in our list.

Butchers (No. 34).—From simple shopkeepers we pass on to those occupations or handicrafts that involve manual labour, though often in combination with shopkeeping. The death-rates in these lighter handicrafts are on the average higher than among shopkeepers, and the comparative mortality figure rarely falls to 900, whereas the mean for the shopkeepers was 877.

The butchers have now, and had in the previous record, very high death-rates, and their comparative mortality figure is as high as 1170. The rate, as in so many other trades, has declined in the earlier and risen in the later

* The Comparative Mortality Figure is so far corrected as that it is based in each trade upon equal numbers living under and above 45 years of age, viz., 41,920 in the former age-period, and 22,721 in the latter; but even within the limits of a single age-period of 20 years there is room for much diversity. Moreover, in abstracting the causes of death, no distinction was made between the two age-periods, all deaths between 25 and 65 being taken indiscriminately.

age period, but in neither to any great extent. The high mortality of butchers is manifestly due to excessive indulgence. Their mortality from alcoholism, liver diseases, and urinary diseases, respectively, is almost identically the same as that of brewers. So also is their mortality from diseases of the nervous system. But under the headings Phthisis and Diseases of the Respiratory System their mortality falls far short of that of the brewers. Still, even under these headings their mortality is high, and especially under the heading Phthisis.

This is noteworthy, for all writers who touch on the question of the diseases of trades ascribe to butchers a very considerable immunity from tubercular diseases, following Dr. Beddowes, who made this statement in his work on consumption at the close of the last century.* Thackrah† goes so far as to say that "if we see a phthisical youth in the fraternity, we shall generally find that his parents, aware of an hereditary disposition to consumption, brought him up in the business with the hope of averting this formidable malady." So strongly has this opinion as to the immunity of butchers from phthisis been held, that a medical man at Montpellier wrote a treatise in 1788 on the question, "*Utrum in carnario commoratio phthisicis prodesse possit?*" Our figures in no wise tally with this very generally held opinion. The mortality of butchers from phthisis as given in the Table is high, the figure being 261 against an average of 220 for all males; and in this respect butchers agree with other trades in which there is evidence of alcoholic excess. It may, of course, be said that deaths are frequently ascribed to phthisis that are not really tubercular, and that should be put under respiratory diseases. But there is no apparent reason why such transference should occur in the case of butchers more than in the case of other males. Moreover, the writers who ascribe to butchers the supposed immunity from phthisis give no figures, but apparently have formed their conclusion on the insecure basis of general impression. The only precise figures that are to be found as to mortality from phthisis in different trades are those put out by the Swiss authorities‡ as the result of investigations in 1879-82, and these figures coincide with our own. For of the 27 trades concerning which particulars are given in the Swiss returns, that of butchers comes fifth when the trades are ranged in the order of their mortalities from phthisis, beginning with the highest.

Bakers and Confectioners (No. 35); *Millers* (No. 36).—The death-rates of bakers and confectioners have not altered materially since the previous record; they are still rather high, though far short of those of butchers, and the comparative mortality figure is 958, being almost exactly the same as that of millers, who in one respect resemble bakers, viz., in their exposure to flour-dust, though otherwise their lives are very different. There is some indication in the Table of Mortality by Causes, Table L., of abuse of alcoholic drinks by bakers; for the mortality in this trade directly ascribed to alcohol is high, and that ascribed to suicide very high, while the mortality from liver disease is also somewhat above the average. In spite of the high temperature in which bakers work, and the inhalation of flour-dust that their craft entails, their mortality from phthisis and from diseases of the respiratory organs hardly departs from the average for all males. Judging from the death-rates of millers and bakers, the inhalation of flour-dust would seem to be innocuous; probably little, if any, of the dust inhaled by them reaches the lungs.

Hatters (No. 37).—The death-rates of hatters have fallen since the previous record, but are still high, the mortality figure being 1064. In making hats the workman "at the plank" is exposed to considerable

* "Causes, Early Signs, and Prevention of Pulmonary Consumption." London 1799, pp. 33, 39, 44.

† "The Effects of the Principal Arts, &c." London, 1831, p. 9.

‡ "Mouvement de la Population de la Suisse," 1882, p. xviii.

variations of temperature, working over a stove and in steam. To judge from the sample of deaths and causes in Table K., which is, however, too small to give a secure basis for calculation of rates, the conditions under which hatters work lead to excessive drinking and its consequences, liver disease, suicide, and also to phthisis and tubercular affections.

Hairdressers (No. 38).—The death-rates of hairdressers, though the mortality has fallen at the earlier age-period since the previous record, are still excessively high, and give a comparative mortality figure of no less than 1327. Judging from the deaths abstracted with their causes, which however only amounted to 371, and thus were below the minimum fixed for calculation of rates, the high mortality of hair-dressers is due to phthisis and to the diseases caused by drink. The life of hairdressers, speaking generally, is a town life; and their work is entirely indoors, and carried on in a heated atmosphere; moreover, the air in which they work must necessarily be more or less dusty, being charged with particles of hair and other substances.

Tailors (No. 39); *Shoemakers* (No. 40).—The death-rates of tailors and of shoemakers have declined since the previous record in the earlier, and gone up in the later, of the two age-periods. In both trades the mortality must be considered high, the comparative figure for tailors being 1051 and for shoemakers 921. Tailors are proverbially unhealthy men; and probably, owing to the work requiring no great strength, and being of a sedentary character and carried on entirely indoors, more than an average proportion of weakly youths enter the trade. The chief heading under which the mortality of tailors exceeds that of shoemakers is phthisis, where the figure for tailors is 285, while that for shoemakers is only 254 and not very much above the average. The difference is readily explained by the closer and more confined air in which tailors habitually carry on their business. Under diseases of the respiratory organs neither tailors nor shoemakers depart widely from the average.

The death-rate of tailors from alcoholism and from diseases of the liver is high, and above that of shoemakers, and in both trades the suicide figure is in excess; still the figures under these headings in Table L. are hardly such as to justify us in speaking of tailors in the words quoted by Thackrah as "the most intemperate set of men in London." That they drink more than is good for them is manifest, but it must be remembered that their work is purely sedentary, and that an amount of drink that can be borne with impunity by those whose lives are spent in active out-of-door occupation is seriously injurious to those who lead sedentary lives. The mortality of tailors and of shoemakers from diseases of the organs of circulation is very nearly that of all males; but their mortality from diseases of the nervous system is high, that of the tailors being higher than that of the shoemakers, probably in consequence of their being more intemperate.

"Consumption and other forms of chest disease," wrote Dr. E. Smith of tailors in 1863, in the Sixth Report of the Medical Officer of the Privy Council, p. 429, "are the most frequent causes of death, and constitute two thirds of all the causes of death." Dr. Smith gives no precise figures, and his conclusions seem rather founded on general impressions than on accurate statistical data; nor does it appear whether heart diseases are included by him among chest diseases in the above quotation. But the mortality from phthisis and diseases of the respiratory and of the circulatory organs altogether do not at present constitute nearly two thirds of the total mortality. The conditions, therefore, under which tailors work, and which lead to the production of these diseases, have apparently undergone much improvement.

Curriers (No. 42); *Saddlers, Harness Makers* (No. 43).—The death-rate of curriers has fallen at both age periods since the previous record; their comparative mortality figure is 906, while that of saddlers and

harness makers is 987, the death-rate in this latter industry having fallen in the earlier, but gone up in the later, of the two age-periods.

Tanners, Fellmongers (No. 41); *Tallow Chandlers, Soap Boilers, &c.* (Nos. 44-45).—The workers in these industries are exposed to sickening exhalations, but apparently their mortality is not so seriously affected by it as might be expected *à priori*. The comparative mortality figure for the tanners is 911, and for the tallow chandlers and soap boilers 920, or, if glue and manure makers be included, 933. The death-rates in each of these industries have fallen at both age-periods since the earlier record.

Printers (No. 46); *Bookbinders* (No. 47).—The death-rates in these industries have fallen from the previous record, and at each of the two age-periods, but they are still very high, the mortality figure for the printers being 1071, and for the bookbinders as much as 1167. Both industries are carried on under notoriously unhealthy conditions, in ill-ventilated rooms, and in an atmosphere unduly heated by engines, stoves, and flaring gas-lights. The decline in the death-rates may be fairly attributed to the improvements effected by the factory inspectors since these trades came under supervision, while the high mortality which still prevails in them shows how much there yet remains to be done.

It will be seen in Table L. that the high mortality of printers is entirely due to phthisis, their mortality figure under this heading being no less than 461, against an average of 220 for all males; that is to say, the mortality of printers from this cause is more than twice as high as the average. What an appalling mortality this is will be seen at once on running the eye down the column which gives the comparative figures for phthisis in the several trades and industries. Excepting costermongers, whose special circumstances have already come under discussion, and those industries in which the workman is exposed to the inhalations of dust, such as file-makers, potters, and Cornish miners, there is no industry in the Table in which the mortality from phthisis approaches to that of printers.* As for bookbinders the data in Table K. are too scanty for any certain statement; but, so far as can be judged from the 77 deaths of which the causes are recorded, in this industry also the high mortality is due to phthisis, for of the 77 deaths no less than 30 were caused by this disease.

Printing is one of the occupations which renders those engaged in it liable to lead-poisoning. Of the 678 deaths of printers (Table K.) of which the causes were abstracted, 3 were attributed to this affection. The amount of lead-poisoning, however, in a given industry is not to be measured so well by the deaths directly attributed to this cause, for these would probably be only the cases of acute poisoning, as by the deaths attributed to diseases of those organs which are known to suffer from chronic exposure to the influence of lead, and especially by the deaths from diseases of the kidneys and of the nervous system (see *file makers, painters*). Measured by this test, the amount of lead-poisoning among printers can be but insignificant,† for their mortality figure is below the average under both of those headings. It may, however, be well to note that Hirt believes that the high mortality of printers from phthisis is in some degree to be attributed to lead-poisoning, an opinion which is

* A long report on printers in London, by Dr. E. Smith, will be found in the 6th Report of the Medical Officer of the Privy Council. That report agrees with the results in the text so far as regards consumption, which Dr. Smith found to be "twice as prevalent among printers as among the members of the whole community." But diseases of the lungs and of the heart appear to have been much more common among printers at that date, 1863, than is now the case.

† The above statement as to the rarity of lead poisoning among printers tallies with the result of the inquiry into the matter made by Dr. Whitely, and published in the 6th Report of the Medical Officer of the Privy Council, 1863, p. 354.

not shared by Tanquerel des Planches, who, on the contrary states, as the result of his own experience, that lead confers a certain degree of protection against phthisis.*

Watch and Clock Makers (Nos. 48-49).—The death-rate in this industry has fallen at each of the two age-periods since the previous record, and the comparative mortality figure is 903. The rates, however, are not very trustworthy, owing to possible confusion between watchmakers and jewellers. If these latter be included, and also makers of philosophical instruments, the comparative mortality figure will be 932. This somewhat high mortality figure is probably attributable to the injurious influences of confinement to indoor life and in a small degree to the inhalation of metallic dust. For, though the amount of such dust given off may not be very great, yet the bent attitude which watchmakers habitually assume in order to see their work brings their mouths into such a position of proximity as to favour its inhalation. The cramped attitude itself, moreover, by hindering free expansion of the chest must injuriously affect the organs of respiration. Our Table gives no account of the causes of mortality in this business; it may, however, be noted that the Swiss returns show a somewhat high mortality among the watchmakers, and an especially high mortality from phthisis. A French writer also, M. Perron,† stated, some twenty years ago, that in the district of Besançon no less than 60 per cent. of the mortality of watchmakers is caused by phthisis, which he attributes to the inhalation of the dust of copper filings.

Paper Manufacture (No. 50).—The death-rates in this industry have fallen since the previous record, very considerably in the earlier, and slightly in the later, age-period; and the comparative mortality figure is only 717, being among the lowest. The only unwholesome processes in paper manufacture are the preliminary operations of cutting, sorting, and generally dealing with the rags, which give off clouds of dust, and moreover sometimes serve as transmitters of infectious diseases such as small-pox‡; but these preliminary processes are almost exclusively in the hands of women, while our figures relate solely to males.

Glass Manufacture (No. 51).—The death-rate in this industry is very high at both age-periods, having risen in the later and fallen in the earlier period since the previous record. The comparative mortality figure is no less than 1190. Glass-working is carried on in an excessively high temperature; and in some of the operations fine, hard, and sharp-pointed dust is given off. Glass-blowers also are reputed to be very liable to emphysema. It would probably, therefore, be found that the high mortality in this industry is due to lung affection, but glass manufacture is not one of the industries in which the causes of death have been abstracted.

Earthenware and China Manufacture (No. 52).—This industry, wrote Dr. Farr in the last decennial supplement, "is one of the unhealthiest trades in the country." The death-rates on which that statement was based were excessively high, and since the statement was made the rates have increased at each of the two age-periods, and give now a comparative mortality figure of no less than 1742, which is only exceeded in the Table by the figures for costermongers, Cornish miners, and inn and hotel servants. This excessive mortality is in greatest part due to phthisis and diseases of the respiratory organs, the deaths from these two causes being represented by 1118, while the number for all males is only 402; so that the mortality under these two headings is almost three times as great in

* Hirt. i. 93. iii. 139.

† Ann. d'Hygiene, 2nd Ser. xvi., p. 70.

‡ Supplement to 11th Report of Local Government Board (1881), p. 107, and 8th Report of Medical Officer to Privy Council (1865), p. 196.

this industry as among average males. There is only one occupation in Table L., viz., mining in Cornwall, in which the mortality from these two causes is higher; and scarcely any other in which it comes near this. The mortality from diseases of the circulatory system is also extremely high, almost the highest in the Table; the inhalation of dust induces emphysema and chronic bronchitis, or "potters' asthma," and this in turn gives rise to heart disease. The various processes of the manufacture differ very greatly as regards their unhealthiness; and full particulars concerning them individually are given by Dr. Greenhow* in his report upon the industry as carried on at Wolstanton and Stoke-upon-Trent. Taking, however, the aggregate industry, the two main conditions that produce this terrible mortality are the inhalation of air charged with fine irritating dust, and exposure to great vicissitudes of temperature. The mortality ascribed to alcoholism and to liver disease seems to imply a certain but not very great amount of intemperance; and this tallies with the statement made by Dr. Greenhow that the potters are said to be of intemperate habits, but much less so than formerly. In one branch of the industry, viz., the "dipping," the workman is exposed to the chance of lead-poisoning, and among the 881 deaths of which the causes were abstracted 5 were attributed to this poison. But, taking the industry in the aggregate, there is no evidence, either under the headings Diseases of the Nervous System or Diseases of the Urinary System, of any considerable amount of chronic lead-poisoning, such as we find among painters and file-makers.

Textile Manufactures (Nos. 53-58).—Among the textile industries there are two in which the death-rates are high, and unfortunately these are the two in which by far the largest number of persons are engaged, viz., the cotton industry of Lancashire (No. 53) and the woollen and worsted industries† of the West Riding (No. 55). The comparative mortality figures in these industries are 1088 and 1032 respectively. After these comes carpet manufacture (No. 56) with a figure of 945; while the silk manufacture (No. 54), the lace manufacture (No. 57), and the hosiery manufacture of Leicestershire and Nottinghamshire (No. 58), all have low death-rates, their respective mortality figures being 845, 755, and 717. Some part of these differences may possibly be due to differences of locality; for, high as is the cotton mortality, it is lower than the mortality of males in Lancashire generally, and the high figure which denotes the woollen and worsted mortality corresponds almost exactly to that of the whole of the West Riding; while the low mortality figure of the hosiery manufacture may be partly due to the low mortality in Leicestershire and Nottinghamshire generally, as shown in Table L., where the rates for those counties are given for the sake of comparison. But it can scarcely be doubted that the main cause of the differences is to be found in the conditions under which the industries are severally carried on, and especially in the differences that they present in regard to the dustiness and the temperature of their respective working-places. In the cotton factories the temperature of the weaving sheds is described in a recent (October, 1883) report by Dr. Bridges to the Home Secretary as "tropical and relaxing," and dust, composed partly of filamentous particles of cotton and partly of mineral substances used for sizing, is stated to be a notable feature in most of the sheds. In the woollen industries the temperature is not so high as in the cotton factories, nor is the dust evolved in most of the processes nearly so great, owing to the wool being treated with oil. There are, it is true, some preliminary processes, such as wilying and teasing, in which considerable dust is given off; but even in these processes it is said‡ that owing to "the dust being drawn away into a flue connected with a fan, which

* Third Report of Medical Officer of Privy Council, pp. 102-113.

† It was found practically impossible to separate the mortality in the Woollen and Worsteds Industries, and they have therefore been grouped together.

‡ Dr. Greenhow in 3rd Report of Medical Officer of the Privy Council, p. 166.

"produces a powerful indraught, but little of it escapes into the atmosphere of the workroom." But both as regards dust and as regards temperature, the silk mills, as I am informed by Mr. Lakeman, the Senior Inspector of Factories, contrast most favourably with the cotton and with the woollen factories; inasmuch as both dust and high temperature have to be scrupulously avoided, as injurious to the costly material. "The only process of the silk manufacture of Leek and Macclesfield," says Dr. Greenhow,* "in which dust is evolved is the manufacture of silk waste, "in which comparatively few persons are engaged." Neither in the hosiery nor in the lace manufacture is there any necessary evolution of dust, though it is said that a small and almost imperceptible quantity is given off in the process of making stockings; nor are the workmen exposed by any necessary conditions of their industry to high temperature; the factories, which of recent years have been gradually, to a great extent, superseding the former domestic labour, being as a rule lofty and tolerably well ventilated.†

It is to differences of this kind that we must attribute in the main the great diversity in the mortalities of the several textile industries; and it is strictly in harmony with this view, that the chief share in that diversity, so far as the three industries for which the causes of death have been abstracted are concerned, is due to differences in the mortality from phthisis and from diseases of the respiratory organs. The mortality figure for these two together is for the cotton industry 543, for the woollen and worsted industry 462, and for the hosiery manufacture only 283, the figure for all males being 402. There are no similarly wide differences between these industries under other headings. Thus the mortality from diseases of the nervous system, together with suicide, is represented for the cotton industry by 142, for the woollen and worsted industry also by 142, and for the hosiery manufacture by 136, or practically the same figure. Under diseases of the organs of circulation the figure for the cotton industry is very slightly higher than that for the hosiery manufacture, while for some unexplained cause the figure for the woollen industry is in considerable excess.

In none of these three industries does there appear to be any seriously injurious amount of intemperance, to judge from the mortality attributed to alcoholism and to diseases of the liver. The figures indeed for the hosiery manufacture under these headings are exceptionally low.

There is one ailment to which certain workmen in the woollen industries are exposed from which the other textile industries are free, namely, anthrax or woolsorters' disease. Of the 1278 deaths of wool and worsted workers, of which the causes were abstracted, 10 were ascribed to this disease.

Dyers, Bleachers, Printers, of Textile Fabrics (No. 59).—The death-rate in this group of industries, as in so many others, has fallen in the earlier and gone up in the later of the two age-periods. The mortality is high and the comparative figure 1012. The causes of death have not been abstracted, but the high mortality not improbably is connected with the fact that many of these industries are carried on in places where the amount of steam is such as "frequently to produce the effect of a dense fog."‡

Rope, Cord, Twine, Makers (No. 60).—The death-rates in this industry have fallen very considerably at each age-period since the previous record, and the comparative mortality figure is now only 839.

Builders, Masons, Bricklayers (No. 61), *Slaters, Tilers* (No. 62), *Plasterers, Whitewashers* (No. 63).—The death-rate of slaters has fallen

considerably at each age-period since the previous record, but still is high, giving a comparative mortality figure of 942; the rates are, however, based on comparatively scanty data, the years of life for the second period being under 5000. The death-rates of plasterers and whitewashers, and of builders, &c., have also fallen very considerably at each of the two age-periods, but the comparative mortality figure for the former is still 896, and for the latter is 969. Builders, masons, and bricklayers are of course exposed by the nature of their work to the inhalation of dust, but in a mitigated degree, inasmuch as their work is carried on mainly in the open air; and consequently their mortality is somewhat high from phthisis and diseases of the respiratory organs, but not excessively so, the figures being 252 under the former and 201 under the latter heading, figures which, though not inconsiderably above the average, are yet low as compared with those of workers similarly exposed to dust in trades not carried on in the open air. Bricklayers are commonly reputed to be intemperate, but so far as can be judged from their mortality from alcoholism, diseases of the liver, and diseases of the nervous system, under each of which headings the figure is below the average, the amount of intemperance is not such as to do serious mischief; if they drink in excess the ill effects on the body are counterbalanced by hard muscular exertion. Working often on scaffoldings these men are liable to falls from heights, and consequently the mortality from accident is rather high, its figure being 45. This is considerably below the figure for All Males, which is 67, but the figure for All Males is no true standard for comparison, being raised very greatly by the inclusion of a few terribly dangerous industries, such as mining, quarrying, fishing, &c., &c.

Plumbers, Painters, Glaziers (No. 64).—The death-rates in these extensive industries, which it was found impossible to separate accurately from each other, and which have therefore been grouped, has fallen considerably from the previous record at each of the two age-periods; but the rates are still very high, and give a comparative mortality figure of 1202. The main condition, apparently, that determines this high mortality is liability to lead-poisoning, while auxiliary conditions are liability to accident and habits of intemperance. The mortality from lead-poisoning is higher than in any other industry in the Table excepting file-making, and probably the figure under this heading, which is 21, would be still higher than it is were painters taken by themselves, which, as before stated, was found impracticable. In association with this mortality directly attributed to lead, there is an excessively high rate of mortality from diseases of the urinary organs, and also a high rate under the headings Diseases of the Nervous System and Diseases of the Organs of Circulation. The mortality figure for urinary diseases is no less than 100, and is only exceeded in the Table by that of file-makers, who also, as before said, exceed in their liability to lead-poisoning. There seems, therefore, to be scarcely room for reasonable doubt that the views entertained by most English medical men, though apparently not yet fully accepted by foreign writers, as to the production of certain renal diseases by lead are correct. At the same time it must be admitted that, though there is a certain amount of lead-poisoning in the earthenware manufacture and also among printers, the mortality from renal disease is apparently scarcely above the mean in the former, and is below the mean in the latter, industry. The effect of lead in producing disease of the nervous system is of course notorious. Whether the high mortality from diseases of the circulatory system is also to be attributed to lead may be more doubtful; but, as heart disease is frequently a result of renal disease, it is not improbable that this also may be the explanation of the high figure under this heading; and it may be noted, as confirmatory of this supposition, that the mortality from diseases of the circulation is exceptionally high among file-makers, among whom lead-poisoning is most frequent. Another heading in the Table under which there is a high figure for

* Op. cit., p. 157.

† Op. cit., pp. 169-70.

‡ Report by Dr. Bridges to Home Secretary, October 1833, p. 6.

painters and plumbers is Gout. That chronic lead-poisoning is productive of gout was pointed out in 1854* by Dr. Garrod, who found that of his hospital patients who suffered from gout no less than 30 per cent. had been subjected to the influence of lead. It is curious, however, that among file-makers, in spite of their great liability to lead-poisoning, there was not a single death attributed to gout out of the 528 deaths of which the causes were abstracted.

The effects of chronic lead-poisoning upon the mortality of painters and plumbers from gout, and from diseases of the nervous system and of the urinary and circulatory organs, are increased by the intemperance which apparently prevails amongst this group of workmen; for alcoholic excess resembles lead-poisoning in adding to the mortality under these same headings; and that such excess is common among painters and plumbers is shown by their high mortality under the headings Alcoholism, Liver Disease, and Suicide. Their mortality is also somewhat but not greatly in excess under the heading Phthisis; while their mortality from diseases of the respiratory organs only equals the average.

The remaining heading under which there is excess of mortality is Accident, the figure here being the highest in the Table after that for cab and omnibus service, and of course for miners, quarrymen, and fishermen, who in this matter are scarcely comparable with workers in other industries.

The form of accident to which this high mortality of plumbers, painters, and glaziers is due, is falling from scaffolding or ladders, or through skylights.

Upholsterers, Cabinet Makers, French Polishers (No. 65).—The death-rate has fallen in the earlier and risen slightly in the later age-period. The comparative mortality figure is high, being 963.

Carpenters, Joiners (No. 66), *Sawyers* (No. 67), *Wood Turners, Box Makers, Coopers* (No. 68).—In each of these three groups of workers in wood the death-rate has fallen in the earlier and gone up in the later of the two age-periods. The mortality of the carpenters and of the sawyers is low, but not so that of the turners, box makers, and coopers, whose comparative mortality figure is as high as 1091. Why these last workers should be so much less healthy than the carpenters and sawyers is not very apparent; possibly it may be in part attributable to their not having so much out-of-door work, but more probably it is due to coopers being brought by their business into tempting relations with drink; and it may be noted that in Switzerland also coopers are found to have an excessively high mortality, which is similarly explained by the statisticians of that country.

The only one of these industries in which the causes of death have been abstracted is that of carpenters and joiners, and it will be seen in Table L. that their mortality is low under all the main headings; they are healthy all round.

Coachmakers (No. 69); *Wheelwrights* (No. 70); *Shipbuilders, Shipwrights* (No. 71).—The death-rates have declined since the previous record at both age-periods in each of these industries. The mortality figure for the coachbuilders is still high, being 944, while the figures for the other two are low, 723 for the wheelwrights and 775 for the shipbuilders and shipwrights.

Locksmiths, Bellhangers, Gasfitters (No. 72); *Gunsmiths* (No. 73).—Both gunsmiths and locksmiths are exposed more or less to the inhalation of metallic dust, and probably this is the explanation of the rather high mortality in these industries; the comparative figure for locksmiths, &c. being 967, and for gunsmiths 1031. The death-rates for the latter have hardly altered since the previous record, while the rates for the former have gone down considerably at each of the two age-periods. The Swiss returns also show a high mortality for locksmiths.

* Med. Chir. Trans. xxxvii, p. 211.

Cutlers (No. 74); *File-makers* (No. 75).—The death-rates in these two industries are terribly high, and give a mortality figure of 1309 for the cutlers, and of no less than 1667 for the file-makers. The main cause of these high figures is of course the inhalation of metallic dust mixed with stone dust given off from the grindstones. The result of this inhalation is that the mortality from phthisis and diseases of the respiratory organs is represented in the table by 760 in the case of cutlers, and of 783 in the case of file-makers, against an average for all males of only 402. The mortality of cutlers is also high under the heading Diseases of the Nervous System; for what reason is not apparent, for so far as can be judged from the mortality from alcoholism or from liver diseases there is no great amount of intemperance among them.

The file-makers, in addition to the inhalation of metallic dust, to which they are exposed in common with the cutlers, suffer from another serious evil from which the cutlers are free, namely, liability to lead-poisoning.

This comes about from their using a cushion of lead on which to strike their file. This liability has been previously noticed by Dr. Greenhow,* but it does not appear that the serious extent to which it exists has been fully recognized. It will be seen, however, that out of the 528 deaths in which the causes of decease were abstracted, 13 were directly attributed to lead; and that the mortality figure under this heading is higher for file-makers than for any other industry in Table L, even than for painters, plumbers, and glaziers. The mortality of file-makers from diseases of the urinary organs is also the highest in the Table, and is only approached by that of painters, plumbers, and glaziers, as was previously pointed out. The same is the case as regards diseases of the nervous system and diseases of the organs of circulation, under both of which headings the mortality figure for file-makers is the highest in the list (costermongers excepted), while plumbers and painters come almost next in order.

The high figure under the heading Diseases of the Organs of Circulation is to be accounted for in part by the high mortality from diseases of the respiratory system, heart disease following on chronic lung affection, as among the potters. But seeing how much higher the mortality from this cause is among file-makers than among cutlers, who also suffer greatly from lung affection, it is probable that some part at any rate in the mortality is due to some other cause not common to cutlers, such as lead poisoning; and this view is strengthened by the high mortality under this heading among painters.

The mortality of file-makers from liver disease is rather high, and therefore some contribution may possibly have been made by intemperance to the figures under Diseases of the Nervous and of the Circulatory System, but there can be no doubt that the greatest share in the former, and not improbably some share in the latter, is due to lead; and it becomes a question that demands the attention of those who are practically acquainted with the industry, whether some substitute for the lead cushion cannot be devised.

Cutlery, Saw, Needle, Pin, Tool Makers, &c. (No. 76).—Besides cutlery and files, there are numerous other implements and tools the manufacture of which constitutes separate industries, which are, however, too small to give a trustworthy basis for calculating mortality. Grouping the workers in all these industries together and joining them to cutlers and file-makers, it is found that the death-rate has very slightly declined since the former record in the earlier age-period, and gone up not inconsiderably in the later, the comparative mortality figure for the united group being 1273.

* Third Report of Medical Officer of Privy Council, page 126.

Engine, Machine Makers (No. 77); *Boiler Makers* (No. 78); *Blacksmiths* (No. 80); *Other Iron and Steel Workers* (No. 81).—The death-rates in these industries, so far as we have means of comparison, have fallen in the earlier and gone up in the later age-period. Seeing how rough is the character of the work in most of these industries, and to what risk of accident they would appear to be subject, the mortality can scarcely be considered high; but it is probably lowered by the men who undertake this kind of hard labour being above the average artisan in strength. The mortality is higher for the blacksmiths and the boiler-makers than for the other two groups, the comparative mortality figure being 973 for the blacksmiths and 994 for the boiler-makers, whereas for the engine and machine makers it is only 863, and for the other iron and steel workers (exclusive of all previously dealt with), 869. Of these four groups the only one for which the causes of death have been abstracted is that of the blacksmiths. Their mortality from accident it will be seen is rather high, as might be expected; but the only heading under which their mortality figure is at all notably in excess of the average for all males is Diseases of the Respiratory Organs; here the mortality is represented by 204, while the figure for all males is 182. This is probably to be explained by the nature of the blacksmith's work, which exposes him to great heat and to rapid alternations of temperature. The mortality from diseases of the circulatory system, though only just above the average, must be considered somewhat high, considering the necessarily picked character of the men who become blacksmiths, and it is considerably above that of miners and of quarrymen, who also are picked men. This may be because the blacksmith's labour involves much more sudden effort than does that of the miner or quarryman. The blacksmith's figure under the heading Alcoholism is rather high, but not so the figure under Liver Disease, the heavy muscular exercise probably preserving that organ from the effects of liberal potations.

Tin Workers (No. 82); *Copper, Lead, Zinc, Brass, &c. Workers* (No. 83).—In each of these groups, which include the remainder of the metal workers, the death-rate has declined in the earlier and gone up in the later of the two age-periods. The workers in copper, lead, &c., as might be expected, are less healthy than the workers in tin; the comparative mortality figure for the former being 992, while for the latter it is only 885.

Metal Workers generally (No. 84).—The great bulk of workers in metal are included in the groups numbered from 72 to 83. Putting all these together, we have an enormous body of workmen, with a comparative mortality figure of 938.

Miners (No. 85-93).—Mining constitutes so important an industry in this country, one in every 19 males between 25 and 65 years of age being a miner, that the mortality under this heading requires special attention. At the Census of 1881, great pains were taken to secure accurate returns of miners, distinguished from each other by the character of the minerals or metals with which they were engaged, and it was hoped that it would thus be possible to estimate the death-rate of each group of miners more closely than could be done with the vaguer data of former Censuses; that is to say, to estimate the death-rates of coal miners, tin miners, ironstone miners, copper miners, &c. separately. But, after all, it was unfortunately found that this was impossible, owing to the very imperfect manner in which the speciality of occupation of deceased miners is stated in the death registers. This was found to be especially the case with those deaths which are caused by accident, and on which inquests are held. The coroners in their certificates very commonly neglect to distinguish one kind of miner from another, and simply describe the deceased as "miner," without further specification. As at least a fifth of the deaths of miners are due to accident of one kind or another, it is plain that this negligence on the part of

coroners renders the separate estimation of the mortality of the several kinds of miners an impossibility.*

The best practicable substitute that offered itself was to divide out the miners geographically, and estimate their death-rates by counties or other convenient areas; and this may be accepted as a rough approximation to a division of the miners by the nature of the material in which they work. For in the West Riding, in Durham with Northumberland, in Derbyshire with Nottinghamshire, in Monmouthshire with South Wales, in Lancashire, and in Staffordshire respectively, more than 90 per cent. of the miners are coal miners; in the North Riding and in the districts† that have been grouped with it, 90 per cent. are ironstone miners; while in Cornwall, 79 per cent. are tin miners, the remainder being almost all lead and copper miners. The first group of counties, therefore, may be taken to represent coal miners; the North Riding, with the associated districts, to represent ironstone miners; while Cornwall will represent tin miners. The lead miners and the copper miners must be left without estimated death-rates.

Coal Miners (No. 85-90).—The death-rates of coal miners are surprisingly low. In spite of their terrible liability to accident, and their constant exposure to an atmosphere vitiated by coal-dust, by foul air, and by an excessively high temperature, the comparative mortality figure of these labourers is considerably below that of all males; nor is this only true of coal miners in the aggregate, but it is true, with one single exception, for the miners in each great coal area taken separately. It holds good for Durham with Northumberland, for Lancashire, for Derbyshire with Nottinghamshire, for the West Riding, and for Staffordshire. In each of these areas, as is shown in Table L., the comparative mortality figure of all males within the area is higher than that of the miners. The one exception to the rule is furnished by South Wales with Monmouthshire; here the mortality figure for the miners is slightly higher than that of all males within the same area; but even here, if deaths from accident be left out of account, the rule holds good; the mortality of the miners from all other causes together is below that of the general male population.

Again, if in each case we exclude accidents, it will be found that the mortality of the coal miners only slightly exceeds that of the most healthy class of men in our Table, viz., the agriculturists, that is to say, the farmers, the agricultural labourers, and the gardeners.

This low mortality of coal miners is not now noted for the first time. "Whilst lead and copper and tin mining," wrote Dr. Greenhow ‡ in 1858, "are certainly dangerous to health, coal mining appears to be at least not "unhealthy."

It has of course to be borne in mind that miners are a body of picked men. No very weakly man is likely to take to the occupation, and moreover, as much strength is necessary, many men who become weakly must abandon this form of labour for lighter work. On the other hand, the general male population, with which miners have just been put in comparison, comprises the sick and weakly of all sorts, and the men who have fallen out of the ranks of all industries. This objection, however, ceases to be of much weight if we compare coal miners with such other labourers as quarrymen or blacksmiths, who also require to maintain a high standard of vigour; and a glance at the Table shows that, again excluding accidents, the mortality of the coal miners is considerably below that of these two

* Complaint as to the unsatisfactory certificates given by coroners in mining districts was also made by the Commissioners on Condition of Miners (1864) in their Report (p. xxi.). The complaint then made was that the nature of the accident which caused death was not stated in the verdict, but merely "Accidental death."

† Namely, the districts of Ulverston and Barrow, with the sub-districts of Harrington and Egremont in Whitehaven.

‡ "Papers relating to the Sanitary State of the People of England." Board of Health, 1858, p. 65.

groups of workers. Making, then, all due allowance for the picked character of coal miners, their extremely low mortality figure cannot but remain a matter of surprise.

Turning to Table L., which gives the comparative mortality figures for the several causes, it will be seen that under the heading Accident the mortality of the coal miners is of appalling magnitude, there being no other industries in the Table at all comparable to coal mining in this respect, excepting other forms of mining, stone and slate quarrying, and fishing.

Under all the other headings, however, the mortality figure for coal miners, taking the mean of the figures for the six great coal areas (No. 85 to 90), is far below the average with one important exception; viz, Diseases of the Respiratory Organs. The mean mortality of coal miners under this heading is 202, while the figure for all males in England and Wales is 182. Moreover, there can be no doubt that the mortality of coal miners under this heading is considerably understated, owing to a number of deaths which are not of veritably tubercular character being designated by the popular term "miners' phthisis," and so being transferred from the heading Diseases of the Respiratory Organs to the heading Phthisis. It must, therefore, be admitted that coal miners, in spite of their being picked men, and in contrast with their low mortality from other diseases, suffer from diseases of the respiratory organs to a greater extent than those engaged in most other industries. What is the precise excess above the average cannot be stated, because of the confusion already noticed between phthisis and diseases of the respiratory organs, but it is plain that the excess is but small as compared with that which occurs in occupations where the workmen are exposed to the inhalation of other kinds of dust than that of coal; for instance, in the quarrying of slate and stone, in the manufacture of pottery, or in the making of cutlery and files.

This comparative innocuity of coal-dust, as compared with stone-dust or with metallic dust, is probably to be explained by the microscopical character of its particles, which are comparatively free from sharp points and corners,* and therefore do not cause such acute irritation to the lungs when inhaled.

The understatement of the mortality of miners from diseases of the respiratory organs implies, of course, a corresponding overstatement of their mortality from phthisis. But the mortality figure under this heading is already extremely low, the mean figure for the miners in the six coal areas being only 126, and being only raised even so high as this by the inclusion of South Wales and Monmouthshire, where the miners for some local reason have a higher mortality generally than the miners in the remaining coal districts. To what extent this figure of 126 should be still further reduced, on account of the inclusion of non-tubercular cases of miners' phthisis, it is impossible to say, but in all probability the reduction would bring the figure down at least to the level of the figures for farmers and for fishermen, which are the lowest in the Table.

It is much to be regretted that there should be this confusion in the case of miners between phthisis and other affections of the respiratory organs, because it prevents a definite answer being given to the question whether coal miners enjoy any special immunity from tubercular disease. If the figures as they stand in the Table were correct—if, that is to say, no transference had to be made from the heading Phthisis to the heading Diseases of the Respiratory System—then, low as the mortality from the former would be, it would not be much lower in proportion to the average for all males than the mortality under other headings. For instance the mortality figure of coal miners from phthisis in the Table is some 43 per cent. below the average for all males, but so also, or nearly so, is their mortality from diseases of the nervous system. The conclusion, therefore,

* Hirt, i., 144.

as to phthisis would simply be that the low mortality of coal miners from this malady is part and parcel of their general healthiness and exemption from disease of all kinds. But if, as is most probable, a large transference should be made from the heading Phthisis to the heading Diseases of the Respiratory System, then the inference from the figures would be quite different. We should have to conclude that coal miners add to their low mortality from all diseases a special immunity from phthisical affections; and that there is some condition or other in their life, possibly the inhalation of coal-dust, that renders them comparatively proof against tuberculosis.

At any rate, be the explanation what it may, there can be no possible doubt that the mortality of coal miners from phthisis is remarkably low, especially when their liability to irritation of the lungs from dust, and the alternations of temperature and other conditions to which their work subjects them, are taken into account.

And this statement is in strict harmony with the observations of those medical practitioners who in this and in other countries have had opportunity of studying the ailments to which coal miners are subject. "The miners of Durham and Northumberland," says Dr. R. Wilson, "are not prone to phthisis."* "Il est incontestable," says Dr. Boens Boisseau,† "que la phthisie pulmonaire est moins fréquente dans la classe des charbonniers que dans la plupart des autres classes laborieuses;" and Dr. Schoenfeld, who, like Dr. Boisseau, practised in the Belgian colliery districts speaks of this immunity of coal miners in even stronger terms. Similar conclusions have been arrived at in Germany‡ from the data furnished by the coalfields of Upper Silesia.

This general concurrence § of evidence, English, Belgian, and German, leaves no room for doubt, but that for some reason or other the mortality of coal miners from phthisical disease is excessively low as compared with that of other workers. But the question can scarcely be said to be as yet answered beyond all cavil or doubt, whether the reason for this apparent comparative immunity consists merely in the picked character of the men engaged in coal mining or in some special preservative condition attaching to their industry. The latter is the view adopted by foreign writers, such as Hirt; and, inasmuch as the most notable of the special conditions under which coal miners work is the inhalation of coal-dust, their apparent immunity has been usually attributed to this cause, though some writers have exceptionally sought an explanation in other conditions of the miner's life, such as the warmth and moisture of the atmosphere in which he works. "It is in the highest degree probable," says Dr. Hirt, "that coal dust possesses 'the property of hindering the development of tuberculosis, and of arresting 'its progress.'"

Not impossibly it may eventually turn out that this is really the case; but it must be admitted that the data at present forthcoming are hardly sufficient to establish the conclusion beyond all possibility of fair doubt, and there are certainly some facts which must make us at any rate for the present hold our judgment in suspense. In the first place there is the uncertainty, already expressed, whether the immunity of coal miners from phthisis is really greater than their immunity from other disease, and not merely a part of their general healthiness. Secondly, the figures in Table L., which relate to the North Riding miners are hardly consistent with

* Report of the British Association for the Advancement of Science, 1863, p. 126.

† Maladies des Houilleurs. Bruxelles, 1862, p. 110.

‡ Hirt, Die Staubinhalations Krankheiten. Breslau, 1871, p. 150.

§ To the authorities already cited may be added the following: Levy (Traité d'Hygiène ii. 918), who says that "la phthisie pulmonaire est rare chez les mineurs," and who cites to that effect Hervier, Gaz. Méd. de Lyon, 1859, iii. 516; François, Bulletin de l'Acad. de Belgique, 1857, c. xvi.; and Riembault, Hygiène des Ouvriers Mineurs dans les exploitations houillères. Paris, 1861, p. 209.

the view that the supposed immunity of coal miners is due to coal-dust. For the miners in the North Riding, and in the other districts that have been grouped with it, work almost exclusively in ironstone, and are in no wise exposed to the inhalation of coal-dust or coal-gas or other product of coal mines. Yet their mortality from tubercular disease is also extremely low, and, though somewhat higher than that of most coal miners, is actually lower than that of the coal miners in South Wales and Monmouthshire. The low mortality of these ironstone miners, which is not limited to phthisis but extends to the other headings in the Table, can hardly be referable to any other cause than the picked character of these miners; and the natural inference certainly would be that the similarly low mortality of the coal miners was due to a similar cause. Again, if coal-dust really possess the supposed preservative influence, we should expect that coalheavers, who, though in a less degree than coal miners, are also exposed to the inhalation of such dust, would also present an exceptionally low mortality from phthisis, but the figures in Table K. (No. 96), scarcely answer to this expectation. The comparative mortality figure for coalheavers (see Table J.) is 968, and, judging from the 230 deaths of which the causes were abstracted, the mortality of this group of coal workers from phthisis was very little below the average of all males. Departing for once from the general rule laid down previously, that no rates for individual diseases should be calculated on less than 500 deaths with known causes, the phthisis rate for coalheavers would be 210, while the rate for all males is 220, and the mean of the six figures for coal miners is 126.

Another element in the question must not be altogether neglected. Whenever the mortality from any one cause in any industry is in abnormally great excess, the mortality from other causes must be to a certain extent thereby reduced. A man who is killed by an accident cannot also die of phthisis or other disease. Now, among miners the mortality from accident is appallingly high; and the mortality from all other causes must be by that fact more or less reduced.

On the whole, then, we must be content to leave the question of the supposed protective action of coal-dust undecided. The most that we can say with certainty is that the inhalation of coal-dust does not seem to increase the liability to phthisis, and that both in this respect and in respect to its effect in producing disease of the respiratory organs it contrasts favourably with many other kinds of dust.

The mortality of coal miners from alcoholism, or from the diseases which are specially connected with habitual alcoholic excess, is low. This is in accordance with the description of their habits given by various observers; for though "many of them indulge periodically in great excesses," says Dr. Wilson,* "the régime of a colliery is so strict that, however much they may exceed on receipt of their wages, they must resume work at the proper time, and thus habitual drunkenness is prevented, and consequently the specific diseases induced by alcohol are extremely rare."

The mortality of the coal miners differs considerably in different areas, and arranging these in the order of mortality, beginning with the lowest, the sequence is as follows: Derbyshire with Nottinghamshire, 734; the West Riding, 772; Durham with Northumberland, 873; Lancashire, 929; Staffordshire 929; South Wales with Monmouthshire, 1081. Possibly some of these differences might vanish if a larger basis were taken than the mortality of only three years; but, as regards the three areas concerning which alone we have previous experience, the order remains unchanged from the previous record, for in 1860-2 the mortality of miners was higher in South Wales and Monmouthshire than in Staffordshire, and in Staffordshire than in Durham and Northumberland. In each of these three areas

* On the Coal miners of Durham and Northumberland. Report of British Association, 1863, p. 126.

the mortality of the miners decreased very considerably in the interval between 1860-2 and 1880-2 in the earlier age-period, 25-45 years, but in the second age-period, 45-65 years, it rose both in Durham with Northumberland and in South Wales with Monmouthshire, while it fell only in Staffordshire.

So large a share of the mortality of coal miners is attributable to accident that it may be well to give a summary view of the deaths thus occasioned. In the ten years 1871-80 the total number of deaths ascribed to accidents in coal mines was 9678, and these deaths were distributed by ages and causes in the manner shown in the following Table.

TABLE M.—DEATHS FROM ACCIDENTS IN COAL MINES, 1871-80.

	Under 15	15-	20-	25-	35-	45-	55-	65 and over.	All Ages.	Per 1000 accidental Deaths.
Crushing, Fall of Coal, Stone, &c.	291	605	688	1120	871	667	344	102	4688	485
Fall in Shaft, Pit - - -	53	83	91	211	152	100	67	27	784	81
Machinery, Explosion of Boiler	23	31	13	23	21	16	9	4	140	14
Waggon, Tram, Tub - - -	413	307	120	151	117	114	85	43	1350	139
Drowning - - - - -	8	13	11	28	13	14	3	2	92	10
Blasting - - - - -	4	15	27	66	41	15	10	2	180	19
Fire-damp - - - - -	128	331	336	606	358	221	82	22	2084	215
Choke-damp, Suffocation - -	19	50	45	88	40	29	11	3	294	30
Otherwise, or not state - -	13	13	6	7	16	2	6	3	66	7
	952	1448	1337	2300	1638	1178	617	208	9678	1000

Nearly half the deaths, it will be seen, are caused by falling in of the sides or roofs, and a quarter by fire-damp or by choke-damp. After these forms of accident, which are shared equally by miners of all ages, that is to say, shared pretty nearly in proportion to the numbers employed at the several ages, come accidents from the waggons and tubs in which the coals are carried from the underground workings to the shaft; this form of accident falls especially on the young lads who are engaged in "trammings and hurrying" the coals. The remaining and less common forms of accident, viz., falls in the shaft, accidents with machinery and boilers, explosions of blasting powder, and drowning from the irruption of water into the mine, affect miners of all ages alike. Putting, however, all causes together, it is plain that the lads and younger miners suffer considerably more from accident than do the elder workmen, and consequently that the figures in Table L., which are based on the mortality of males between 25 and 65 years of age, understate the liability to fatal accident of coal miners in the aggregate and independently of age.

Ironstone Miners (No. 92).—The miners in the North Riding and in certain selected districts have been grouped together to represent ironstone miners, being almost exclusively engaged in that form of mining. Their mortality is very much the same in its general features as that of coal miners. For in both groups of miners the mortality is somewhat in excess under the heading Diseases of the Respiratory Organs, while it is considerably below the average under all the other main headings, with, of course, the exception of Accident. Here the mortality figure for ironstone miners is even higher than that for coal miners. This seems strange, inasmuch as there is neither fire-damp nor choke-damp in the iron mines. Possibly the apparent anomaly would disappear if a larger basis were taken, for

accident is, of course, a very fluctuating element in the death-rate; but it must not be forgotten that the main cause of mining accidents, namely, the falling-in of roofs and walls, is shared alike by iron miners and coal miners. The low mortality of ironstone miners from disease can scarcely be attributed to other causes than the picked character of the men who alone are able to undertake such hard labour.

Cornish Miners (No. 93).—The mortality of the Cornish miners, who may practically be considered to be tin-miners, for the proportion of lead and copper miners to the whole is but small, contrasts in a most extraordinary degree with that of coalminers or of ironstone miners. So strange indeed seemed the contrast, that it was thought expedient to go a second time through both the Census returns and the death registers to see whether some great error had not been made in the abstraction. It was found, however, that the figures had been correctly given. While the mortality of the other miners is, as has been shown, lower than that of males generally in the corresponding areas, the mortality of the Cornish miners is more than double that of Cornish males in the aggregate. For while the comparative mortality figure for all Cornish males is 887, that for Cornish miners is no less than 1839, and is almost the highest in the Table. Moreover the death-rates have risen very considerably since the previous record, and at each of the two age-periods. This exceptional rise may very probably be explained in the following manner. In the decennium 1871–80, the mining industry in Cornwall was in a state of decadence; and the miners in that county at the Census of 1881 were 44 per cent. fewer than they had been in 1871. A similar falling off moreover, but on a smaller scale, had also occurred in the previous decennium, the miners in 1871 being 27 per cent. fewer than in 1861. These successive decreases in the number of the miners in Cornwall were due to their emigration into countries where mining was more prosperous, and offered better chances of employment; and it is only reasonable to suppose that the miners who had the energy to emigrate would be the more vigorous and healthy, while those who remained behind would be the comparative weaklings.

Thus the very opposite process has been going on among the Cornish miners to that which has been going on among coal miners. The latter, as before explained, have been kept at a high standard of healthiness by the constant elimination of the least vigorous; the former have been undergoing deterioration by the constant emigration of the strongest.

The notable increase of the death-rates of Cornish miners in the interval between 1860–2 and 1880–2 may be explained with much probability by the foregoing hypothesis; but, after allowing all due weight to these considerations, it is still unquestionable that mining in Cornwall is for some reason or other very considerably more unhealthy than mining in other parts; for the death-rates of the Cornish miners in 1860–2 (which rates it may be noted were almost identically the same as those of 1849–53, though much lower than those of 1880–2) were vastly in excess of the death-rates of the coal miners; and yet these rates apply to a period when the decadence had not yet set in. Allowing all the increase in the mortality since 1860–2 to be explained by emigration of the strongest, and taking the death-rates at that date to be the normal rates for Cornish miners, their comparative mortality figure would still be 1449, while that of the miners in the six colliery areas is only 886.

The great bulk of the excess of mortality among the Cornish miners comes under the headings Phthisis and Diseases of the Respiratory Organs. The mortality figures from these two causes amount together to no less than 1148, while the figure for all males in Cornwall is only 368, and the figure for the least healthy group of miners outside Cornwall, namely, the miners of South Wales and Monmouthshire, is only 459. The Cornish miners suffer therefore from these diseases more than three times as much as Cornish males in the aggregate, and more than twice as much as the

miners in any other great mining area. In the whole list of industries in Table L. there is only one that at all approximates to these Cornish miners in this respect, namely, the earthenware and china manufacture. Here the mortality figure from the two causes is 1118, while that of the Cornish miners, as already stated, is 1148. It is under the heading Phthisis that the mortality of these Cornish miners is most appallingly in excess; the mortality attributed to this one cause alone is actually greater than the mortality of either farmers or gardeners from all causes together. In the case of miners, however, as also in the case of earthenware makers, the word phthisis has to be looked on with suspicion, owing to the unfortunate use of the terms “miner’s phthisis” and “potter’s phthisis” for non-tubercular affections, so that it is safer in these industries not to separate phthisis from diseases of the respiratory organs. Still it is curious to note that, if we compare the figure for the potters with those for the Cornish miners, the relative proportions of the phthisis and the respiratory mortalities are almost exactly inverted, while the sum of the two is practically the same in each case. The Cornish miners, therefore, are more liable than the pottery makers to tubercular disease, or to diseases likely to be confounded with tubercular disease of the lungs, while they are less liable to other affections of the respiratory organs.

Of the total mortality of the Cornish miners nearly two-thirds is attributed to phthisis and respiratory diseases; and practically the same proportion marked their mortality* both in 1849–53, and in 1860–62. Under the headings Diseases of the Nervous System and Diseases of the Organs of Circulation their mortality, though higher than that of other miners, and also higher than that of all males in Cornwall, shows no such enormous excess as that under the two headings already considered, and is less than the mean mortality for England and Wales. Neither do these Cornish miners show any excess of mortality from alcoholism or its consequences; a fact which tallies with the account of their habits given long since by the Royal Commissioners, who stated that “as a class they are well conducted and temperate; large numbers have taken the pledge and kept it, and whatever may be the causes of the diseases to which they are liable, the habit of intoxication cannot be assigned as one of them.”† Under the heading Diseases of the Digestive Organs the mortality figure is unusually high; possibly this may be connected with the nature of their diet, which according to the Report of the Royal Commissioners was considered by the doctors to be unwholesome for men, whose digestions are already weakened by working in foul air and in high temperature.

The mortality from accident falls far short of that of other miners, and even than that of quarrymen or of fishermen. As compared with all other occupations, however, it is very high, the figure being 117, while that for cab-drivers, which comes next highest, is only 84.

Slate and Stone Quarriers (No. 94).—The death-rates of these workmen, though much lower than those of the miners in Cornwall, are extremely high, as also they were in the previous record, and give a comparative mortality figure of 1122. The excess is due partly to accident, under which heading the mortality approximates to that of coal miners and is almost the same as that of fishermen, but mainly to phthisis and diseases of the respiratory system, under which headings together the mortality is 582, and not far from double that of coal-miners; on the other hand it is not much more than half that of the Cornish miners, this difference being probably due to the advantages enjoyed by the quarrymen who, though exposed to the inhalation of stone-dust, like the Cornish miners, yet work much more in the open air, and not in the ill-ventilated and overheated atmosphere of deep mines. Their mortality from diseases of the nervous

* See Report of Royal Commission on Condition of Miners, 1864, p. xiv.

† See Report of Royal Commission on Condition of Miners, 1864, p. xxv.

and of the circulatory systems, and generally from other causes than accident and lung disease, is low, and rivals that of coal miners and of agriculturists. Like coal-mining, quarry-work is an occupation to which, as a rule, only robust men betake themselves.

Railway, Road, Clay, Sand, &c., Labourers (No. 95).—The mortality figure for these diggers and delvers is lower than that of quarrymen, probably because they are less liable to fatal accident, but still is high, being 1025.

Coalheavers (No. 96).—The comparative mortality figure for these men is 968, and above that of coal miners. Judging from the 230 deaths, of which the causes were ascertained, coalheavers are very liable to accident, though, of course, not in anything like the same degree as miners. The question of their liability to phthisis has been already discussed, when coal miners were under consideration. Putting phthisis and diseases of the respiratory organs together coalheavers would appear to have a liability considerably above that of coal miners, but not far from the average of all males.

Chimney Sweeps (No. 97).—The death-rates in this industry are lower at both age-periods than in the previous record, but still are excessively high, and give a comparative mortality figure of no less than 1519. It is true that the rates are based on comparatively small numbers, but the agreement of the testimony of the previous with that of the present record leaves no fair doubt that the mortality of chimney-sweeps is terribly high. Judging from the 242 deaths of which the causes were ascertained, an excess of mortality prevails under nearly all the chief headings, but the number is too small for trustworthy inference. There is, however, one cause of death, which, though it does not appear as a separate heading in the Table, yet requires special mention, as being notoriously common among chimney sweeps, namely cancer. Of the 242 deaths of chimney-sweeps, of which the causes were ascertained, no less than 49 were due to some or other form of malignant disease; this gives 202 deaths from this cause to 1000 deaths from all causes, whereas the proportion of deaths from malignant disease to deaths from all causes among all males of from 25 to 65 years of age in England and Wales is only 36 in 1000; so that even if the total mortality of sweeps were simply equal to that of all males, their mortality from malignant disease would be more than five times as much as the average. But the total mortality of chimney sweeps, as shown by their comparative mortality figure, is 50 per cent. higher than the average, so that the liability of chimney-sweeps to malignant disease is about eight times as great as the average liability for all males. These figures scarcely support the belief expressed by some authorities that improvements in the art and habits of sweeps have caused this disease to be comparatively infrequent among them.

The organs affected in the 49 cases of malignant disease, the precise nature and site of which were not always stated, were as follows:—

Scrotum, penis, testis, groin	-	-	-	23
Lip	-	-	-	1
Face	-	-	-	2
Orbit	-	-	-	1
Palate	-	-	-	1
Neck	-	-	-	1
Stomach, liver	-	-	-	7
Organ affected not stated	-	-	-	13
				<hr/> 49

Messengers, Porters, Watchmen (No. 98); *Costermongers, Street-sellers*; (No. 99); *General Labourers in London* (No. 100).—In each of these three groups the death-rates are very high, and in the two latter, concerning which alone the rates at an earlier date are obtainable, have increased at both age-periods since the previous record. These high rates of mortality are, however, probably not to be attributed to any special unhealthiness of the occupations themselves, but to the kind and condition of a large proportion of the men who adopt these somewhat vague and ill-defined modes of livelihood, which are the refuge of the broken down out-casts from more definite occupations. The only one of these groups for which the registered causes of death have been abstracted is that of the costermongers and street-sellers, who have already come under consideration with other out-of-door workers (*see page xxxv*).

The several industries have now been passed successively in review, and their respective mortalities considered. It remains to sum up very briefly the results of this review, so far as they indicate the effects exercised on health by certain conditions of life, such as living in fresh or close atmosphere, inhalation of various kinds of dust, liability to lead poisoning or to alcoholic excess, and the like.

Influence of Fresh or Foul Air.—The difference between an out-of-door life in fresh country air and an indoor life in a town is readily shown by comparing the mortality of agriculturists or fishermen with that of shopkeepers, or, going a step further in the scale of vitiated atmosphere, with the mortality of tailors, hatters, printers, and bookbinders. The agriculturists on the average have a comparative mortality figure of 644, the shopkeepers of 877, and the tailors, hatters, printers, and bookbinders of 1088. The damage done by living in the vitiated atmosphere, though it is not confined to any one set of organs, nevertheless specially affects the organs of respiration. The mortality from diseases of these organs and from phthisis, taken together, is 198 for the fishermen and averages 237 for the agriculturists, while for drapers and grocers it averages 357, and for tailors and printers 549. Moreover, drapers live habitually in a more vitiated air than do grocers, and printers in a more vitiated air than do tailors, and the mortality in these several trades corresponds in each case to these differences. If we arrange the several industries in the order of purity of air, the order will also be that of mortality from phthisis together with diseases of respiratory organs, beginning with the lowest.

TABLE N.—Comparative Mortality of Males Working in Air of Different Degrees of Purity, from Phthisis and Diseases of the Respiratory Organs.

	Phthisis.	Diseases of Respiratory System.	The two together.
Fishermen	108	90	198
Agriculturists	115	122	237
Grocers	167	116	283
Drapers	301	129	430
Tailors	285	186	471
Printers	461	166	627

Influence of Dust.—The effect of exposure to inhalation of dust, speaking generally, is of course to increase the mortality from diseases of the respiratory organs and phthisis, but the effect differs very greatly not only according to the amount but according also to the character of the dust, that which consists of hard and of sharp pointed particles naturally doing more mischief to the air-passages than that of which the particles are soft or rounded. It is, however, unfortunately impossible to estimate accurately the comparative effects of different kinds of dust, independently of all other conditions, because the several industries concerned differ from each other materially in many other important respects besides the nature of the dust to which those who are engaged in them are exposed; some for instance being carried on in the country, others in towns, some in the open-air, others in the close and heated atmosphere of factories or in underground passages and the like. Nevertheless, if we arrange those dust-inhaling occupations, for which Table L. gives the necessary data, in the order of their mortalities from phthisis and diseases of the lungs, we have some valuable indications of the differences between different dusts in the production of such diseases. Of all occupations the one which is most completely free from exposure to dust is that of fishermen, and consequently the mortality figures for this industry have been added to the table as a standard for comparison.

TABLE O.—Comparative Mortality of Males in certain DUST-INHALING OCCUPATIONS from Phthisis and Diseases of the Respiratory Organs.

	Phthisis.	Diseases of Respiratory Organs.	Phthisis and Diseases of the Respiratory Organs.
Coal Miner - - - -	126	202	328
Carpenter, Joiner - - -	204	133	337
Baker, Confectioner - -	212	186	398
Mason, Builder, Bricklayer - -	252	201	453
Wool Manufacture - - -	257	205	462
Cotton Manufacture - - -	272	271	543
Quarryman - - - -	308	274	582
Cutler - - - -	371	389	760
File Maker - - - -	433	350	783
Earthenware Manufacture - -	473	645	1,118
Cornish Miner - - - -	690	458	1,148
Fisherman - - - -	108	90	198

It will be noted that in every one of these dust-inhaling occupations, the mortality from phthisis and from diseases of the respiratory organs is higher than among fishermen. Of the various dusts the least injurious, to judge from the table, is coal-dust; for, though the mortality of coal-miners from diseases of the respiratory organs is higher than that of several other industries in the list, their registered mortality from phthisis is by far the lowest, and indeed not so very much higher than that of fishermen; and, therefore, as has been explained at length in a previous page, it is believed by many that coal-dust acts as a preservative from this form of disease.

The dust of ordinary wood does not appear to be very baneful, for carpenters and joiners stand nearly on a level with coal miners as regards mortality from the two causes taken together; the mortality figures, however, for the two causes when taken separately are almost exactly inverted, the carpenters having a higher rate than the coal miners from phthisis and a considerably lower rate from diseases of the respiratory organs. Carpenters and joiners, however, work to a great extent in the open-air, and very possibly the mortality figures for cabinet makers, or for wood-turners, who work indoors in a much thicker atmosphere of wood-dust, might tell a different tale; nor is this improbable, seeing that their comparative mortality figure from all causes together is considerably higher than that of carpenters (see Table J.). Moreover, many of the harder woods which are used by cabinet makers are said to give off a much more injurious dust than the ordinary timber used by carpenters and joiners.

Bakers and confectioners, who inhale the dust of flour, have a considerably higher mortality from diseases of the respiratory organs than carpenters, but it may be doubted whether this is due to the flour-dust so much as to the heated atmosphere of the bakehouse. For, though much flour-dust may be inspired into the mouth of the baker, it is extremely doubtful whether much or any of it would get as far as the air passages, and not be arrested on the way by inter-mixture with the saliva and adherence to the wet surface of the tongue and pharynx. The mortality of bakers from phthisis is scarcely higher than that of carpenters, which accords with the observation of Hirt* that the inhalation of flour-dust rarely conduces to that disease.

More injurious than either coal-dust, wood-dust, or the dust of flour, appear to be the filaments and fluff and other dusts that are given off in textile factories; the mortality both from phthisis and from diseases of the respiratory organs being higher among workers in cotton and workers in wool than among persons exposed to either of the previously mentioned kinds of dust. The workers in cotton factories fare worse than the workers in wool; the comparative mortality from the diseases in question being 543 for the former, and 462 for the latter. It must be remembered, however, that the air in the weaving sheds of cotton factories contains not only flocculent matter, but also a large amount of dust from mineral substances of various kinds used in sizing, and that the inhalation of mineral substances, judging from industries presently to be considered, is much more injurious than the inhalation of textile filaments.

The deleterious effects of dust upon the air-passages is increased both in the cotton and in the wool factories, and especially in the former, by the high temperature in which the work is carried on (see p. xliii), and it is impossible to say how much of the lung mortality is due to the latter cause and how much to the dust.

But all the dusts as yet mentioned seem to be insignificant in their injurious action when compared with the dust of stone and the dust of metal. There are two industries in the Table, those of cutlers and of file-makers, in which the workman is exposed to metallic dust. In the former the comparative mortality from the diseases in question is 760, and in the latter it is 783; and, doubtlessly, had not the subsidiary operations, such as hafting, been included in the cutlery manufacture, the mortality figure for cutlers would have been still higher. Even as it is, it is almost four times as high as that of fishermen.

Still more appalling seems the effect on the air-passages of stone dust. There are four industries in the Table that are exposed more or less to this source of disease. Two of the four, namely, masons with builders and bricklayers, and quarrymen, work mainly in the open air, and though their mortality from lung diseases is very high, being between two and

* Op. cit., pp. 142 and 214.

three times as high as that of fishermen, yet it is nothing as compared with that of Cornish miners and pottery makers, who work in more confined space, and consequently inhale the stone-dust in much larger amount. For these workers the lung mortality is from five to six times as high as that of fishermen.

Influence of Alcoholic Excess.—The effects of intemperance are best exhibited by the mortality figures of innkeepers, including publicans and generally all dealers in the liquor trade, and of brewers. In both groups the general death-rates are excessively high, and the mortality figures under the heading Alcoholism are higher for these two trades than for any others in the list with the single exception of cabdrivers, who in this respect come between the two.

The mortality directly ascribed to alcoholism is, however, a very imperfect measure of the intemperance prevailing in different industries, for there can be no doubt that the desire to spare the feelings of surviving relatives practically limits the statement of this cause of decease to those cases where no disguise is possible. A better measure is the mortality from diseases of those organs which are known to be seriously affected by alcoholic excess, and which can be stated in certificates of death to have been diseased without fear of offence.

Pre-eminent among such organs is the liver; for, though alcoholic excess appears to affect injuriously every tissue and organ in the body, it is upon the liver that its effect is most marked, the mortality from hepatic diseases being six times as high among innkeepers and publicans, and two and a half times as high among brewers, as among the generality of males. The following Table (Table P.) shows this very clearly. Certain causes of death have been taken, and under each of them those trades in which the mortality exceeds or equals the average have been arranged in order, beginning with the one in which the mortality is highest. There are seven headings in the Table, and it will be noticed that under no less than three of these, viz., Alcoholism, Liver Disease, and Gout, innkeepers head the list, while they stand as high as third in three of the four remaining columns, viz., under Diseases of the Nervous System, Diseases of the Urinary System, and Suicide. Moreover, in one of these three, viz., Diseases of the Urinary Organs, the list would be headed by innkeepers were it not that file-makers and painters, who stand above them, suffer from another special cause of renal disease, viz., lead-poisoning, of which presently. The Table tells its own story so unmistakably that it is scarcely necessary to do more than point out that the same occupations recur again and again in the several successive columns, and that very generally an occupation that stands high in one column stands also high in the others; leaving no reasonable doubt that a very large proportion of the mortality from the several diseases included in the Table is due to drink. Phthisis has not been included in the Table, because the mortality under this heading is affected much more seriously by other causes than by alcoholic excess; still, if the figures in Table L. be carefully examined, there will probably be little doubt felt that alcohol is not without its contributory share in the mortality from this disease. At any rate the mortality from phthisis is, with one exception, above the average for each of the occupations in which there is also a mortality above the average from alcoholism; and though in some of these occupations, such as those of cabdrivers, costermongers, and tailors, this high mortality from phthisis may very possibly be attributable in larger proportion to other causes than to drink, yet there seems no other equally probable interpretation of the high phthisical mortality of brewers, innkeepers and publicans, butchers, and commercial travellers. There is no similar evidence of any serious addition by alcohol to the mortality from diseases of the respiratory system, or to diseases of the digestive organs other than the liver; but under the heading Accident,

if we put aside those occupations which from their nature subject those engaged in them to considerable risk, there are few, if any, left in which the mortality figure is so high as for brewers, innkeepers and publicans, and butchers.

TABLE P.—Industries with Highest Mortalities from certain SELECTED CAUSES.

Alcoholism.		Liver Disease.		Gout.		Diseases of the Nervous System.	
Innkeeper - - -	55	Innkeeper - - -	240	Innkeeper - - -	13	File-maker* - - -	262
Cab, Omnibus Service.	33	Brewer - - -	96	Cab, Omnibus Service.	11	Costermonger - - -	207
Brewer - - -	25	Butcher - - -	96	Painter, Plumber, Glazier.	10	Innkeeper - - -	200
Butcher - - -	23	Commercial Traveller	61	Brewer - - -	9	Cutler* - - -	190
Commercial Traveller	23	Cab, Omnibus Service.	54	Commercial Traveller	6	Plumber, Painter, Glazier.	167
Costermonger - - -	19	Grocer - - -	52	Butcher - - -	5	Brewer - - -	144
Baker - - -	15	Earthenware Manufacturer.	49	Tailor - - -	4	Tailor - - -	144
Painter, Plumber, Glazier.	12	Painter, Plumber, Glazier.	48	Costermonger - - -	3	Cotton Manufacture*	142
Tailor - - -	11	Tailor - - -	48	Builder, Mason, &c.	3	Earthenware Manufacture.*	140
Grocer - - -	10	Costermonger - - -	47			Butcher - - -	139
		Baker - - -	46			Commercial Traveller	139
		Cotton Manufacture	43			Baker - - -	136
		Farmer - - -	41			Cab, Omnibus Service	134
		File-maker - - -	41			Woolen Manufacture	127
		Cornish Miner - - -	40			Shoemaker - - -	122
ALL MALES - - -	10	ALL MALES - - -	39	ALL MALES - - -	3	ALL MALES - - -	119

Suicide.		Diseases of the Urinary System.		Diseases of the Circulatory System.	
Costermonger, &c. - - -	44	File-maker - - -	123	Costermonger - - -	227
Commercial Traveller - - -	31	Painter, Plumber, Glazier - - -	100	File-maker - - -	180
Innkeeper, &c. - - -	26	Innkeeper - - -	83	Brewer - - -	165
Baker - - -	26	Costermonger - - -	69	Cab, Omnibus Service - - -	160
Butcher - - -	23	Cab, Omnibus Service - - -	65	Earthenware Manufacture - - -	160
Hosiery Manufacture - - -	22	Brewer - - -	55	Fishermen - - -	153
Painter - - -	21	Butcher - - -	55	Woolen Manufacture - - -	142
Farmer - - -	17	Builder - - -	49	Innkeeper - - -	140
Carpenter - - -	17	Earthenware Manufacture - - -	49	Plumber, Painter, Glazier - - -	140
Shoemaker - - -	17	Grocer - - -	48	Butcher - - -	132
Grocer - - -	17	Tailor - - -	45	Baker - - -	131
Cab, Omnibus Service - - -	16	Commercial Traveller - - -	44	Tailor - - -	127
Tailor - - -	16	Shoemaker - - -	44	Blacksmith - - -	121
Wool Manufacture - - -	15	Blacksmith - - -	44	Miner (South Wales) - - -	120
Builder, Mason, &c. - - -	14	Hosiery Manufacture - - -	42		
ALL MALES - - -	14	ALL MALES - - -	41	ALL MALES - - -	120

* The deaths from Suicide in this industry are included among deaths from Diseases of the Nervous System.

Before leaving this subject there is one more remark to be made. It will be noticed that the occupations in which the injurious effects of intemperance are most marked are those in which to alcoholic excess is added absence of severe muscular exercise. The miners, the quarrymen, the blacksmiths, the masons and bricklayers, the carpenters and joiners, and the agricultural labourers, if they indulge in drink, counterbalance its ill effects on their health by strong exercise, whereas the innkeepers and publicans lead a sedentary life, and the commercial travellers and the cabmen do their work on wheels; and though brewers, and costermongers, and still more butchers, have not quite so quiescent a life, yet the exercise which their several occupations entail upon them is far short of that of the industrial groups first enumerated.

Effects of Exposure to Chronic Lead-poisoning.—There are four headings in Table L. in which there is evidence of lead poisoning, viz., printers, earthenware makers, painters with plumbers and glaziers, and file-makers. It is only, however, in the two latter, that plumbism prevails to any very great extent, and it is consequently in the mortality figures for those two industries that the best evidence is to be had as to the effect of lead on the several organs. The file-makers, according to the Table, suffer more than the painters, plumbers, and glaziers, probably because among the latter are included a considered number of subsidiary workers who do not come directly or habitually into contact with lead. Had painters and plumbers formed a single group by themselves, without intermixture of other allied trades, their lead poisoning would probably have been marked by a much higher mortality figure. The most striking feature in the mortality figures for these two lead-poisoned industries is the extremely high mortality from diseases of the urinary organs, corroborating the opinion held by English writers, that renal disease is a common consequence of chronic lead-poisoning. There are no other industries in the Table in which the mortality from urinary diseases approaches to that of these two trades (*see* Table L.). There is, as already noticed, some amount of lead-poisoning among earthenware makers, and a slight amount among printers; but in neither of these industries is there any similarly notable excess of mortality from urinary diseases; indeed the mortality from these diseases is below the mean among printers, and, though it is not inconsiderably above the mean among the pottery workers, yet their figure is exceeded by those of several industries which are not concerned with lead, and especially of those industries where there is evidence of excessive indulgence in drink (*see* Table L.). Lead, as is well known, conduces to gout; and the mortality from this disease is higher for painters, plumbers, and glaziers, than for any other trades in Table L., excepting innkeepers and publicans, and cab-drivers. It is curious, however, that, though file-makers in other respects show such unmistakeable tokens of lead-poisoning, not one death among them was attributed to gout out of 528 deaths of which the causes were abstracted. Possibly, had the sample of deaths abstracted been larger, this anomaly would have disappeared; for the mortality of a disease, comparatively so rarely fatal as gout, would require for its proper estimation a very much larger basis than 528 deaths from all causes. The effect of lead on the brain and nervous system generally is shown by the high mortality under this heading in both trades, and especially among the file-makers. Both also have very high figures, and again the file-makers the higher, under the heading Diseases of the Organs of Circulation, probably owing to the injurious action of lead upon the muscular substance of the heart and on the walls of the blood-vessels, which parts share in the general cachexia produced by this mineral. It is believed by Hirt, that chronic lead-poisoning conduces to phthisis; but though the mortality of file-makers under this heading is enormous, that of painters, plumbers, and glaziers is not very greatly above the average; and the phthisical mortality of the file-makers has of course a sufficient explanation in the

metallic dust to which they are exposed, independently of any presumable effect of lead.

Lead-poisoning is luckily not a very common cause of death in this country; and, so far as it is due to occupation, is confined to a small number of trades. In the course of four years (1879–1882) the deaths of males ascribed directly to this cause were only 229; but this number would of course be very largely raised were it possible to include the deaths from renal, nervous, and other affections that originated in lead-poisoning. The 229 deaths were distributed as follows:—

House-painter - - -	91	Whitesmith - - -	2
Plumber - - -	28	Earthenware maker -	16
Glazier - - -	1	Printer - - -	6
Coach-painter - - -	3	File-cutter - - -	14
Artist - - -	1	Glass-cutter - - -	2
Paint, colour maker -	2	Iron-moulder - - -	2
Lead (? white lead) worker	8	Calico printer, dyer -	2
Lead roller - - -	1	Caulker - - -	1
Lead miner - - -	3	Children (under 15) -	6
Lead mine agent - - -	1	Others - - -	36
Gas fitter - - -	3		

The annual mortality from lead-poisoning among males over 15 years of age, as deduced from a comparison of these figures with the Census returns of 1881 would be as follows: rates, however, based on such small numbers of deaths are, of course, not very trustworthy:

File-maker - - -	466	per million living.
Painter, plumber, glazier -	224	” ”
Earthenware maker -	152	” ”
Gas-fitter - - -	62	” ”
Printer - - -	27	” ”
All other males - - -	4	” ”

And now, Sir, in bringing this introductory letter to a close, it will perhaps be convenient if the main subjects that have come under consideration be very summarily enumerated with page references to the places where they have been severally discussed. It has been shown (pp. iv–vi) that very considerable changes have occurred of late years in this country in the death-rates of both sexes, the mortality having risen at some age-periods and fallen at others; and inquiry has been made by means of a new Life Table, constructed on the basis of the fresh death-rates (pp. vi–ix), into the balance of gain and loss accruing to the community from these changes (pp. ix–xi). Inquiry has also been made as to the diseases under which there has been diminution, and under which there has been on the other hand increase of mortality (pp. xi–xvi).

It has been shown that the death-rates vary greatly in different parts of the country (pp. xvi–xvii); and the question why these differences exist has been taken into consideration (p. xvii).

It has been shown that, independently of all differences in sanitary administration or in geographical position, the death-rates are seriously affected by differences in the age and sex distribution of the population (pp. xvii–xix); in the closeness of its aggregation (pp. xx–xxi); and above all in the character of the occupations in which it is engaged (pp. xxi–lxiii). To this latter element in the question, viz., the influence of occupation, a very considerable space, and indeed the larger part of this introduction, has been allotted, and not only have the death-rates been calculated for the males engaged in each of some hundred different industries, but for some score of these an attempt has been made to calculate the share in such

death-rates that is due to individual diseases. I can but think that the results of this latter inquiry, now undertaken for the first time in the Statistical Branch of your office, will be found to be of much interest by those who give attention to vital and social statistics ; and I would further express my hope that the experience which has been gained in this first attempt may render it possible, when the next Decennial Supplement comes to be undertaken, to conduct a similar inquiry upon a wider basis, and for a larger number of industries, and thus to give statistical results of still greater value and of increased accuracy.

I am, Sir,
Your obedient servant,

WILLIAM OGLE.

To
The Registrar General.