

A SURVEY OF THE MORTALITY IN DR FARR'S 63 HEALTHY DISTRICTS OF ENGLAND AND WALES DURING THE PERIOD 1851-1925.

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(With 1 Diagram.)

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I. INTRODUCTION AND GENERAL OBSERVATIONS ON THE DATA.

IN 1859, Dr W. Farr published his famous memoir on the Construction of Life-tables, illustrated by a New Life Table of the Healthy Districts of England. His "healthy districts" consisted of those districts in which the crude rate of mortality of the population in the period 1849-53 did not exceed 17 annual deaths per 1000 living.

These districts are distributed over various parts of the country, for: "Such is the variety of the soil of England, that tested by the rates of mortality . . . healthy districts are found in nearly every county . . . the north districts of Northumberland, the districts extending from the Tees over the North and East Ridings of York to Leicestershire, Herefordshire and parts of Shropshire; some of the districts of Gloucestershire about the Cotswold Hills; parts of Wales, North Devon, including Dartmoor and Exmoor; and the Surrey and Sussex Hills with the Southdowns¹."

The present survey is a study of the mortality rates of these same 63 districts from 1851 to 1925, but omitting the years 1911-19 inclusive, because the data relating to the majority of these omitted years are affected by the war.

Objective.

The idea of making this study had its birth in a consideration of the table set out on p. xv of the *Supplement to the 35th Annual Report of the Registrar-General* (1861-70). Consideration of this table (reproduced here, Table I A) drew attention to the fact, that in districts where, owing to the rise of industry, large masses of people were gathering together, the death rate was increasing. Also that in districts where a declining industry was slowly dying and people were drifting away, a falling death rate was found.

¹ *Phil. Trans.* 1859, p. 863.

Table I A. Comparing the trend of the death rate in districts with increasing populations, with the trend in districts with decreasing populations.*Districts with increasing populations owing to the development of industry.*

Registration districts	Years	Persons living at the censuses of 1861 and 1871	Death rates per 1000 living
Ulverston (including Barrow in Furness) ...	1860-1-2	35,738	21·0
	1870-1-2	55,083	20·9
Guisborough (including part of Middlesbrough)	1860-1-2	22,128	20·3
	1870-1-2	39,016	24·8
Stockton (including part of Middlesbrough) ...	1860-1-2	57,099	23·3
	1870-1-2	99,705	25·7

Districts with decreasing populations owing to the decline of mining enterprise.

St Austell	1860-1-2	33,797	19·9
	1870-1-2	31,194	19·4
Redruth (including Camborne)	1860-1-2	57,173	22·8
	1870-1-2	53,503	22·3

The question which naturally arose was: What happened to the death rates in districts unaffected by the rise or decline of industrialisation?

With the primary object of answering this question Farr's original 63 healthy districts were selected for investigation. Other points of interest afterwards arose, for example: What had happened to these 63 districts in the last three-quarters of a century? Had the favourable position as regards their death rate in relation to that for the rest of the country been still further improved or had it not been maintained? Was this low death rate in 1849-53 due to low death rates from certain diseases, and, if so, what is the position in more recent years in respect of these same diseases? It is these questions which the present study attempts to answer.

Absence of industrialisation in the healthy districts.

With certain exceptions, which will be referred to, all the data used in this survey are extracted from the Reports of the Registrar-General and the Census Returns.

It will be gathered from Table I B that, with only two exceptions, Farr's healthy districts were, in 1851, agricultural.

In all cases, except Lewisham and King's Norton, the number of those engaged in agriculture outweigh the number engaged in industry. Even Guisborough, which is shown in Table I A as a district with increasing population owing to the development of industry, was still, in 1851, predominantly agricultural.

Examining the two exceptions, it is found that their mean populations for the two periods 1851-60 and 1861-70 were as follows:

		Mean population
Lewisham	1851-60	50,296
	1861-70	77,568
King's Norton	1851-60	39,110
	1861-70	57,076

Table I.B. *Showing that in 1851, Farr's healthy districts were, with two exceptions, agricultural in character.*

Healthy districts	Population aged 20 years and over at the 1851 census	Proportion per 1000 engaged in agriculture	Proportion per 1000 engaged in industry
36. Lewisham ...	19,303	71	147
42. Hambledon ...	3,750	707	219
43. Dorking ...	3,116	541	273
44. Reigate ...	3,937	587	264
45. Godstone ...	2,428	680	215
49. Bromley ...	4,625	506	324
63. E. Ashford ...	3,118	733	205
66. Blean ...	3,665	411	271
77. Battle ...	4,144	557	318
78. Eastbourne ...	2,142	505	239
79. Hailsham ...	3,441	784	204
81. Uckfield ...	4,737	830	178
82. E. Grinstead ...	3,464	697	204
83. Cuckfield ...	4,212	693	251
86. Steyning ...	4,436	401	225
88. Petworth ...	2,574	695	226
90. Worthing ...	4,641	389	318
93. Midhurst ...	3,599	686	223
99. I. of Wight ...	12,888	340	319
100. Lymington ...	2,945	521	280
101. Christchurch ...	2,116	521	309
103. Ringwood ...	1,471	628	262
104. New Forest ...	3,543	585	225
111. Catherington ...	691	641	224
113. Alresford ...	2,072	666	210
128. Wokingham ...	3,815	551	253
130. Easthampstead ...	1,674	536	209
135. Hendon ...	8,660	224	126
196. Ongar ...	6,368	408	97
227. Mutford ...	10,992	217	167
236. Henstead ...	6,433	377	97
285. Kingsbridge ...	11,353	337	121
291. Oakhampton ...	11,065	419	145
292. Crediton ...	11,942	370	174
295. Barnstaple ...	20,801	285	144
296. Torrington ...	9,470	369	99
297. Bideford ...	10,382	282	132
298. Holsworthy ...	5,990	508	78
299. Stratton ...	4,634	424	91
300. Camelford ...	4,470	336	197
301. Launceston ...	8,909	361	148
305. St Columb ...	9,360	314	171
313 A. Williton ...	10,536	358	123
343. Winchcomb ...	5,622	455	116
393. King's Norton	17,079	103	263
418. Melton Mowbray	11,034	359	121
441. Southwell ...	14,070	355	114
484. Garstang ...	6,821	433	142
527. Easingwold ...	6,216	420	100
532. Guisborough ...	6,932	329	168
556. Haltwistle ...	4,036	343	276
557. Bellingham ...	3,640	419	107
560. Belford ...	3,745	373	123
562. Glendale ...	7,491	399	108
563. Rothbury ...	4,135	428	101
566. Brampton ...	6,093	365	192
567. Longtown ...	5,180	495	152
572. Bootle ...	3,341	510	103
573. Eastward ...	7,678	453	129
592. Haverfordwest	20,842	294	127
599. Builth ...	4,473	545	110
615. Corwen ...	8,302	427	146
619. Pwllheli ...	12,068	448	94

So that, although these two places did have industry in 1851, it was not a declining industry.

We must next ascertain if any of these districts have been affected by the growth of a new industry within their area.

Since the original Healthy Life Table, two other Healthy District Life Tables have been made, one based on the mortality in 263 healthy districts in 1881–90, the other on the mortality in 260 healthy districts in 1891–1900.

Table I c shows the respective criteria required by these three Healthy Life Tables in order that a district might be classified as “healthy.” The

Table I c. *Showing the criteria for “healthiness” at specific periods.*

Period	England and Wales. Crude annual rate of mortality among persons of both sexes (per 1000)	Maximum death rate a district may have in order to be included in the “healthy” life table of the period (per 1000)	Criteria for “healthy” expressed as a percentage of the crude death rate of England and Wales
1849–53	21.74	17.0 (crude)	78.20
1881–90	19.08	15.0 (standardised)	78.62
1891–1900	18.19	14.0 (standardised)	77.00

actual effect of applying these criteria was that: To be included in the 1849–53 table the crude death rate of a district had to be less than 78.2 per cent. of the *crude* death rate of the whole country. For inclusion in the 1881–90 table the standardised death rate of a district had to be less than 78 per cent. and in 1891–1900, less than 77 per cent. of the crude death rate of the whole country.

Therefore, as a rough test of healthiness in 1901–10, 75 per cent. of the crude death rate of the whole country may be taken as a criterion, and since the annual rate of mortality in England and Wales, 1901–10, was 15.4, only those places where the standardised death rate was below 11.5 can be included.

In the first three columns of Table II, Farr’s 63 districts are set out and tested by all the criteria referred to above. Only 41 of them satisfied the 1881–90 test, 45 passed in 1891–1900, whilst the rough estimate for 1901–10 again excludes only 22. Thus, judged by death rate criteria, 22 districts had by 1901–10 become “unhealthy” and, if this “unhealthiness” can be associated with a growth of industrialisation, they should be excluded from any investigation made of stationary districts—“stationary,” for the purpose of this survey being limited to meaning “Unaffected by the rise or decline of industry, though not necessarily unaffected by urbanisation.”

One indication as to whether the “unhealthiness” of these 22 districts is associated with growth of industry may be obtained by a comparison of the 1901–10 population of the districts with that existing in 1851–60. This comparison is shown in the last column of Table II, where the mean population of each district for the ten years, 1901–10, is expressed as a percentage of the mean population for the years 1851–60.

Table II. *Showing which of the original healthy districts passed the respective tests of healthiness in certain decades.*

Dr Farr's 63 healthy districts, 1849-53.	1881-90. Which of col. 1 had a corrected death rate of < 15.0 per 1000	1891-1900. Which of col. 1 had a corrected death rate of < 14.0 per 1000	1901-10. Which of col. 1 had a corrected death rate of < 11.5 per 1000	Population in 1901-10 expressed as a percentage of the population in 1851-60
Lewisham ...	1	.	.	303.7
Hambledon ...	1	1	1	170.4
Dorking ...	1	1	1	150.5
Reigate ...	1	1	1	267.1
Godstone ...	.	.	.	332.8
Bromley ...	1	1	1	492.6
E. Ashford ...	1	1	1	110.1
Blean ...	1	1	1	164.6
Battle ...	1	1	1	187.8
Eastbourne ...	.	1	1	587.4
Hailsham ...	1	1	.	129.5
Uckfield ...	1	1	1	143.4
E. Grinstead ...	1	1	1	139.0
Cuckfield ...	1	1	1	166.7
Steyning ...	1	1	1	438.2
Petworth ...	1	1	1	90.9
Worthing ...	.	.	.	230.0
Midhurst ...	1	1	1	109.9
I. of Wight ...	1	1	1	161.1
Lymington ...	1	1	1	122.1
Christchurch ...	.	.	.	836.6
Ringwood ...	1	1	1	120.6
New Forest ...	1	1	1	114.1
Catherington ...	1	1	1	134.1
Alresford ...	1	1	1	99.2
Wokingham ...	.	1	1	137.7
Easthampstead ...	1	1	1	240.7
Hendon ...	.	.	1	407.4
Ongar ...	1	1	1	89.1
Mutford ...	.	.	.	208.1
Henstead ...	1	1	1	90.4
Kingsbridge ...	1	1	1	80.5
Oakhampton ...	1	1	1	83.3
Crediton ...	1	1	1	71.9
Barnstaple ...	1	1	.	114.7
Torrington ...	.	1	1	71.4
Bideford ...	1	.	1	108.2
Holworthy ...	1	1	1	93.5
Stratton ...	.	.	1	91.4
Camelford ...	.	1	1	89.7
Launceston ...	1	1	1	80.4
St Columb ...	.	1	1	97.8
Williton ...	1	1	1	87.6
Winchcomb ...	1	1	1	91.1
King's Norton ...	.	.	.	532.3
Melton Mowbray ...	1	1	.	114.2
Southwell ...	1	1	1	77.3
Garstang ...	1	1	1	96.5
Easingwold ...	1	1	1	98.7
Guisborough ...	.	.	.	278.5
Haltwistle ...	.	1	.	121.9
Bellingham ...	1	.	.	89.0
Belford ...	1	1	.	77.8
Glendale ...	1	1	1	63.0
Rothbury ...	.	1	.	80.7
Brampton ...	.	.	.	75.8
Longtown ...	.	1	.	63.9
Bootle ...	.	.	.	248.5
Eastward ...	1	.	.	89.9
Haverfordwest ...	.	.	.	90.5
Builth ...	.	.	.	110.6
Corwen ...	.	.	.	103.8
Pwllheli ...	.	.	.	102.8
Totals ...	41	45	41	

An analysis of this column has been made, and is shown in Table III. Between 1851-60 and 1901-10 the population had diminished in 26 and increased in 37 out of the 63 districts. Of the former, 10 had declined less than 10 per cent., 9 had declined between 10 and 20 per cent. and 7, 20 to 40 per

Table III. *Showing changes in population in Farr's 63 healthy districts. Population in 1851-60 compared with population in 1901-10.*

(a) *Healthy districts where population decreased between 1851 and 1910.*

Rate of decrease %	No. of districts	No. of districts remaining "healthy" in 1901-10	No. of districts changed to "unhealthy" by 1901-10	No. of districts changed to "unhealthy" expressed as a percentage of the total
0-10	10	9	1	10
10-20	9	6	3	33½
20-30	5	3	2	40
30-40	2	1	1	50
	26	19	7	27

(b) *Healthy districts where population increased between 1851 and 1910.*

Rate of increase %				
0-50	17	10	7	41
50-100	6	6	.	0
100-200	6	2	4	68
200-300	2	.	2	100
300-400	3	3	.	0
400-500	2	1	1	50
...		.		
800-900	1	.	1	100
	37	22	15	41

cent. The range of increase, however, is enormously greater. One district, Christchurch, had increased its population over 800 per cent., 7 districts were between 200 and 500 per cent. larger, 6 districts were twice their original size, 6 more were over half as large again, and the residue of 17 were less than half as large again. *If* industrialisation were the cause of increase of population in these groups, one would expect to find that those groups showing the greatest increases in population would have the greatest percentage of districts becoming unhealthy. But the last column of Table III shows that no such definite relationship exists. Even if we group together all districts which increased over 200 per cent. the results obtained are:

41 per cent. of districts whose population increased up to 50 per cent. became "unhealthy."

0 per cent. of districts whose population increased 50-100 per cent. became "unhealthy."

68 per cent. of districts whose population increased 100-200 per cent. became "unhealthy."

50 per cent. of districts whose population increased over 200 per cent. became "unhealthy."

As a further test, the percentage increase or decrease in population in these districts during the period 1851–1910 has been correlated with the percentage increase or decrease in death rate over the same period, using, for this purpose, standardised death rates. It should be noted that whilst the 1901–10 standardised death rates for each district were those given by the Registrar-General, the 1851–60 standardised death rates used in this case were not obtained by the orthodox method.

There were already in existence, having been calculated for another purpose, the standardised death rates (based on the 1901 standard population) for *each sex* for each registration district for the period 1851–60. To save the enormous labour of re-standardising each district for persons, the mean of the male and female standard rates was used. Examination of the later publications of the Registrar-General where all three rates (male, female and persons) are given for each district shows that the error involved by merely averaging is not greater than 0.1 per 1000 in any district, and considering that the unit of grouping used in making the correlation table was 5 per cent. it is unlikely that the method used can materially affect the result.

The value of the correlation coefficient is found to be -0.035 ± 0.09 , from which it can be concluded that in these districts there is no sensible relation between variation in population and variation in death rate.

Therefore, although a certain number of the original 63 healthy districts have become “unhealthy” as judged by their relative death rates, this group cannot be singled out as being identical with another group which has greatly increased its population in the period. Hence there is no justification for excluding them from a survey of “stationary” districts of England and Wales on the grounds that growth of industry has caused a massing of the population and a consequent rise in the death rate.

From this point then, Sections I to III deal with the 63 healthy districts as a whole and, except where specifically noted, all death rates have been obtained by dividing the total of the deaths at all ages or at specific age periods in all the districts by the total of the populations at the corresponding age.

It should be noted, however, that whereas from 1851 to 1910 the populations used are the mean populations for the ten-year periods (as given in the Decennial Supplements of the Registrar-General) the population used for the six-year period, 1920–5, is the population as recorded at the census of 1921.

Identification of registration districts with administration areas.

Certain changes in the method of recording deaths took place in 1911. These changes were of two kinds: changes in area, and changes in the allocation of deaths.

Previously to 1911, the units of publication were the registration districts, conterminous with the Poor Law Unions as constituted in 1834, or with groups of adjacent Unions. After 1911, the units of publication were the Local Government administrative areas. For purposes of comparison, it is impossible

to relate each *individual* healthy district to a corresponding administrative area, but it has been found possible with the aid of maps published by the Ordnance Survey Office in 1902, which show both the old registration districts and the new administrative areas, to relate the healthy districts *as a whole* to certain administrative areas (141 in number), with but one exception. The exception is the registration district of King's Norton in Worcestershire. Under the new system, this was split up into three parts: (1) King's Norton and Northfield Urban District (entire), (2) part of the County Borough of Birmingham, (3) Smethwick County Borough. Since the figures for that part which went into the County Borough of Birmingham are not available separately from the entire County Borough of Birmingham, it has been considered advisable to omit King's Norton entirely from the 1920-5 data.

The second change that took place in 1911 was that, from this date, deaths occurring in public institutions and elsewhere were referred back to the last district of permanent residence, whereas previously they had been assigned to the district in which the institution was situated. No means exist of measuring the effect of this change. Most unions had their own institutions, so that the practice of registering deaths in the district in which the institution was situated probably had appreciable effect only in the towns. Any effect such a practice might have had would have been to make the healthy districts (except those few having an institution and situated near to large towns) a little healthier than they were. A levelling up influence is, however, exerted by the factors referred to in the following quotation: "It often happens that unhealthy and healthy villages, streets, parishes and towns are in immediate juxtaposition; and constitute parts of the same district. The effect of this admixture on the results is that the unhealthy districts appear less unhealthy. Upon the other hand, the healthy districts are made to appear less healthy than they would if they consisted only of healthy places¹."

Were Farr's "healthy" districts really healthy?

Farr himself by his method of selecting his districts has left it open to doubt as to whether his districts were really healthy, or whether indeed others also were not even more healthy. For his criterion of a maximum death rate of 17 per 1000 is only a crude death rate, and had he made allowance for the age constitution of the population, he might have found it necessary to adopt a new figure which would absorb some other districts and exclude some which, as judged by the standard used, were healthy. A glance at Table IX bears out this surmise, for in 1851-60 there were 177 districts of England and Wales with a standardised death rate below 17.0 per 1000.

Bearing in mind the limitations imposed by the above considerations, on any comparisons, the examination of the death rates of the healthy districts can be proceeded with.

Report of Registrar-General on Cholera in England, 1828-49, p. v.

Table IV. *Standardised and crude death rates per 1000, in certain periods. Comparison between England and Wales, the healthy districts, and the registration district of Liverpool.*

	England and Wales			The healthy districts			Registration district of Liverpool		
	Standardised		Crude	Standardised		Crude	Standardised		Crude
	Actual rates	% relative to 1851-60		Actual rates	% relative to 1851-60		Actual rates	% relative to 1851-60	
1851-60	21.17	100	22.2	16.13	100	17.81	35.27	100	33.30
1861-70	21.34	101	22.5	16.13	100	17.82	40.13	114	38.62
1871-80	20.34	96	21.4	15.55	96	17.11	35.32	100	33.57
1881-90	18.62	88	19.1	14.26	88	15.54	34.95	99	33.13
1891-1900	18.07	85	18.2	13.91	86	14.83	35.22	100	33.20
1901-10	15.19	72	15.4	11.61	72	12.71	31.42	90	30.51
1920-25	11.39	54	12.3	9.95*	62	11.14	—	—	—

* Obtained by indirect standardisation.

II. HAS THE INITIAL ADVANTAGE HELD BY THE HEALTHY DISTRICTS BEEN MAINTAINED?

Throughout the Report no reference is made to male and female death rates separately. Discussion has been limited to the death rates of "persons." Apart from a few exceptions, which will be discussed as they arise, standardised rates have been calculated on the basis of the sex and age constitution of the population of England and Wales as enumerated in 1901. The chief of these exceptions refers to the decade 1871-80, in which only the deaths for persons are given. Hence, no allowance could in this decade be made for differences in the sex constitution of the population.

In Table IV are set out, for comparison, the crude and standardised death rates of England and Wales, and the healthy districts in each decennium, 1851-60 to 1901-10, and for the period 1920-5, and in order to emphasise the point that the healthy districts are taken as representative of the stationary districts, the rates of the registration district of Liverpool are added as representing, during the nineteenth century, the most unhealthy conditions in the country. Unfortunately no comparison is possible between the old registration district of Liverpool and the administrative area, *i.e.* the County Borough of Liverpool in 1920-5, so that in this case the figures for the latter period are not given, for the registration district of Liverpool covered an area of 1866 acres with a population in 1911 of 128,673, whilst the County Borough of Liverpool covers 16,642 acres, and in 1911 had a population of 746,421.

Before proceeding to examine this table a word must be said about the standardised death rates of the healthy districts in 1920-5. These have been calculated by the indirect method of standardisation, since only the total deaths, and not data containing the numbers of deaths in age groups, were available. In order to be satisfied that death rates found by the two methods are sufficiently accurate for purposes of comparison, the standardised death

rate in the healthy districts in 1851-60 was calculated by both methods. Direct standardisation gave 16.13 and indirect standardisation gave 16.81. Furthermore, the 1911 *Annual Report* of the Registrar-General, Table XIX (partly reproduced here), shows a comparison of results by direct and indirect methods.

	Standardised death rates, 1911	
	By indirect method	By direct method
England and Wales	14.289	14.307
London	15.152	15.254
County boroughs	16.537	16.606
Other urban districts	13.956	13.996
Rural districts	11.620	11.390

Table IV contains the main results which have been obtained from this survey. From a consideration of the figures set forth, three important deductions can be made which will be afterwards amplified.

(1) **During the whole period examined, the healthy districts had a lower death rate than England and Wales but, whereas, between 1851-60 and 1901-10, both England and Wales and the healthy districts had improved to the extent of roughly 30 per cent., Liverpool had only improved 10 per cent.**

(2) **That the periods of greatest improvement seem to be 1881-90 and 1901-25 for the first two sections, but only from 1901 in Liverpool.**

(3) **That the population in the healthy districts was unfavourably constituted for a low death rate, whilst in Liverpool it was very favourable.**

Examination of the first inference drawn from Table IV (see above).

Table V shows the standardised rates of the healthy districts, and also of Liverpool registration district expressed as a percentage of England and Wales at each decennium. This clearly establishes that the healthy districts main-

Table V. *Standardised decennial death rates in healthy districts and in the registration district of Liverpool expressed as a percentage of the England and Wales death rate.*

	Standardised death rates			Healthy districts as percentage of England and Wales	Registration district of Liverpool as percentage of England and Wales
	England and Wales	Healthy districts	Registration district of Liverpool		
1851-60	21.17	16.13	35.27	76.19	166.60
1861-70	21.34	16.13	40.13	75.59	188.05
1871-80	20.34	15.55	35.32	76.45	173.65
1881-90	18.62	14.26	34.95	76.58	187.70
1891-1900	18.07	13.91	35.22	76.98	194.91
1901-10	15.19	11.61	31.42	76.43	206.85
1921-25	11.39	9.95*	—	87.36	—

* By indirect standardisation.

tained the position that they held, relatively to the whole country in 1851-60, down to 1901-10, their death rate being 76 per cent. of that for the whole country at each decennial period.

Liverpool on the other hand, could not keep pace with the standard of

improvement as exemplified by the death rate of England and Wales and its relative position grew steadily worse. From 167 per cent. of England and Wales in 1851-60 it increased to 207 per cent. in 1901-10.

In 1921-5 the position as regards the healthy districts is not so favourable, the death rate having increased to 87 per cent. of that for England and Wales. But before it can be concluded that any of the initial advantage has been lost since 1901-10, it is necessary to make due allowance for certain factors in the death rate of the healthy districts in 1921-5 which were not effective previously to 1911.

(1) The system adopted in 1911 of referring back to their last permanent place of residence, deaths occurring in institutions would, if it affected the healthy districts death rate at all, affect them in an adverse direction as compared with previous years. Measurement of this factor is impossible.

(2) The loss of position may have been due, not to a retrogression on the part of the healthy districts but to exceptional improvement on the part of non-hygienic districts in the whole country. This possibility is best considered by an examination of Diagram 1. In this diagram, the standardised death rates, as shown in Table V, have been plotted and straight lines fitted to them by the method of least squares. In the calculation of the equations of these straight lines, only the decennial death rates 1861-70 to 1901-10 have been used, and, on the basis of the improvement shown in this period, an expected death rate for 1921-5 has been obtained and compared with the observed death rate for 1920-5 (Table VI).

Table VI. *Actual death rates, compared with death rates by fitted line, calculated on the basis of actual rates of 1861-70 to 1901-10.*

	England and Wales		Healthy districts		Registration district of Liverpool		Healthy districts death rate by fitted line on the basis of improvement observed in England and Wales
	Actual	Calculated	Actual	Calculated	Actual	Calculated	
1851-60	21.17	23.08	16.13	17.49	35.27	40.66	17.89
1861-70	21.34	21.63	16.13	16.43	40.13	38.91	16.43
1871-80	20.34	20.17	15.55	15.36	35.32	37.16	14.97
1881-90	18.62	18.71	14.26	14.29	34.95	35.41	13.52
1891-1900	18.07	17.26	13.91	13.23	35.22	33.65	12.06
1901-10	15.19	15.80	11.61	12.16	31.42	31.90	10.60
1911-20	—	14.34	—	11.09	—	30.15	9.15
1921-25*	11.39	13.16	9.95†	10.24	—	28.84	8.05

Equations connecting observed death rates and death rates by fitted line.

England and Wales	...	...	$y = 21.63 - 1.457x$
Healthy districts	...	...	$y = 16.43 - 1.068x$
Liverpool	...	...	$y = 38.91 - 1.752x$

The period 1861-70 was taken as origin: units were 10 years.

* Actual are here 1920-5, whilst those by fitted line are 1921-5. † Indirect standardisation.

It is to be noted that the straight lines for the healthy districts and for England and Wales respectively are not parallel; but this is still compatible

with the statement that the healthy districts maintained up to 1901-10, the advantage which they possessed in 1851-60. Table VI shows the expected death rates for 1851-60 to 1921-5 as compared with the actual death rates. The figures for 1921-5 are as follows: in England and Wales, the predicted death rate is 13.16 against the observed rate of 11.39, *i.e.* 13.5 per cent. more

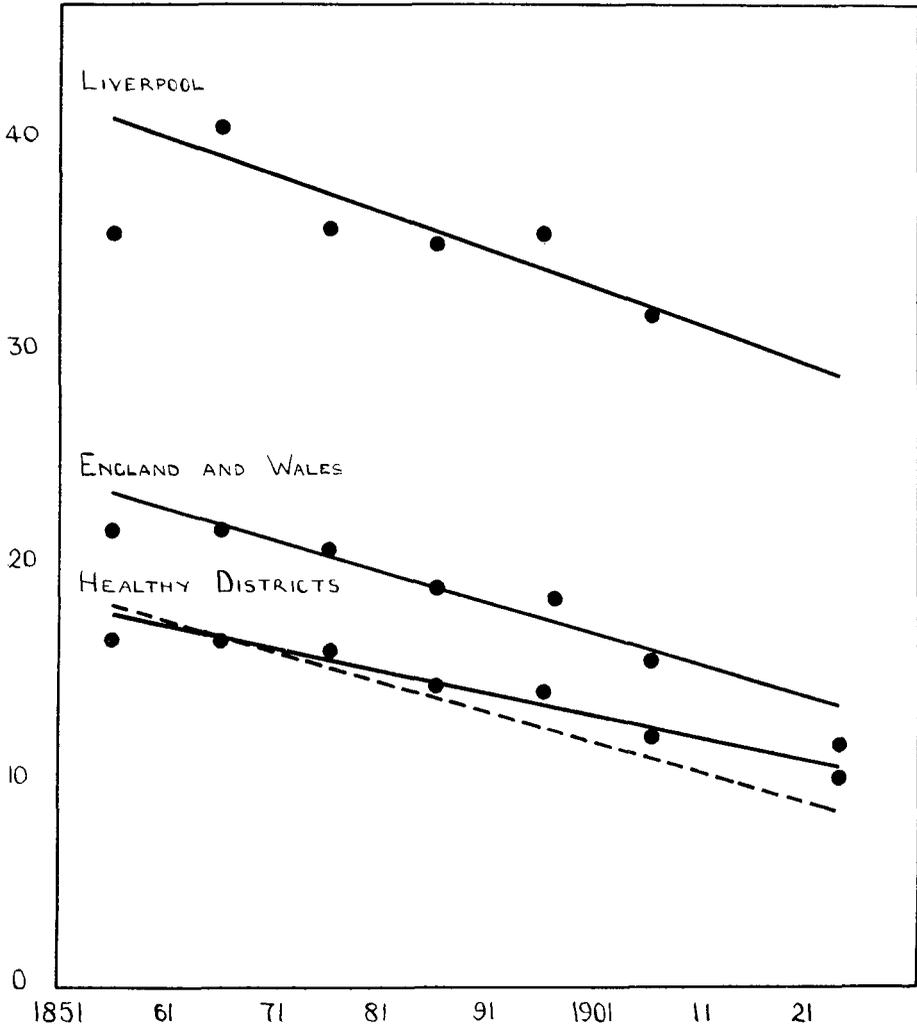


Diagram 1. Showing the actual and graduated standardized death-rates.

improvement than was anticipated, whilst in the healthy districts the predicted rate is 10.24 against 9.95 as actually occurring, *i.e.* 3 per cent. more improvement than was anticipated. In other words, in 1920-5, although the whole country shows improvement at a greater rate than heretofore, it is not so marked in the healthy districts. Hence there is a strong case for the suggestion that the loss of position shown by the healthy districts in relation

to England and Wales in 1921-5 is due, not to their failure to maintain the rate of improvement in the past, but to a sudden increase in the rate of improvement of the more backward districts. In this connection, due allowance must be made for the influence which national education, improved sanitation, medical knowledge and improved standard of living would have in reducing the initial advantage of the healthy districts.

Examination of the second inference drawn from Table IV (see p. 130).

It was seen from Table IV that in the healthy districts the chief periods of improvement were 1881-90 and 1901-25. Was this improvement particularly noticeable at certain ages? Tables VII A and VII B show the percentage increased or decreased mortality in each age group as compared with the mortality in the same group in the immediately preceding decennia and in 1851-60.

This shows quite clearly that so far as England and Wales and the healthy districts are concerned, 1881-90 and 1901 onwards were the periods of greatest advance. At "all ages," the period 1881-90 records a decrease in the death rate of 8 per cent. on the preceding decennium, and 1901-10 records a decrease of 16 per cent. on 1891-1900. On the other hand, it is only from 1901 that any marked improvement is shown in the registration district of Liverpool.

There are two particularly noticeable features in this table which call for some elucidation.

(1) What was the cause of the increased mortality in Liverpool at every age group in 1861-70?

(2) What were the important factors in the great decrease in mortality which occurred in 1901-10?

The increase in mortality at every age group for Liverpool in 1861-70 is in the main due to an epidemic of typhus, the crude death rates from this disease for three consecutive decennia being

	Crude death rate from typhus in Liverpool		
1851-60	1.37 per 1000
1861-70	3.10 „
1871-80	0.58 „

Without doubt, the fall in infantile mortality which took place at the beginning of the twentieth century is the most important factor in the decreased death rate of 1901-10. This is shown by Table VII A (1901-10, cols. A and B) for, in 1901-10, the mortality at ages 0-5 in the healthy districts improved 23 per cent. and in England and Wales 20 per cent. on the previous decennium. But as the following argument shows, decrease in infantile mortality was not the only factor contributing to the improvement in this decennium.

The death rates at ages above 45 show, in 1881-90 for the first time, an improvement; and this, no doubt, is one of the causes why that decennial period shows a greater advance. In previous decennia, improvement has been made at the younger ages, but it has been to some extent counterbalanced by retrogression at the older ages. Now, for the first time, improvement is general.

Table VII A. Showing increase or decrease per cent. of the mortality in each age group compared with the mortality in the same group in the immediately preceding decennium.

Age group All ages standardised	Persons.														
	1861-70			1871-80			1881-90			1891-1900			1901-10		
	A*	B*	C*	A	B	C	A	B	C	A	B	C	A	B	C
0-	+0.8	-0.0	+13.8	-4.7	-3.7	-12.0	-8.5	-8.3	-1.1	-3.0	-2.5	+0.8	-15.9	-16.5	-10.8
5-	+1.5	+4.1	+5.7	-7.6	-6.2	-14.5	-10.4	-5.8	-4.2	+1.7	+1.2	+0.3	-20.4	-23.0	-7.6
10-	+5.6	+13.9	+9.4	-19.1	-21.1	-20.8	-18.0	-14.9	-12.7	+18.1	-11.5	-18.4	-18.0	-21.5	-9.2
15-	+9.5	+14.5	+8.8	-17.4	-18.5	-14.2	-18.3	-19.8	-2.7	-17.3	-13.7	-17.8	-15.8	-20.5	+10.5
20-	+8.9	+7.8	+10.4	-16.6	-17.4	-20.0	-18.4	-21.3	-0.0	-14.7	-13.8	-9.0	-19.8	-23.9	+0.2
25-	+5.3	-6.7	+18.5	-13.9	-14.9	-20.8	-20.4	-23.3	-1.1	-15.8	-16.0	-8.5	-19.5	-18.8	-2.8
35-	+0.7	-1.5	+26.3	-8.8	-9.6	-13.4	-15.6	-16.1	-3.9	-15.4	-18.2	-4.8	-19.8	-19.2	-16.4
45-	+3.5	+4.4	+29.6	-0.6	-1.5	-10.3	-9.6	-10.9	+4.5	-8.2	-12.0	+6.0	-20.9	-18.0	-19.4
55-	+5.2	+3.0	+34.4	+2.0	+2.5	-11.4	-3.4	-5.0	+6.8	-2.2	+1.0	+9.6	-14.7	-15.1	-13.5
65-	+1.8	+0.0	+12.5	+3.5	+4.7	-5.8	-0.1	-2.4	+8.5	+0.1	+2.5	+1.0	-10.7	-10.3	-6.2
75 and up	-0.2	-1.1	-0.3	+1.5	+3.9	-1.0	-4.7	-6.7	-11.8	-1.4	+1.5	+10.2	-6.1	-7.2	-12.8

Table VII B. Showing increase or decrease per cent. of the mortality in each age group compared with the mortality in the same group in 1851-60.

Age group All ages standardised	Persons.														
	1861-70			1871-80			1881-90			1891-1900			1901-10		
	A*	B*	C*	A	B	C	A	B	C	A	B	C	A	B	C
0-	+0.8	-0.0	+13.8	-3.9	-3.7	+0.1	-12.0	-11.7	-0.9	-14.6	-13.8	-0.1	-28.2	-28.0	-10.9
5-	+1.5	+4.1	+5.7	-6.2	-2.3	-9.6	-16.0	-8.0	-13.5	-14.6	-6.9	-13.2	-32.0	-28.3	-19.8
10-	+5.6	+13.9	+9.4	-23.6	-32.1	-13.4	-37.4	-42.2	-24.4	-48.7	-48.8	-38.3	-58.0	-59.8	-44.0
15-	+9.5	+14.5	+8.8	-25.3	-30.3	-6.6	-39.0	-43.0	-9.2	-49.5	-51.8	-25.3	-57.5	-61.6	-17.5
20-	+8.9	+7.8	+10.4	-23.9	-23.9	-11.7	-37.9	-40.1	-11.7	-47.1	-48.4	-19.6	-57.5	-60.7	-19.6
25-	+5.3	-6.7	+18.5	-18.5	-20.6	-6.1	-35.1	-39.1	-16.0	-45.3	-48.9	-23.2	-56.0	-58.5	-25.4
35-	+0.7	-1.5	+26.3	-8.2	-11.0	+9.3	-22.5	-25.3	+5.1	-34.4	-38.9	+0.0	-47.4	-50.6	-16.4
45-	+3.5	+4.4	+29.6	+2.9	+2.8	+16.3	-6.9	-8.3	+21.5	-14.6	-19.3	+33.5	-32.5	-33.9	+4.2
55-	+5.2	+3.0	+34.4	+7.3	+5.7	+19.1	+3.6	+0.3	+27.2	+1.3	+0.7	+39.3	-13.6	-15.6	+23.8
65-	+1.8	+0.0	+12.5	+5.3	+4.7	+6.0	+5.2	+2.2	+15.0	+5.4	+4.8	+31.6	-2.6	-3.3	+23.4
75 and up	-0.2	-1.1	-0.3	+1.3	+2.7	-1.3	-3.4	-4.2	-12.4	-4.8	-2.7	-4.0	-10.6	-9.7	-16.3

*A = England and Wales; B = Healthy districts; C = Liverpool.

The older age improvement, however, did not persist. There is a falling off again in 1891–1900, followed by another great advance in 1901–10. Attention is therefore drawn to the fact that until 1901–10 the improvement at ages above 45 was very slight. A suggestion as to the cause of this is here put forward, and in order to focus ideas let a concrete case be considered. Why, for example, was there no improvement, relatively speaking, at ages 45–55, in 1891–1900? At these ages a certain number of people died who should have lived longer if the improvement in earlier age groups had been maintained at ages 45–55.

The first effective Public Health Act was not passed until 1875 although, spasmodically, sanitation had received attention since the great cholera scare of 1831¹. The population in the age group 45–55 in 1891–1900 was aged 25–35 when the 1875 Act was passed. That is, they had lived at least 25 years of their life under the bad environmental conditions prevailing in England and Wales up to this date. Hence, their power of resistance to later life diseases may have been reduced. The same argument may be applied *a fortiori* to the older age groups, and to a lesser degree from 35 upwards in 1881–90 and from 25 upwards in 1871–80.

Thus the answer to the question. What were the important factors in the great decrease in mortality which occurred in 1901–10 is:

(a) The great general decrease in infantile mortality which took place in the twentieth century.

(b) The effect of 25 years' progress in Sanitation and Public Health on the death rates at ages 45 and over, such methods having been previously un-availing to reduce the death rates at the higher ages.

Examination of the third inference drawn from Table IV (see p. 130).

In Table VIII the standardised rates as set out in Table IV are expressed as a percentage of their respective crude rates. From a study of this table it is observed that the healthy districts have an older population than the rest

Table VIII. *Standardised death rates expressed as a percentage of crude death rates at each period.*

	England and Wales (%)	Healthy districts (%)	Registration district of Liverpool (%)
1851–60	95	91	106
1861–70	95	91	104
1871–80	95	91	105
1881–90	97	92	105
1891–1900	99	94	106
1901–10	99	91	103
1920–25	93	89	—

¹ Chadwick (a member of the first General Board of Health 1842, and often spoken of as the Spiritual Father of Public Health) had the great ambition to clean up England. In pursuance of this ideal, he became from 1837 to 1854 the best hated man in the country. He, and the first Public Health Act of 1848, became so unpopular that in 1854 he was retired with a pension—being paid, as he himself put it, to leave dirt and disorder alone.

of the country, which is what would be expected, since they are predominantly rural. With the general ageing of the population which has taken place during the present century, they have aged also. Too great a stress however must not be laid on the age constitution of these districts, since it is in order to eliminate this factor that standardised death rates have been used throughout.

Distribution of the healthy districts according to rate of mortality.

Although it is known that all the 63 districts had, in 1849-53, a crude death rate below 17.0 per 1000, this bare fact gives no indication of what was the scatter of their rates below this level. A table has therefore been prepared, Table IX, which gives the distribution, according to the standardised rate of mortality, of the healthy districts and also of all registration districts of England and Wales in four specific decades. The four decades dealt with are 1851-60, 1881-90, 1891-1900 and 1901-10, and for each decade, the mean rate of mortality, the standard deviation and the coefficient of variation are given. The standardised death rates for the decade 1851-60, for England and Wales, have been calculated on the basis of the population of the whole country in 1901, but as already explained (see p. 127), the standardised death rate for persons

Table IX. *Distribution of districts according to standardised rate of mortality, in several decades.*

Standardised rates* of mortality per 1000	England and Wales (all districts)				Healthy districts			
	1851-60	1881-90	1891- 1900	1901-10	1851-60	1881-90	1891- 1900	1901-10
Under 10	—	—	—	35	—	—	—	11
10-11	—	—	{ 27 }	135	—	—	1	12
11-12	—	—	—	118	—	—	7	24
12-13	{ 1 }	33	112	80	1	14	17	8
13-14	{ 1 }	89	121	61	1	13	20	7
14-15	{ 16 }	177 141	92	56	9	17	11	1
15-16	{ 46 }	85	53	42	22	12	5	—
16-17	{ 113 }	69	56	38	20	5	2	—
17-18	109	45	31	29	7	.1	—	—
18-19	97	40	40	12	3	1	—	—
19-20	61	28	31	10	—	—	—	—
20-21	36	29	21	7	—	—	—	—
21-22	35	23	18	3	—	—	—	—
22-23	24	9	13	2	—	—	—	—
23-24	19	19	6	1	—	—	—	—
24-25	24	8	5	—	—	—	—	—
25-30	39	9	5	1	—	—	—	—
30-35	2	5	4	3	—	—	—	—
35-40	1	—	—	—	—	—	—	—
40-45	—	—	—	—	—	—	—	—
45-50	—	—	—	1	—	—	—	—
No. of districts	624	632	635	634	63	63	63	63
Mean	19.2	16.7	15.7	13.2	16.0	14.3	13.4	11.4
Standard deviation	3.4	3.5	3.5	3.4	1.2	1.4	1.3	1.3
C. of V.	17.7	20.8	22.1	25.5	7.2	9.8	9.5	11.1

* The standardised death rates for the decade 1851-60, for England and Wales, have been calculated on the basis of the population of the whole country in 1901. The rates for 1881-90 and for 1891-1900 and 1901-10 both for England and Wales and the healthy districts are those given by the Registrar-General, and are based on the population of the whole country for the respective decade. This difference in principle, however, is unlikely materially to affect the comparison here made (see text, p. 137).

for individual districts for 1851–60 were obtained by taking the arithmetic mean between the standardised male and the standardised female rates. The rates for 1881–90 and for 1891–1900 are those given by the Registrar-General, and are based on the population of the whole country for the respective decade. From these results it is to be noted that the mean rate of mortality for the healthy districts stands steadily between 84 and 86 per cent. of the mean rate of all districts in England and Wales for each decennial period. This figure differs from that given in Table V (where the percentage was found to be constant at 76 per cent.) owing to the fact that in Table IX the figures are not weighted by the populations.

Although the mean itself has steadily decreased in both divisions, there has been little variation in the scatter of the rates as measured by the standard deviations. Generally, as one would have expected, the measure of dispersion in England and Wales is greater than that in the healthy districts, the ratio being in the neighbourhood of 3 to 1. It may be thought that the basing of the standardised rates of 1881–90 and 1891–1900 on the population of the whole country for the respective decennia, whilst the rates for 1851–60 and 1901–10 are based on the 1901 population, has considerably depreciated the value of the results in Table IX. But the following figures extracted from the Registrar-General's returns show that this is not so.

England and Wales (all causes, all ages).

Period	Standardised death rate based on the population for the respective decade	Standardised death rate based on the 1901 population
1881–90	18.7	18.6
1891–1900	18.2	18.1

Comparison of expectation of life in the healthy districts in the two periods, 1851–60 and 1901–10.

The amount of general improvement as regards mortality rates made by the stationary districts during the last half of the nineteenth century is perhaps best grasped by a comparison of the expectation of life in Farr's healthy districts in 1851–60, and the expectation of life in the same districts in 1901–10.

Such a comparison is set out in Table X. To obtain these "expectations" recourse was had to the method expounded by Dr J. Brownlee in his paper "The use of Death-rates as a Measure of Hygienic Conditions"¹ and as illustrative of the fitness of this method in this connection, column (1) gives for comparison the expectations of life calculated for these districts by Dr Farr in his original paper for the period 1849–53. Similar figures for 1920–5 are not obtainable since the deaths in age groups are unknown.

Great improvement is shown at the very young ages, an increased expectation of eight years being indicated. This increase becomes less and less as age advances, until finally at ages over 75 the expectation of life is the same in 1901–10 as it was in 1851–60.

¹ *Medical Research Council Special Report Series*, No. 60.

*Mortality in England and Wales***Table X.** *Expectation of life in the healthy districts in two periods, 1851-60 and 1901-10.*

Ages	Expectation of life as calculated by Dr Farr for the period 1849-53 (years)	Expectation of life as obtained by Dr Brownlee's method	
		1851-60 (years)	1901-10 (years)
0-	49.00	49.12	57.14
5-	55.16	55.28	60.53
10-	51.08	51.95	56.50
15-	47.12	47.92	51.92
20-	43.45	44.07	45.39
25-	40.05	40.50	43.31
35-	33.17	33.28	34.97
45-	26.05	25.91	26.84
55-	18.86	18.59	19.18
65-	12.29	11.92	12.51
75 +	7.34	7.14	7.21

As will subsequently be shown, however, it seems likely that at the older ages, improvement in some diseases has been made which has been counter-balanced by a retrogression in others.

III. COMPARATIVE ANALYSIS OF THE INITIAL AND FINAL POSITION.

Having dealt with the first part of the problem to the extent of tracing the course of the death rates of the stationary districts in the last three-quarters of a century, and discovering that the advantage they commenced with was maintained, it is now necessary to analyse the position in 1851-60 and endeavour to discover if there was any change in its constituent parts throughout the period covered. Here, however, an initial difficulty is encountered owing to the changes which have occurred in the classification of causes of death during the last seven decades. With the growth of medical knowledge, many diseases which 75 years ago were treated as items in certain general groups of disease are now classified separately as distinct groups.

The following list, which is also important in view of the results obtained in this section, illustrates the difficulty of making any comparison between 1920-5 records and 1851-60.

The first column is a list of classified causes of death in the 1851-60 Supplement of the Registrar-General, whilst the second column shows the corresponding list in the *Statistical Review* for 1922. Those above the line are considered roughly comparable with the 1851-60 disease opposite which they are shown, but those below the line cannot be definitely related. Influenza, for example, which is now an important separate classification formed, in 1851-60, one of a group of eleven diseases called "Other Zymotic Diseases." Rheumatic fever, erysipelas and even puerperal fever were also included in this group (see *Annual Report*, 1855).

If is added to this difficulty, the improvement in the diagnoses of the causes of death, which has been continuously going on; then all results obtained from comparisons of the death rates from diseases over a long period of years must be regarded with a considerable amount of scepticism. Nevertheless, by

Comparative list of classified causes of death

1851-60	1922
Smallpox	Smallpox
Measles	Measles
Scarlatina	Scarlet fever
Diphtheria	Diphtheria
Whooping cough	Whooping cough
Typhus	
Cholera, diarrhoea and dysentery	Diarrhoea, etc.
Other zymotic diseases	
Cancer	Cancer
Scrofula and tabes mesenterica	
Phthisis	Tuberculosis of respiratory system: other tubercular diseases
Hydrocephalus	
Diseases of the brain	
Heart disease and dropsy	Heart disease
Diseases of the lungs	Bronchitis, Pneumonia; other respiratory diseases
Diseases of the stomach and liver	
Diseases of the kidneys	
Diseases of the generative organs	
Diseases of the joints	
Diseases of the skin	
Childbirth and metria	Puerperal sepsis* parturition and congenital debility
Violent deaths	Suicide and violence
Other causes	Other defined causes and causes ill-defined
	Enteric fever
	Influenza
	Encephalitis lethargica
	Meningococcal meningitis
	Rheumatic fever
	Diabetes
	Cerebral haemorrhage
	Arterio sclerosis
	Ulcer of stomach and duodenum
	Appendicitis and typhlitis
	Cirrhosis of liver
	Acute and chronic nephritis

* Included under other zymotic diseases in 1851-60.

selecting for comparison certain well defined diseases, results have been obtained which if regarded broadly, are interesting. No attempt has been made to trace the incidence of the diseases through the successive decades. The position of each is simply stated as it was at the commencement and at the end of the survey. The causes selected for examination are smallpox, measles, scarlet fever, diphtheria, whooping cough, diarrhoea, cancer, pulmonary tuberculosis, organic heart disease and respiratory diseases.

By the courtesy of the Registrar-General, access was obtained to data giving the deaths at all ages from these various diseases in each administrative area¹ for the years 1921-5, and the total deaths for the six years, 1920-5, from these causes, together with the relative populations (taken from the 1921 census *Reports*) are shown in Table XI.

Smallpox. Although this was selected as one of the diseases for enquiry, the small number of fatal cases (only six) occurring in 1920-5, makes examination impossible. It may be worthy of passing mention that in England and Wales there were 88 fatal cases during these six years against 42,071 fatal cases in the years 1851-60, 1102 of which occurred in the healthy districts.

¹ These data are not given in the *Statistical Reviews* for areas with a population of less than 10,000.

Table XI. *Deaths from certain causes in administrative areas corresponding to Farr's healthy districts, 1920-5 inclusive.*

Diseases	No. of deaths
All causes	131,872
Smallpox	6
Measles... ..	550
Scarlet fever	212
Diphtheria and croup	910
Whooping cough	814
Diarrhoea	1,085
Cancer	16,702
Pulmonary tuberculosis	8,437
Organic heart disease	19,152
Respiratory diseases	16,916
Bronchitis	8,183
Pneumonia	6,922
Other respiratory diseases	1,811

Total population in the same areas. 1921 census.

Ages	Population
0-5	152,157
5-10	167,377
10-15	178,236
15-20	169,501
20-25	150,156
25-35	292,926
35-45	288,509
45-55	245,269
55-65	173,960
65-75	106,692
75 +	47,947
All ages	1,972,730

Measles. 550 deaths occurred from this disease (1920-5) in the healthy areas, but we have no knowledge of the age distribution of these. By indirect standardisation a death rate of 0.052 per 1000 is obtained, which may be compared with 0.17 per 1000 for England and Wales for the same period. For the decade 1851-60 the standardised death rates from measles for the healthy districts were 0.18 per 1000 by the indirect method and 0.16 per 1000 by the direct method, as compared with 0.36 per 1000 for England and Wales.

For clearness these results are set out as follows:

Measles death rates (all ages) standardised.

1851-60	England and Wales	0.36	per 1000	(Direct)
	Healthy districts	0.16	"	(Direct)
	"	0.18	"	(Indirect)
1920-25	England and Wales	0.17	"	(Direct)
	Healthy districts	0.052	"	(Indirect)
	Healthy districts as % of England and Wales	1851-60 =	50	
	"	1920-25 =	31	

Thus, whereas the death rate from measles in the healthy districts in 1851-60 was 50 per cent. of the measles death rate in England and Wales, it had dropped to 31 per cent. by 1920-5.

Scarlet fever, whooping cough and diphtheria. These have been dealt with in exactly the same way as measles, and the results may be stated briefly in the following form:

Scarlet fever death rates (all ages) standardised.

1851-60	England and Wales	0.78	per 1000	(Direct)
	Healthy districts	0.61	"	(Direct)
	" "	0.69	"	(Indirect)
1920-25	England and Wales	0.037	"	(Direct)
	Healthy districts	0.019	"	(Indirect)
	Healthy districts as % of England and Wales	1851-60 = 88		
	" "	1920-25 = 51		

From these figures it is seen that the healthy districts have improved from having a death rate from scarlet fever of 88 per cent. of that for England and Wales at the beginning of our period to having only 51 per cent. at the close.

Whooping cough death rates (all ages) standardised.

1851-60	England and Wales	0.44	per 1000	(Direct)
	Healthy districts	0.27	"	(Direct)
	" "	0.31	"	(Indirect)
1920-25	England and Wales	0.17	"	(Direct)
	Healthy districts	0.078	"	(Indirect)
	Healthy districts as % of England and Wales	1851-60 = 70		
	" "	1920-25 = 46		

Diphtheria death rates (all ages) standardised.

1851-60	England and Wales	0.10	per 1000	(Direct)
	Healthy districts	0.15	"	(Direct)
	" "	0.16	"	(Indirect)
1920-25	England and Wales	0.120	"	(Direct)
	Healthy districts	0.086	"	(Indirect)
	Healthy districts as % of England and Wales	1851-60 = 160		
	" "	1920-25 = 72		

Diphtheria shows the greatest relative improvement in young life diseases. The death rate, which in the healthy districts in 1851-60 was 60 per cent. greater than the death rate from the same cause in the same period in England and Wales, was so much improved that by 1920-5 it was 28 per cent. less.

Diarrhoea. Only age group 0-5 has been taken into account in discussing the trend of this disease, because in the list of recorded deaths in the administrative areas for 1920-5, it is expressly referred to as "Diarrhoea (under 2 years)." Furthermore, in 1851-60, cholera, diarrhoea and dysentery were all grouped together, whereas now whilst cholera under 2 years is included with diarrhoea, deaths from cholera at ages over 2 years are assigned to "Other Causes." All deaths from dysentery are also now assigned to "Other Causes¹." The death rate from diarrhoea for England and Wales in 1851-60 at ages 0-5 was 5.26 and in the healthy districts 1.96. In 1920-5 in England and Wales the rate is 2.39 and in the healthy administrative areas 1.19. So that whereas the healthy districts' diarrhoea death rate was 37.3 per cent. of that for England and Wales in 1851-60, it rose to a percentage of 49.8 in 1920-5. From this point of view as regards diarrhoea the healthy districts do not seem to be so favourably situated now as they were in 1851-60. But the rate for the whole country was extremely heavy in the earlier period, and the scope for improvement was correspondingly great. In fact, an improvement of 55 per cent. is

¹ *Causes of Death—England and Wales 1912.*

recorded as against 39 per cent. improvement for the healthy districts. But their rate in the earlier period was not so heavy, and so has not given scope for so much improvement. Furthermore, in view of the changes which have taken place in the grouping of the diseases which together constitute the total deaths from diarrhoea, it is impossible to say to what degree the figures give an accurate picture of the actual trend in this case.

Cancer. 16,702 deaths from cancer were registered in the healthy areas in the six years 1920-5. In England and Wales 287,608 were registered but 97.3 per cent. of these occurred at ages over 35, so that it appears justifiable to assume that all the 16,702 deaths occurred at ages 35 and upwards. By the *direct* method of standardisation (using only ages 35 and up) a standardised death rate of 3.012 per 1000 is obtained for England and Wales. By *indirect* standardisation of the total deaths from this cause in the healthy areas (again using only the population at ages 35 and up) a standardised death rate of 2.983 or 99 per cent. of that for England and Wales is obtained. Treating the 1851-60 period in exactly the same way the percentage figure obtained is 93.3 per cent. This loss of ground is not simply a natural result of the older age population in the healthy districts, for allowance has been made for this factor by standardisation. It seems to show that cancer, which has increased in England and Wales as a whole (ages 35 +) from 0.95 per 1000 in 1851-60 to 3.02 per 1000 in 1920-5, has increased at an even slightly faster rate in the stationary areas of the country.

Pulmonary tuberculosis. From an examination of the sub-divisions into which deaths from this disease are classified in 1920-5 it is concluded that it is comparable with phthisis, as recorded in 1851-60. All rates have been standardised, England and Wales by the direct method and the healthy districts indirectly for 1920-5 and by both methods for 1851-60.

The results are as follows:

Phthisis death rates (all ages) standardised.

1851-60	England and Wales	2.77 per 1000	(Direct)
	Healthy districts	2.41	„ (Direct)
	„	2.32	„ (Indirect)

Pulmonary tuberculosis.

1920-25	England and Wales	1.05 per 1000	(Direct)
	Healthy areas	0.71	„ (Indirect)
	Healthy districts as % of England and Wales	1851-60 = 83.8	
	„	1920-25 = 68.0	

So that there has apparently been a much greater improvement as regards tuberculosis in the stationary districts of England than in the country generally.

Heart disease. Deaths from dropsy were grouped with heart disease in 1851-60, whereas in the later period dropsy is assigned to other causes. This alteration in classification, however, will affect the total rate for the whole country just as it will the healthy districts, hence it will not affect the comparability of the death rates.

The results are set out in the same way as those for pulmonary tuberculosis.

Heart disease and dropsy (all ages) standardised.

1851-60	England and Wales	1.27 per 1000	(Direct)
	Healthy districts	1.17	„ (Direct)
	„ „	1.17	„ (Indirect)

Organic heart disease.

1920-25	England and Wales	1.23 per 1000	(Direct)
	Healthy districts	1.33	„ (Indirect)
	Healthy districts as % of England and Wales	1851-60 = 92.1	
	„ „ „ „ „	1920-25 = 108.4	

Respiratory diseases. These have been obtained in 1920-5 by grouping together deaths from bronchitis, pneumonia and "other respiratory diseases." They are here compared with deaths from diseases of the lungs as classified in 1851-60.

Diseases of the lungs (all ages) standardised.

1851-60	England and Wales	2.87 per 1000	(Direct)
	Healthy districts	1.76	„ (Direct)
	„ „	1.86	„ (Indirect)

Respiratory diseases.

1920-25	England and Wales	2.00 per 1000	(Direct)
	Healthy districts	1.28	„ (Indirect)
	Healthy districts expressed as % of England and Wales	1851-60 = 64.8	
	„ „ „ „ „	1920-25 = 64.0	

The results which have been obtained from this comparison of individual diseases are summarised in Table XII, from which it appears that, with the exception of diarrhoea, heart disease and cancer (the figures of the first being

Table XII. *Showing the comparative rates of improvement in respect of certain diseases between the healthy districts and England and Wales.*

Cause of death	1851-60			1920-5			Percentage improvement of the healthy districts over or under the standard rate as measured by the whole country 100(a-b)/a
	Standardised death rates per 1000 per annum		Healthy districts expressed as percentage of	Standardised death rates per 1000 per annum		Healthy districts expressed as percentage of	
	England and Wales	Healthy districts		England and Wales	Healthy districts		
	(a)	(b)	(a)	(b)			
Measles (all ages)	0.36	0.18	50.0	0.17	0.052	30.6	- 39
Scarlet fever (all ages)	0.78	0.69	88.5	0.037	0.019	51.4	- 42
Whooping cough (all ages)	0.44	0.31	70.5	0.17	0.078	45.9	- 35
Diphtheria (all ages)	0.10	0.16	160.0	0.12	0.086	71.7	- 55
Diarrhoea (0-5)	5.26	1.96	37.3	2.39	1.19	49.8	+ 34
Heart disease (all ages)	1.27	1.17	92.1	1.23	1.33	108.4	+ 18
Respiratory diseases (all ages)	2.87	1.86	64.8	2.00	1.28	64.0	- 1
Pulmonary tuberculosis (all ages)	2.77	2.32	83.8	1.05	0.71	68.0	- 19
Cancer (ages 35 +)	0.95	0.89	93.3	3.01	2.98	99.0	+ 7
All causes (all ages)	21.17	16.81*	79.4*	11.39	9.95	87.4	+ 10

* The difference between these figures and the corresponding figures given in Tables IV and V is due to the difference between the direct and indirect method of standardisation. The indirect method is used here in order to allow of comparison with 1920-5, where the direct method was impossible.

somewhat unreliable), the healthy districts have improved their death rates from these diseases at a faster rate than the rest of the country. This is particularly marked in diphtheria, and to a lesser degree in pulmonary tuberculosis, whilst respiratory diseases improved almost on a par with England and Wales.

The question may be asked, why is it that with all these diseases improving so much more rapidly in the healthy districts, the rate from "All causes combined" shows improvement since 1920 to be less rapid? The answer must be, leaving aside the limitations of the data, that these more rapid increases have been more than counterbalanced by less rapid improvements or possibly by increased death rates relatively to the rest of the country, occurring in some other cause-groups, the data of which do not permit of analysis and comparison individually. To test this, the deaths from all causes other than those specifically examined were grouped together and examined in the same way as the above. The results are:

All other causes (all ages) standardised.

1851-60	England and Wales	11.28 per 1000	(Direct)
	Healthy districts	9.52	„ (Indirect)
1920-25	England and Wales	4.86	„ (Direct)
	Healthy districts	4.99	„ (Indirect)
Healthy districts expressed as % of England and Wales 1851-60 = 84.4			
" " " " " " " 1920-25 = 102.6			
or a rate of improvement slower than the whole country of 20 %.			

This only serves to emphasise still more, that though the results obtained in this section of the survey are of an interesting character, they must only be interpreted in a very general way. It seems clear that the size of the "All other causes" group as regards the number of diseases included by it, is larger at the end than at the beginning of the period. Overlapping and interlocking no doubt occur, making only the most general conclusions possible. Furthermore, in considering the last column of Table XII, the fact must not be overlooked that, for example, a movement of 5 per cent. in one direction in "Other causes" might counterbalance the whole movement of several diseases in the opposite direction.

Influenza might be one of the causes which has contributed to lack of improvement in "Other causes." Deaths from this cause were not shown separately in 1851-60, and even if they had been, changes in the use of the term as well as of "epidemic constitutions" would vitiate any comparison of the two periods. A detailed explanation of the reasons why mortality in these districts has approximated to or diverged from that of the rest of the country could only be attempted by those with local knowledge more intimate than can be acquired from books. One may surmise that the *relatively* sparse populations of the districts account for their favourable position with respect to the infectious illnesses of childhood. It is also tempting to believe that an improvement of the nutritional standards of the agricultural labourer—a point in which the agricultural workers of 60 years ago had no advantage over the

townsmen—may help to explain the relative improvement in the “stationary” districts with respect to tuberculosis.

IV. DIVISION OF THE HEALTHY DISTRICTS ACCORDING TO CERTAIN TOPOGRAPHIC CRITERIA.

An unavoidable consequence of making a study of districts in which the rise or decline of industry has been absent is that the names of the majority of them will be unfamiliar and will give no indication to the general reader as to the class of district under discussion. The average Londoner, in the course of years, accumulates general impressions and ideas regarding the various districts lying around London. For example, he learns to contrast Hampstead with Wapping, Richmond with Bethnal Green. Certain areas appeal to him as being those whence issue every morning the thousands of workers, who by bus, tram, train or tube make their way to work in certain other districts of inner London, which again are more or less strictly defined in his mind, though he will probably verbally refer to them as “the city” or “town.” Other areas, again, such as Dorking, Guildford, Henley and Hatfield are associated in his mind with the residences of persons of means. Few Londoners, however, would have a similar natural knowledge of the outlying districts of Manchester, Glasgow and other large towns of the British Isles, and generally, taking any district as a centre, it may be said that although the population of that district will be familiar with the social status of places within a small radius, the more the radius is increased, the more general and vague will be their knowledge of places within it. Northumberland to the southerner means perhaps “the country” in contrast to London—possibly “coal mining”; but Haltwistle, Bellingham, Belford, Glendale and Rothbury (which are those districts of Northumberland forming component parts of the total healthy districts of England as used in this investigation) will most likely be mere names.

In order, therefore, to give some indication of the type of the districts which have been under discussion, the last section of this report will be devoted to a sub-division of the healthy districts according to certain topographic criteria, and to a comparison of the death rates in those groups.

The reference (in the first paragraph of this section) to the daily movement of population suggests a classification of the districts according to whether the residents mainly work in the district or merely use it as a dormitory. It is true that in most instances, the daily outgoing population is, to various degrees, balanced by an incoming population, and from some points of view the character of a district might be said to depend on the actual number of people employed in it by day and on the nature of their occupations. But the daily influx of workers into any area will only affect its death rate to the extent to which they alter its environmental conditions. The deaths occurring among the incoming workers will be registered against the district in which they reside, which will not necessarily be one included in this survey. Thus, to ignore the incoming workers of a district is, in this case, to a great extent justifiable.

For this classification, the administrative areas, 1920-5, are used in preference to the original registration districts for the following reason. Most of the registration districts cover such a large area that they have themselves become individually capable of sub-division into districts distinct in character. For example, when one speaks of Dorking as a residential area for well-to-do city men, it is the urban district of Dorking with its 1338 statute acres which one has in mind and not the rural district of Dorking which covers 39,526 acres.

There are then, 141 administrative areas to be classified according to the percentage of workers who find their occupation within the district's boundary. The data for this process are to be found in the Occupational Census for 1921, which gives for each district the following data:

Total number of occupied persons.

Number of persons working in the area of enumeration.

Number of persons enumerated in the area but working outside it.

These data are not exhaustive since there are two other groups, which are so indefinite that they must be omitted. They are:

Persons with no fixed workplace, and

Persons whose workplace is not stated.

It should be noted that "total occupied persons" includes employers, employees and unemployed. It excludes children, the retired, women at home and those fortunate enough not to be obliged to work. In the words of the Registrar-General it excludes those "Not gainfully occupied."

Table XIII gives a distribution of the "healthy" administrative areas according to the percentage of occupied persons working in the area of

Table XIII. *Healthy administrative areas. Distribution of districts according to the percentage of occupied persons working within the district.*

% of occupied persons who work in the district of enumeration (1921 census)	No. of districts	Total no. of occupied persons	No. of persons working in the area of enumeration	Average %
(a) Decile grouping:				
10-20	—	—	—	—
20-30	—	—	—	—
30-40	4	177,620	60,482	34
40-50	7	56,656	24,925	44
50-60	15	76,712	43,192	56
60-70	28	122,322	79,639	65
70-80	51	317,162	232,833	73
80-90	34	112,092	93,297	83
90-100	2	1,160	1,049	90
Total	141	863,724	535,417	62
(b) Quartile grouping:				
0-25	—	—	—	—
25-50	11	234,276	85,407	36
50-75	74	430,439	290,243	67
75-100	56	199,009	159,767	80
Total	141	863,724	535,417	62

enumeration. In the first half of the table decile grouping and in the second half of the table quartile grouping has been used.

It is the second half of this table which supplies the criteria for classification.

From its figures we see that only 11 administrative areas are of the type in which more than 50 per cent. of the occupied persons go to other districts to work, whilst 130 districts are of the type in which more than 50 per cent. work within the area.

Had the numbers in the former class been greater, it might have been possible to sub-divide according to the district to which the majority of the workers went. As it is, in 10 of the 11 districts most of the workers go to London, whilst as regards Southwick (West Sussex), the remaining one, Hove, Brighton, and Shoreham are its receiving areas.

The latter class is already sub-divided by the quartile grouping into (a) districts in which 50-75 per cent. of the occupied persons work within its area; (b) districts in which 75-100 per cent. work within its area.

To make one more sub-group, 21 well-known seaside watering places were selected from among them and, together with Southwick (see previous paragraph), form a group of seaside resorts. This classification then gives two main groups, the second of which is sub-divided into three:

Table XIV.

A. Classification of healthy administrative areas according to the percentage of workers who find occupation within the district.

	No. of districts	Total population 1921 census	Total deaths 1920-5 inclusive	Death rate 1920-25 (standardised in-directly)	Standardised death rate 1920-25 expressed as % of	
					All healthy districts	England and Wales
I. Dormitories (districts in which more than 50 % of the occupied persons work in other districts)	10	506,808	30,915	10.55	106	93
II (a) and (b). Districts in which more than 50 % of the occupied persons work within the district	109	1,054,246	73,106	9.90	99	87
(a) 50-75 % working within the district	53	587,725	39,186	9.69	97	85
(b) 75-100 % working within the district	56	466,521	33,920	10.14	102	89
(c) Seaside resorts	22	411,676	27,851	9.49	95	83
All healthy areas (omitting King's Norton)	141	1,972,730	131,872	9.95	100	87
England and Wales	—	—	—	11.39	—	100

B. Alternative sub-division of Class II.

II. Districts in which more than 50 % of the occupied persons work within the district	109	1,054,246	73,106	9.90	99	87
(a) Mainly non-agricultural	71	704,299	47,735	9.85	99	86
(b) Mainly agricultural	38	349,947	25,371	9.98	100	88
(c) Seaside resorts (identical with above)	—	—	—	—	—	—

I. Districts in which more than 50 per cent. of the workers are occupied outside the district.

II. Districts in which more than 50 per cent. of the workers are occupied within the district:

- (a) 50–75 per cent. occupied within the district.
- (b) 75–100 ” ” ” ” ”
- (c) Seaside resorts (arbitrarily selected from II (a)).

Table XIV A shows the death rates for the years 1920–5 in each of the two main and three subsidiary groups, standardised by the indirect method as used in the previous sections. These rates are also expressed as percentages of the death rate of the healthy districts as a whole, and also of England and Wales for the same period. The necessity of using administrative areas instead of registration districts excludes the possibility of tracing the death rates of these groups through the decades 1851–60 to 1901–10.

Discussion of the figures in Table XIV A is perhaps better deferred until a description has been given of an alternative sub-division which has been made of the second of the two main groups above.

Alternative sub-division of districts in which more than 50 per cent. of the workers are occupied within the district.

The relatively large number of districts falling into the second main group of districts makes possible an alternative sub-division of this group (excluding the seaside group) into districts mainly agricultural and mainly non-agricultural. Broadly, a differentiation between an agricultural and a non-agricultural district is obtained according to whether the number of agricultural workers exceeds or falls short of the aggregate number of persons otherwise occupied. The 1921 Census Returns give the necessary data, but consideration of two factors necessitates some adaptation of their figures. These are perhaps to be best explained by reference to a particular instance, the Rural District and Municipal Borough of Wokingham in Berkshire for example.

From the following extract from the Census Returns (see p. 149) it appears that the chief occupation in the Municipal Borough of Wokingham is personal service (there are 441 engaged in this way, of whom 294 are domestic servants) and that next to this come commercial and financial occupations, followed by transport workers. Again, although in the Rural District of Wokingham agricultural workers head the list, they are closely followed by personal service (1991, including 1564 domestic servants). But although domestic servants may assist in the determination of the social status of a district, they will not assist the purpose at present in view since they may be employed by both agriculturalists or non-agriculturalists alike. Domestic servants will therefore be excluded from the figures used in comparing the number of agricultural and non-agricultural workers.

There must also be taken into account the fact that a certain number of

Occupation of persons over 12	Wokingham (R.D.) Persons	Wokingham (M.B.) Persons
Total population	18,469	4,475
Aged 0-11	3,837	893
Aged 12 and upwards	14,632	3,582
1. Fishermen	—	—
2. Agricultural occupation	2,041	129
3. Mining and quarrying	12	2
4. Makers of coke, lime, cement, etc.	6	1
5. Makers of bricks, pottery, glass	72	17
6. Workers in chemicals, paints, etc.	5	1
7. Metal workers... ..	277	83
8. Workers on precious metals... ..	5	—
9. Electrical apparatus makers, fitters, etc.	27	4
10. Makers of watches, etc.	3	4
11. Workers on skins; leather goods makers	19	6
12. Textile workers	9	4
13. Makers of textile goods and articles of dress	152	52
14. Makers of foods, drinks and tobacco	172	30
15. Workers on wood, etc.	236	118
16. Paper workers; printers, etc.	33	14
17. Builders, bricklayers, etc.	370	108
18. Painters and decorators	107	38
19. Workers in other materials	5	—
20. Workers in mixed and undefined materials	17	5
21. Persons in gas, water and electricity supply	21	6
22. Transport workers	604	180
23. Commercial and financial occupation	459	231
24. Public administration and defence	166	58
25. Professional occupations	405	121
26. Persons employed in entertainments, etc.	41	6
27. Persons employed in personal service	1,991	441
28. Clerks, draughtsmen, typists, etc.	205	94
29. Warehousemen, etc.	63	12
30. Stationary	27	3
31. All other occupations	375	99
Total occupied	7,925	1,867
Unoccupied and retired	6,707	1,715
Total occupied and unoccupied	14,632	3,582

The above figures include:

Farmers	192	—
Gardeners	616	75
Agricultural labourers	893	35
Gardeners' labourers	108	—
Makers of bricks and pottery	72	17
Makers of foods	147	—
Domestic servants	1,564	294
Laundry workers	—	48

these workers go outside the district to work. In the Rural District their number is 1871 and in the Municipal Borough 347 and the question arises as to whether the type of the district is to be determined by (1) the workers as a whole, or (2) by the number of those remaining in the area to work.

In support of the first view, one takes an extreme case and assumes that 95 per cent. of the workers go outside to work, and that the 5 per cent. left behind are, for example, gardeners. Then, it is argued, the district cannot be called agricultural, even though 100 per cent. of the workers left behind are engaged in a class of agriculture. But, one does not know what proportion of the 95 per cent. outgoing workers were agriculturally occupied in some other district and, furthermore, by definition, the class of district which is now being

dealt with, is of the type which keeps more than 50 per cent. of its workers at home.

It would therefore seem that a fair criterion of distinction between agricultural and non-agricultural districts can be obtained as follows:

From the total number of gainfully occupied persons in each district, deduct the number of domestic servants. Divide the residue into agricultural and non-agricultural workers and compare the number in each of these groups with the number working outside the district. Then there are three possible cases to be considered, and an example of each is given.

	Case 1. Wokingham (R.D.)	Case 2. Crediton (R.D.)	Case 3. Barnstaple (R.D.)
Total occupied	7925	4246	7926
Domestic servants	1564	455	1061
Total occupied (excluding domestic servants)	<u>6361</u>	<u>3791</u>	<u>6865</u>
Agricultural workers	2041	2421	3128
Non-agricultural workers	4320	1370	3737
Persons working outside the area	1871	310	1194

In Example 1, even supposing every one of the 1871 persons working outside the district was engaged in non-agricultural pursuits, the non-agriculturalists left behind would still exceed the agriculturalists. Districts of this type are therefore non-agricultural.

In Example 2, even if every one of the 310 persons working outside the district was engaged in agricultural pursuits, the number of agriculturalists left behind would still exceed the number of non-agriculturalists. Districts of this type are therefore agricultural.

In Example 3, the criterion partly breaks down since one does not know in what proportion agriculturalists are amongst those 1194 persons who go out of the district to work. If it were an urban district or a municipal borough one could suppose that the agriculturalists formed the larger part of the outgoing workers, but since it is a rural district one is more justified in assuming that the non-agriculturalists form the larger part of them. Therefore in districts of this type the real criterion is simply whether they are rural or urban. If the former, they are put into the agricultural group, and if the latter, into the non-agricultural group. Fortunately, their number is small.

In Table XIV B are set out the standardised death rates for the groups in the alternative sub-division of Group II.

Discussion and comparison of the death rates in the two classifications.

The group of seaside watering places have the lowest death rate. This low rate, however, may be partly due to an influx of holiday makers into these seaside towns at the time of the census, the date of which, in 1921, owing to a railway and transport strike was necessarily postponed from April to June. No previous reference to this fact has been made in this study, since only the holiday resorts would have been materially affected, the influx into these being

significant, whilst the outflow from other districts would have been relatively small. That the seaside towns were actually affected is clear from Appendix A of the Census Returns, where is shown the percentage excess of the enumerated over the estimated population in districts where the excess was more than 3 per cent. In Bournemouth, C.B., for example, the excess was 11.5 per cent., in Eastbourne, C.B., 13.6 per cent., in Ilfracombe, U.D., 25.8 per cent., in Worthing, M.B., 10.5 per cent. Unfortunately, no means of making allowance for this factor exists, since the excess at each age group is not given. It is clear, however, that the death rate of these groups is really higher than the figures show.

The group of London dormitories is the one which has the highest death rate, 10.55 per 1000. The number of districts in the group is really too small to draw deductions from, but four factors suggest themselves as possibly contributing to this high rate:

- (a) Density of population and absence of countryside atmosphere.
- (b) The effect of daily travel to and from place of work.
- (c) The effect of working continuously within the London area.
- (d) The proximity of the districts to London permits taking greater advantage of the opportunities provided for late evening amusements.

A comparison between the dormitories of London and those of other English—and foreign—towns would make an interesting study, but is outside the scope of this paper.

With regard to the remaining two groups, *i.e.* II (a) and II (b), it is noticed that the alternative sub-division of Group II gives results but little different from the original. In II (a), the second classification gives a very slightly higher death rate than the first, whilst the contrary movement is found in II (b).

One is perhaps at first surprised to find that the agricultural class of district has a higher death rate than the non-agricultural class, that the agricultural districts have not improved their death rate to the same extent as the non-agricultural districts. This is, however, analogous to the result obtained in Section II, where it was found that in 1920–5 the healthy districts did not improve their death rates to the same extent as England and Wales, and it was suggested that this was due to an extra effort at improvement on the part of certain backward districts of England and Wales. It is perhaps a corresponding effort on the part of the non-agricultural healthy districts in the same period which has given them the advantage over the agricultural districts.

V. SUMMARY AND CONCLUSIONS.

1. Farr's 63 healthy districts are, as a whole, representative of the *stationary* districts of England and Wales, *i.e.* those districts in which growth or decline of industry has, on the whole, been absent and in which mortality rates are consequently free from the influence of industrialisation, though not necessarily unaffected by urbanisation.

2. These healthy districts maintained, until 1901–10, the advantage they held over England and Wales as regards their relative death rates in 1851–60.

3. From 1851–60 to 1901–10 the death rate of the healthy districts remained roughly constant at 76 per cent. of the death rate of England and Wales. Both improved their total death rate to the extent of 30 per cent. of what it was in 1851–60, the rates for this decennium being—England and Wales 21·17, healthy districts 16·13 per 1000.

4. The population of the healthy districts has been unfavourably constituted for a low death rate throughout the period.

5. That the periods during which the most improvement was made in lowering the death rate—not only in the healthy districts, but in England and Wales as a whole—were 1881–90 and 1901–25.

6. By 1921–5 the position of the healthy districts had become a little less favourable, their death rate having risen from 76 to 86 per cent. of that of England and Wales. It is quite possible, however, that this is due, not so much to a falling-off in the rate of improvement in the healthy districts, as to an exceptional increased improvement in backward, very unhealthy districts.

7. For the following diseases, the healthy districts show improvement at faster rates, of varying degrees, than England and Wales as a whole, during the period 1851–1925. Measles, scarlet fever, whooping cough, diphtheria, pulmonary tuberculosis, and respiratory diseases.

On the other hand, the data relating to diarrhoea seems to indicate less improvement, though inherent deficiencies in the data make this a matter open to doubt.

The death rate from cancer, which has increased considerably in the whole country during the last forty years, appears to have increased at a slightly faster rate in the healthy districts.

But, as discussed in the report, the untrustworthiness of the data, relating to comparisons of individual disease death rates over long periods of time, make it essential to regard the points enumerated in conclusion 7 rather in the manner of interesting possibilities than as proven facts.

8. When the 141 administrative areas, which in 1920–5 corresponded to Dr Farr's original healthy districts, were classified as to whether the majority of their occupied persons worked in other districts or in their own district, the standardised death rates found were as follows:

I. Districts in which 50 per cent. of occupied persons work in other districts. Death rate = 10·55 per 1000.

II. Districts in which more than 50 per cent. of occupied persons work within the district. Death rate = 9·90 per 1000.

When the second of these classes is sub-divided according to whether 50–75 per cent. or over 75 per cent. of occupied persons work within the district, the death rates are:

(a) 50-75 per cent. of occupied persons working within the district. Death rate = 9.69 per 1000.

(b) 75-100 per cent. of occupied persons working within the district. Death rate = 10.14 per 1000.

When the same class is sub-divided according to whether the majority of workers are engaged in non-agricultural or agricultural pursuits, the death rates in each sub-class are:

(a) Mainly non-agricultural. Death rate = 9.85 per 1000.

(b) Mainly agricultural. Death rate = 9.98 per 1000.

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