VITAL STATISTICS OF THE COUNTY OF LONDON IN THE YEARS 1901 TO 1951

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The growth and development of London during the past 50 years has been influenced by three major factors. The first factor to operate, and one which still functions, is the continuous growth of London as a commercial centre and the consequent pressure exerted on living conditions by the creation of new offices, shops, warehouses, and factories, especially in the central areas. Secondly, the first world war brought about a social revolution, and perhaps one

of its most important consequences was the large increase in opportunities for female labour in office and factory. Thirdly, during the second world war, thousands of houses in London were destroyed, and a very severe housing shortage ensued. With the publication of the 1951 Census for London it is possible to see how these factors have influenced the vital statistical trends of the different London boroughs during the last half century.

POPULATION

At the beginning of the 20th century London had already overflowed its boundaries in the east and the north-east where other towns had become contiguous with London. Some boroughs were not completely built up and in the north-west and south some land was still used for agriculture and wild life still persisted. Since horse vehicles and steam trains were the only methods of transport, most members of the population were compelled to live fairly close to their places of employment. The development of electricity for traction in the first decade of the 20th century led to the electrification of some suburban train services, the district and metropolitan railways, and the construction of the underground system of "tubes". Further electrification and the introduction of the motor bus greatly facilitated travelling; the centre of London became more commercialized and surrounding country was engulfed for dormitories.

Table I shows the population enumerated at the last five censuses and the changes that have occurred in the distribution of the population during the past 50 years. The central cluster of boroughs (including the City, Finsbury, Holborn, St. Marylebone, Southwark, and Westminster) showed a continuous decline in population during the first 30 years and much house property was converted to commercial uses. On the other hand the outer boroughs, and

those incompletely built-up boroughs in 1901 (Fulham, Hammersmith, Hampstead, Lewisham, Wandsworth, and Woolwich) showed consistent rises. The changes in the distribution of population between 1931 and 1951, particularly the large falls in population in the adjacent boroughs of Bermondsey, Bethnal Green, Finsbury, Poplar, Shoreditch, Southwark, and Stepney, reflect the damage done during the war. In all these districts the 1951 population was approximately only half the 1931 level. Only in Hampstead, Lewisham, and Woolwich did the population of 1951 exceed that of 1931, and the gains here were very slight.

The best residential districts in 1901 were situated in Hampstead and Kensington, and the large number of female domestic staff employed accounts for the very low proportion (39 per cent.) of males in the population of these boroughs. Despite the disappearance of large domestic staffs, the great preponderance of women in these areas persisted until 1951. The occupational section of the 1951 Census is not yet published, but it is probable that the excess female population is due to women in personal service in the hotels and boarding houses to which the large private houses were converted in many instances. Similarly the excess of females in some other boroughs—Chelsea, Holborn, Paddington, and St. Marylebone—is probably due to the many hotels which are here situated. The City, Bermondsey,

TABLE I
POPULATIONS OF BOROUGHES

Borough	Populations (thousands)					Intercensus Variations (per cent.)				Percentage of Males in Population				
	1901	1911	1921	1931	1951	1901-11	1911-21	1921-31	1931-51	1901	1911	1921	1931	1951
City	27	20	14	11	5	-27.0	-30.3	-19.8	-51.6	51.4	51.3	49.0	50.7	49.7
Battersea ..	169	168	168	160	117	-0.7	-0.0	-4.9	-26.6	48.4	48.2	46.9	47.3	46.8
Bermondsey ..	131	126	119	112	61	-3.7	-5.1	-6.6	-45.6	49.8	50.0	48.8	49.2	49.2
Bethnal Green ..	130	128	117	108	58	-1.2	-8.5	-7.7	-46.1	48.9	48.9	48.4	48.3	47.3
Camberwell ..	259	261	267	251	179	0.8	2.2	-5.9	-28.5	47.4	47.5	47.0	47.2	47.1
Chelsea	74	66	64	59	51	-10.1	-4.0	-7.3	-13.7	44.4	42.9	40.5	40.6	41.6
Deptford	110	109	113	107	75	-0.8	2.8	-5.0	-29.4	48.6	48.4	48.1	48.3	47.1
Finsbury	101	88	76	70	35	-13.3	-13.6	-8.0	-49.4	49.2	48.5	47.6	48.1	47.8
Fulham	137	153	158	151	122	11.7	3.0	-4.4	-19.1	47.1	47.4	46.4	46.7	46.4
Greenwich	96	96	100	101	90	0.2	4.7	0.5	-11.0	49.7	49.2	48.6	49.1	48.7
Hackney	219	223	222	215	171	1.6	-0.2	-3.1	-20.4	46.1	46.3	45.9	46.3	47.2
Hammersmith ..	112	122	130	136	119	8.3	7.2	4.0	-11.9	47.0	47.8	48.0	48.0	47.9
Hampstead	82	85	86	89	95	4.3	0.8	3.2	7.0	38.7	38.4	38.6	39.3	41.8
Holborn	59	49	43	39	25	-16.9	-12.5	-10.0	-36.2	49.6	48.8	48.0	46.8	45.4
Islington	335	327	331	322	236	-2.3	1.0	-2.7	-26.8	47.6	47.6	46.8	47.2	47.2
Kensington	177	172	176	181	168	-2.4	2.1	2.7	-6.9	39.1	38.6	38.6	39.3	42.9
Lambeth	302	298	303	296	230	-1.3	1.6	-2.2	-22.3	47.3	47.7	46.7	47.2	47.6
Lewisham	127	161	174	220	228	26.1	8.3	26.3	3.5	44.5	45.3	45.4	46.3	46.9
Paddington	144	143	144	145	125	-1.0	1.2	0.5	-13.4	42.8	42.4	41.9	42.4	45.7
Poplar	169	162	163	155	74	-3.8	0.1	-4.6	-52.6	50.2	49.8	49.5	49.4	49.2
St. Marylebone ..	133	118	104	98	76	-11.4	-11.8	-6.3	-22.3	43.4	42.0	39.4	39.7	41.7
St. Pancras	235	218	211	198	138	-7.2	-3.2	-6.3	-30.2	48.6	48.9	47.1	47.6	47.8
Shoreditch	119	111	104	97	45	-6.1	-6.4	-6.9	-53.8	49.0	49.2	48.3	48.7	48.2
Southwark	206	192	184	172	97	-6.9	-3.9	-6.9	-43.4	50.1	49.8	48.6	49.3	48.7
Stepney	299	280	250	225	99	-6.3	-10.8	-9.8	-56.1	45.4	50.1	49.1	48.9	49.4
Stoke Newington ..	51	51	52	51	49	-1.1	3.0	1.9	-4.0	44.1	44.7	45.0	45.0	47.6
Wandsworth	232	311	328	353	330	34.3	5.4	7.5	-6.4	44.7	45.2	44.8	45.2	45.8
Westminster	183	160	142	130	99	-12.4	-11.7	-8.5	-23.6	46.4	45.8	43.4	43.6	46.4
Woolwich	117	121	140	147	148	3.6	15.7	4.6	0.7	52.3	50.5	49.6	49.8	48.9
London	4,536	4,522	4,485	4,397	3,348	-0.3	-0.8	-2.0	-23.9	47.2	47.0	46.2	46.5	46.8

TABLE II
DENSITY INDICES OF BOROUGHES

Borough	Percentage of the Population living more than 2 to a Room					Persons per Room			
	1901*	1911	1921	1931	1951	1911**	1921	1931	1951
City	10.9	12.3	6.6	5.6	0.8	1.06	0.98	0.91	0.77
Battersea	10.9	13.3	12.4	11.9	2.1	1.09	1.04	0.98	0.81
Bermondsey	19.7	23.4	23.2	21.8	2.7	1.37	1.34	1.25	0.93
Bethnal Green	29.6	33.2	27.8	23.6	2.8	1.56	1.46	1.35	0.92
Camberwell	9.6	13.5	12.8	10.4	1.6	1.08	1.04	0.96	0.80
Chelsea	14.4	14.9	13.7	10.2	1.9	1.04	0.85	0.79	0.75
Deptford	9.1	12.2	12.8	11.0	1.7	1.06	1.05	0.98	0.81
Finsbury	35.2	39.8	34.0	29.4	3.4	1.61	1.50	1.42	0.96
Fulham	10.9	14.6	13.1	10.5	2.7	1.09	1.05	0.97	0.84
Greenwich	8.3	12.1	13.8	11.1	1.9	1.05	1.01	0.94	0.83
Hackney	10.2	12.4	11.5	9.6	1.5	1.08	1.06	1.00	0.85
Hammersmith	11.8	14.2	13.8	10.2	3.9	1.05	1.04	1.01	0.90
Hampstead	6.4	7.1	6.5	4.1	2.7	0.86	0.71	0.70	0.80
Holborn	25.0	25.6	19.8	17.1	2.3	1.30	1.12	1.07	0.92
Islington	17.0	20.0	19.4	16.0	3.8	1.22	1.18	1.12	0.92
Kensington	14.8	17.1	16.7	12.6	4.6	1.04	0.81	0.80	0.82
Lambeth	12.2	13.6	12.7	10.6	2.1	1.05	1.02	0.97	0.83
Lewisham	2.7	3.9	4.7	4.1	1.4	0.83	0.80	0.81	0.77
Paddington	13.6	16.2	15.4	12.3	5.2	1.10	0.93	0.90	0.88
Poplar	16.4	20.6	21.2	20.1	3.5	1.33	1.31	1.25	0.93
St. Marylebone	21.1	20.7	17.9	13.1	2.2	1.14	0.88	0.81	0.76
St. Pancras	24.0	25.5	22.4	17.6	4.4	1.32	1.22	1.13	0.93
Shoreditch	30.0	36.6	32.0	29.1	3.5	1.61	1.54	1.45	0.98
Southwark	22.4	25.8	23.5	21.6	2.9	1.43	1.36	1.28	0.93
Stepney	33.2	34.9	29.0	23.6	3.4	1.56	1.45	1.33	0.94
Stoke Newington	5.5	8.8	8.1	6.6	1.7	0.95	0.92	0.90	0.86
Wandsworth	4.5	6.3	6.8	5.2	1.3	0.89	0.84	0.79	0.75
Westminster	13.0	12.9	10.1	7.1	2.3	1.06	0.81	0.76	0.76
Woolwich	6.6	6.3	7.8	5.7	1.3	0.98	0.97	0.88	0.73
London	16.0	17.8	16.1	13.1	2.5	1.14	1.05	0.98	0.83

* In this year the index is of persons living more than 2 to a room in *tenements of less than 5 rooms* as a percentage of the total population, and consequently the value is slightly lower than it would have been on the basis of subsequent years.

** For 1911 the rate was based on families living in 1-9 rooms and is therefore slightly more than a rate based on all private families as in the other years.

Bethnal Green, Greenwich, Poplar, Shoreditch, Southwark, Stepney, and Woolwich had high male ratios in each census year.

DENSITY

Two measures of density are given in Table II. The most striking feature is the very great decrease in overcrowding that was accomplished by 1951. Between 1911 and 1931 a small improvement had taken place in the overcrowding indices but no large changes occurred in the relative positions of the boroughs; the boroughs with the most overcrowding in 1911 still had the most in 1931. In 1951, in most boroughs, the proportion living more than two to a room had become only a fraction of the corresponding proportion in 1931. The lowest indices of overcrowding were recorded at each Census for the boroughs of Hampstead, Lewisham, Stoke Newington, Wandsworth, and Woolwich.

FOREIGN-BORN POPULATION

For the first 30 years of the 20th century the foreign-born population of London remained almost constant in proportion (some 3 per cent.). In 1951 the proportion rose to 5 per cent. and became more

widely dispersed through London (Table III, opposite).

Thus, early in the century, there were two distinct colonies. One was in the Soho district, partly in Holborn and partly in Westminster, and was mainly Italian, French, and German. The other was in Stepney and consisted mainly of persons born in Russia, or Russian Poland, who formed about 80 per cent. of the foreign-born population in Stepney. By 1951 the Russians and Poles had overflowed into the neighbouring boroughs and formed two-thirds of the large foreign-born population of Hackney. Political refugees from Poland and Germany formed a large proportion of the increase in the foreign-born population recorded at the 1951 Census. Thus, Germans and Poles form the largest groups of foreign-born persons in the adjacent boroughs of Hampstead, Kensington, Paddington, and St. Marylebone. In 1951 the absolute number of foreign-born persons in these areas taken together was four times the figure of 1901, and formed 34.5 per cent. of the total foreign-born population of London compared with 11.3 per cent. in 1901. In Hampstead in 1951 one person in six was of non-British birth.

TABLE III
NUMBER OF FOREIGN-BORN PERSONS ENUMERATED AT EACH CENSUS AND THEIR PERCENTAGE OF TOTAL POPULATION IN EACH AREA

Borough	1901		1911		1921		1931		1951	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
City	1,243	4.6	1,049	5.3	738	5.4	567	5.2	197	3.7
Battersea	952	0.6	1,129	0.7	1,291	0.8	1,214	0.8	2,689	2.3
Bermondsey	1,133	0.9	983	0.8	897	0.8	804	0.7	818	1.3
Bethnal Green	4,634	3.6	7,791	6.1	6,864	5.9	5,356	5.0	1,951	3.3
Camberwell	1,494	0.6	1,723	0.7	1,920	0.7	1,828	0.7	3,509	2.0
Chelsea	1,263	1.7	1,553	2.3	1,760	2.8	1,551	2.6	4,033	7.9
Deptford	742	0.7	577	0.5	588	0.5	620	0.6	1,083	1.4
Finsbury	2,467	2.4	2,442	2.8	1,966	2.6	1,564	2.2	1,124	3.2
Fulham	1,778	1.3	2,273	1.5	2,343	1.5	2,195	1.5	4,916	4.0
Greenwich	790	0.8	765	0.8	783	0.8	839	0.8	1,387	1.5
Hackney	3,201	1.5	4,788	2.2	8,273	3.7	10,291	4.8	12,639	7.4
Hammersmith	1,568	1.4	3,152	2.6	2,870	2.2	2,430	1.8	4,817	4.0
Hampstead	2,269	2.8	3,219	3.8	4,619	5.4	5,691	6.4	15,650	16.5
Holborn	5,706	9.6	5,223	10.6	4,652	10.4	3,521	9.1	2,094	8.4
Islington	4,300	1.3	5,076	1.6	5,120	1.5	5,050	1.6	7,502	3.2
Kensington	4,669	2.6	6,534	3.8	8,469	4.8	8,214	4.5	19,871	11.8
Lambeth	3,506	1.2	5,192	1.7	5,506	1.8	4,738	1.6	7,517	3.3
Lewisham	1,082	0.8	1,264	0.8	1,536	0.9	1,704	0.8	3,393	1.5
Paddington	2,822	2.0	4,523	3.2	5,344	3.7	5,298	3.7	12,741	10.2
Poplar	2,104	1.2	1,966	1.2	2,517	1.5	1,666	1.1	1,320	1.8
St. Marylebone	5,560	4.2	6,274	5.3	5,998	5.8	5,179	5.3	8,872	11.7
St. Pancras	8,156	3.5	10,476	4.8	9,066	4.3	7,267	3.7	7,899	5.7
Shoreditch	2,625	2.2	2,018	1.8	1,745	1.7	1,556	1.6	847	1.9
Southwark	1,593	0.8	1,766	0.9	1,744	0.9	1,352	0.8	1,751	1.8
Stepney	54,310	18.2	53,060	19.0	41,017	16.4	30,083	13.4	8,503	8.6
Stoke Newington	1,073	2.1	1,563	3.1	2,061	4.0	2,712	5.3	3,883	7.9
Wandsworth	2,065	0.9	3,090	1.0	4,261	1.3	9,455	2.7	13,567	4.1
Westminster	11,831	6.5	13,047	8.1	12,318	8.7	9,229	7.1	9,401	9.5
Woolwich	441	0.4	612	0.5	816	0.6	902	0.6	1,811	1.2
London	135,377	3.0	153,128	3.4	147,082	3.3	132,876	3.0	165,785	5.0

TABLE IIIA
FOREIGN-BORN RESIDENTS BY NATIONALITY

Country of Origin	Percentage of all Foreign-born in London				
	1901	1911	1921	1931	1951
Russia	39.5	41.2	23.8	15.4	11.7
Poland	20.3	17.8	21.1	22.5	23.9
Germany	8.3	9.0	6.2	7.4	13.2
France	8.0	7.6	9.7	7.9	5.9
Italy	4.6	5.3	8.0	8.1	7.0
Austria	19.3	19.1	1.1	1.5	7.0
Others	19.3	19.1	30.1	37.2	31.3
Total	100	100	100	100	100

DEATH RATES

Before the adoption in 1911 of the method of transference of deaths to place of usual residence, the death rates in the London boroughs were affected by the number of hospitals and institutions within their boundaries, deaths occurring in such institutions being credited to the borough in which the institution was situated. The study of mortality has therefore been limited to the years 1911 onwards. Some method of standardization is necessary for comparing the London boroughs owing to the varying sex and age constitutions of the populations. For this purpose the direct method of standardization has been used, with the census population of London in 1931 as the standard population. The standardized death rates calculated on this basis are shown in Table IV, which shows that considerable

variation in the death rate between London boroughs was present in each period. The range between the boroughs decreased slightly, however; the ratio of the highest to the lowest was 1.8 in 1911-13 and 1.4 in 1950-52. The boroughs of Hampstead, Lewisham,

TABLE IV
STANDARDIZED DEATH RATES

Borough	1911-13	1920-22	1930-32	1950-52
City	19.45	15.42	13.10	8.05
Battersea	15.29	13.56	11.53	8.56
Bermondsey	20.31	16.84	14.04	9.68
Bethnal Green	18.86	16.39	13.18	9.69
Camberwell	15.11	13.57	11.45	8.97
Chelsea	14.25	12.09	11.35	8.63
Deptford	16.89	14.21	12.04	9.11
Finsbury	21.90	17.61	14.51	9.77
Fulham	16.20	13.09	11.80	8.69
Greenwich	14.92	13.46	11.17	8.60
Hackney	14.85	13.47	11.70	8.90
Hammersmith	15.78	13.65	12.32	9.05
Hampstead	12.35	11.32	10.68	7.80
Holborn	17.71	15.55	13.50	8.86
Islington	16.03	14.27	12.37	9.07
Kensington	14.97	13.58	12.50	8.49
Lambeth	15.51	13.72	11.99	9.05
Lewisham	12.09	11.14	9.93	8.08
Paddington	14.47	12.92	12.61	8.92
Poplar	18.26	15.21	12.74	9.78
St. Marylebone	16.29	14.27	12.36	8.67
St. Pancras	16.82	14.77	12.78	9.12
Shoreditch	19.51	16.33	13.22	9.69
Southwark	18.87	16.41	13.99	10.10
Stepney	13.98	16.53	14.35	10.65
Stoke Newington	12.57	13.42	11.92	9.16
Wandsworth	12.57	11.49	10.27	8.08
Westminster	15.72	13.47	12.12	8.34
Woolwich	14.78	12.42	11.53	8.44
London	15.98	13.91	12.05	8.77

and Wandsworth had the lowest death rates throughout the 40 years, and the boroughs of Bermondsey, Bethnal Green, Finsbury, Shoreditch, Southwark, and Stepney the highest. As is well known, the fall in the death rate has been largely due to the fall in infant and child mortality. This can be illustrated by considering the death rates for the first and last period for London as a whole (Table V):

TABLE V
ADMINISTRATIVE COUNTY OF LONDON
DEATH RATES PER 1,000

Age (yrs)	1911-13		1950-52	
	Males	Females	Males	Females
0-	43.0	36.3	6.4	4.9
5-	2.7	2.6	0.6	0.4
15-	3.2	2.5	0.9	0.6
25-	7.3	5.1	2.2	1.7
45-	24.6	17.2	16.4	8.5
65-	68.2	51.5	61.5	32.5
75+	158.6	135.8	152.7	115.3

It will be noted that between the ages of 45 and 74 the female death rate has decreased faster than the male rate. The death rate for most causes of death in these two age groups show a female advantage. For three large and important groups of causes the rates in 1951 were as shown in Table VI.

TABLE VI
DEATH RATES FOR CERTAIN CAUSES
FOR AGES 45 AND OVER

Cause of Death		Cancer	Heart Diseases	Bronchitis
Age 45-64	Males	4.3	4.4	1.9
	Females	2.7	1.8	0.4
Age 65-74	Males	13.5	20.4	8.4
	Females	6.6	11.1	2.5

Since the overcrowding indices had been so drastically reduced by 1951 it seems of interest to see whether, as in the past, the indices of living conditions are correlated with the death rate. Excluding the City of London from the calculations, the correlation coefficients between the socio-economic conditions of the boroughs and their standardized deaths rates are as follows:

Correlations		1911-13 <i>r</i>	1920-22 <i>r</i>	1930-32 <i>r</i>	1950-52 <i>r</i>
Standardized Death Rate and	Percentage living more than two to a room ..	0.889	0.922	0.874	0.364
	Persons per Room ..	0.930	0.906	0.799	0.800
	Proportion of population in Social Classes IV and V ..	—	0.694	0.625	0.900

5 per cent level of significance $r = 0.36$, 1 per cent. level $r = 0.46$.

The death rate was highly correlated with the percentage of persons living more than two to a room in the first three periods, but the coefficient had only just reached the 5 per cent. level of significance in 1950-52. On the other hand the death rate and persons per room was the same for the last two triennia and only slightly below the earlier figures. The correlation between the death rate and the proportion of the male population in Social Classes IV and V was significant for each of the three triennia for which this index was available and significantly larger in 1950-52 than in the earlier periods.

BIRTH RATE

Heron (1906), from a study of the data relating to the London Boroughs, found a negative correlation between fertility and social status. Some of the indices used were approximate, but Mitra (1937) extended the analysis to include data for the 1931 census, with its more accurate index of social conditions, and substantially confirmed Heron's conclusions. The crude birth rate is influenced by the sex and age constitution of the population, and for this reason the legitimate births per 1,000 married women aged 15-44 have been used in the present study (Table VII).

TABLE VII
LEGITIMATE BIRTHS PER 1,000 MARRIED WOMEN AGED 15-44

Borough	1911-13	1920-22	1930-32	1950-52
City	103	107	66	68
Battersea	193	183	121	99
Bermondsey	250	242	149	116
Bethnal Green	250	228	142	108
Camberwell	201	190	118	101
Chelsea	172	168	117	113
Deptford	209	190	123	105
Finsbury	236	232	145	124
Fulham	193	168	110	90
Greenwich	209	188	122	100
Hackney	198	185	117	94
Hammersmith	185	168	111	101
Hampstead	142	138	93	102
Holborn	146	134	79	95
Islington	195	189	125	104
Kensington	180	169	117	114
Lambeth	184	174	114	101
Lewisham	166	157	101	96
Paddington	176	157	107	106
Poplar	255	238	151	111
St. Marylebone	164	146	99	92
St. Pancras	193	179	115	105
Shoreditch	257	250	156	120
Southwark	229	215	135	112
Stepney	245	221	156	126
Stoke Newington	178	163	111	102
Wandsworth	168	151	98	92
Westminster	134	122	85	98
Woolwich	176	170	108	100
London	198	183	119	102

The highest birth rates were in the East End boroughs throughout the period, while the lowest were those of Hampstead, Holborn, and Westminster in the first three triennia, and of Fulham, St.

Marylebone, and Wandsworth in 1950-52. A comparison of Table VII with Tables II and III suggests that the birth rate, like the death rate, is correlated with the density indices. The correlations are:

Correlations		1911-13	1920-22	1930-32	1950-52
Legitimate Birth Rate and	Standardized Death Rate	0.748	0.741	0.588	0.718
	Percentage living more than Two to a Room ..	0.666	0.750	0.777	0.491
	Persons per Room ..	0.768	0.876	0.825	0.601
	Proportion of population in Social Classes IV and V ..	—	0.811	0.776	0.670

All the correlations are significant. The indices of density in 1950-52 were not so highly correlated with the birth rate as in former years, and the correlation between birth rate and the proportion in the lowest social classes of the population has also decreased since 1920-22, though the difference between 0.811 and 0.670 is not significant.

INFANT MORTALITY

Hersch (1943) chose infant mortality as the best single numerical index of the degree of civilization of a population. He considered that a decrease in this rate reflected the advances made in hygiene, medicine, chemistry, and public instruction, and that it was the best sign of improved living conditions. When Hersch was writing infant mortality in Europe ranged from 37 in the Netherlands to 180 in Rumania, and even higher rates occurred in Eastern countries.

In England and Wales infant mortality has been used in the past as an index of the socio-economic level of the community, since the highest rates were found to occur where living conditions were worst, and infant mortality varied directly with social class. McKinlay (1928) attempted to standardize for varying social conditions in the London boroughs, but found that such standardization for economic status did not reduce the variability between the boroughs by as much as seemed *a priori* probable. Stocks (1928), using the occupations of the males from the census returns, attempted to find a correction factor which would reflect the social make-up of the London boroughs. This correction, however, only reduced the variability between the infant mortality rates of the London boroughs from 17 to 14 per cent. in 1911-13, and from 15 to 13 per cent. in 1921-25. The findings of McKinlay and Stocks

are in agreement, and clearly the economic factor, as measured by their indices, was not very important in determining the level of infant mortality in the various boroughs. During the past 25 years the effect of many variables has been studied: *e.g.* indices of density, proportion of mothers employed, fertility rate, and proportion of males in the professional classes and in the lowest type of labour, etc. These investigations have shown that infant mortality was affected by socio-economic conditions, but since the variables used were themselves inter-related it has not been possible to assess the relative importance of their contributions. In recent years infant mortality has fallen rapidly. In England and Wales the rate was 154 deaths per 1,000 live births in 1900, by 1922, this had been halved, and in 1930 the rate was down to 60. Between 1930 and 1941 the rate fluctuated between 51 and 66, but since 1941 when it was 60 it has fallen steadily to 25.5 in 1954.

In 1950-52 the infant mortality rate for London (24) was below the rate for the whole country (29), and much below the rates for the county boroughs of Durham (40), Lancashire (36), Staffordshire (34), and Yorkshire West Riding (31). Not only was the infant mortality lower in London than in the large industrial towns of the north but the range was smaller; thus the rates in 1950-52 ranged from 19 to 31 in the 28 London boroughs, from 29 to 47 in the seventeen county boroughs of Lancashire, and from 23 to 38 in the eleven county boroughs of Yorkshire West Riding. The low level and relatively small range of infant mortality make the London boroughs unrepresentative of urban areas in general. Use of the 1931 census data showed that, although the infant mortality by social class in London showed the same progression as in the whole of the country, the usual indices of social structure in urban areas were less highly correlated with infant mortality than formerly. It was reasonable to suppose that these correlations would have declined still further during recent years, although the social class differential would still exist. No data, however, existed to test this hypothesis until the publication of the 1951 census for London. The occupational supplement is not yet published and it is not possible to display the infant mortality by social class, but there is no reason to suppose that the relative differences between the social classes has undergone much change. A triennial period centred in the census year was used for the appropriate rates shown in Table VIII, overleaf.

For the County of London as a whole, infant mortality in 1950-52 (24 per 1,000) was less than one-

TABLE VIII
INFANT MORTALITY

Borough	1911-13	1920-22	1930-32	1950-52
City	95	80	58	52
Battersea	107	75	57	24
Bermondsey	134	93	59	21
Bethnal Green	122	95	72	27
Camberwell	100	74	58	25
Chelsea	91	67	45	23
Deptford	117	80	60	28
Finsbury	137	83	73	19
Fullham	105	76	61	26
Greenwich	102	68	65	21
Hackney	100	73	55	24
Hammersmith	114	75	66	20
Hampstead	72	57	58	23
Holborn	101	73	78	31
Islington	107	77	67	27
Kensington	112	91	81	27
Lambeth	104	74	57	26
Lewisham	84	59	49	24
Paddington	109	80	91	28
Poplar	126	81	65	27
St. Marylebone	97	69	72	22
St. Pancras	98	75	66	27
Shoreditch	150	102	73	25
Southwark	122	85	63	22
Stepney	121	86	71	22
Stoke Newington	85	67	54	23
Wandsworth	96	64	60	22
Westminster	95	70	67	28
Woolwich	84	62	54	24
London	109	75	64	24

quarter of the rate in 1911-13 (109 per 1,000). The largest falls occurred in boroughs where the rate was previously very high, the ratio of the lowest to the highest infant mortality being 2.1 in 1911-13 and 1.6 in 1950-52. The correlations with social indices exhibited by the standardized death rates and the legitimate birth rates are not apparent in these infant mortality rates. The correlations are:

Correlations		1911-13 <i>r</i>	1920-22 <i>r</i>	1930-32 <i>r</i>	1950-52 <i>r</i>
Infant Mortality and	Percentage Occupied Males in Social Classes IV and V ..	—	0.649	0.132	-0.072
	Persons per Room ..	0.823	0.767	0.300	0.020
	Percentage living more than Two to a Room	0.782	0.812	0.478	0.184

Infant mortality showed a large positive correlation with each of the three indices of social status up to 1920-22. In 1930-32 it has almost ceased to be affected by the measures of social conditions, and only the percentage living more than two to a room was significantly correlated with the rate. In 1950-52 no significant correlation was present.

The general death rate, crude or standardized, has been frequently used as a broad measure of the health of the people, and recently the birth rate has given an indirect measure of the conditions of living

since it has shown a steep gradation with social class. The correlations of infant mortality with these rates for the last four census periods are:

Correlations		1911-13 <i>r</i>	1920-22 <i>r</i>	1930-32 <i>r</i>	1950-52 <i>r</i>
Infant Mortality and	Crude Death Rate ..	0.879	0.785	0.523	-0.275
	Crude Birth Rate ..	0.812	0.702	0.043	-0.275
	Standardized Death Rate	0.853	0.794	0.553	-0.126
	Legitimate Birth Rate for Women aged 15-44 yrs	0.836	0.754	0.089	-0.225

In 1911-13, the correlations were all of the same order, being large and positive. In 1920-22, they were slightly smaller, but still large and significant and approximately equal. In 1930-32, the infant mortality was no longer correlated with the measures of the birth rate; the correlation with the measures of mortality had fallen considerably but was still significant. In 1950-52, no significant correlation existed at all.

From the preceding correlations it might be inferred that infant mortality has now fallen to such a low level that it is no longer any criterion of the social or economic differences between the London boroughs. While this is so for the death rate for the whole of the first year of life, it must be realized that the neonatal mortality is now affecting the correlation more than in former years, since the deaths in the first month of life form a much larger proportion of the infant deaths than formerly. The percentage of deaths at various ages in the first year of life in London, for the period reviewed, are shown in Table IX:

TABLE IX
DEATHS IN THE FIRST YEAR OF LIFE

Age (mths)	1911-13	1920-22	1930-32	1950-52
Under 1	31.7	37.6	39.2	67.4
1-3	19.1	18.8	17.1	13.3
3-6	19.4	18.1	18.4	10.4
6-12	29.8	25.5	25.3	8.9
Total	100	100	100	100

The very different structure of infant mortality in 1950-52 suggested that it would be of interest to examine the relation of infant mortality and socio-economic indices by ages:

Age (mths)	Years	Proportion of Population in Social Classes IV and V <i>r</i>	Persons per Room <i>r</i>	Percentage living more than two to a Room <i>r</i>
Under 1	1920-22	0.177	0.226	0.350
	1930-32	-0.295	-0.184	-0.187
	1950-52	-0.430	-0.389	-0.118
1-3	1920-22	0.499	0.618	0.632
	1930-32	-0.155	0.027	0.116
	1950-52	0.273	0.319	0.322
3-6	1920-22	0.541	0.698	0.691
	1930-32	0.113	0.242	0.476
	1950-52	0.387	0.430	0.328
6-12	1920-22	0.714	0.786	0.802
	1930-32	0.521	0.622	0.749
	1950-52	0.428	0.288	0.248
1-12	1920-22	0.667	0.778	0.788
	1930-32	0.273	0.428	0.620
	1950-52	0.496	0.484	0.414

In the first two triennia the correlations between neonatal mortality and the indices of socio-economic conditions were not significant, but in 1950-52 the percentage of the population in Social Classes IV and V and the number of persons per room showed a significant negative correlation. During the period the fall in the birth rate, from 198 legitimate births per 1,000 married women aged 15-44 in 1911-13 to 102 in 1950-52 for the whole of London, may account for this negative correlation by increasing the relative importance of the first births. Heady, Daly, and Morris (1955) showed that, for mothers aged 25 years and over, neonatal mortality is highest among first-born children and increases with age of mother. It has been shown that the birth rate is correlated with the three indices of general living conditions, *i.e.* the lower the social index the higher the birth rate, and it is known that the age of marriage decreases with social class. In 1920-22, the infant mortality at all later ages, 1-3 months, 3-6 months, 6-12 months, and 1-12 months, was significantly correlated with the three indices of environmental conditions. In 1930-32, the correlations at 1-3 months were all insignificant, at 3-6 months one was significant (the percentage of the population living more than two to a room), and at 6-12 months all three were significant. For the post-neonatal period as a whole (1-12 months), the correlation between infant mortality and the percentage in Social Classes IV and V was insignificant, but the other two correlations were significant. In 1950-52, the infant mortality at 1-3 months was not correlated with any of the indices, at 3-6 months it was significantly correlated with the percentage in Social Classes IV and V and the number of persons per room but not with the other index of overcrowding, while at 6-12 months only the percentage in Social Classes IV and V gave

a significant figure. For the post-neonatal period, all three indices were significantly correlated with infant mortality.

This sub-division of infant mortality by ages shows, as expected, that the trend of the neonatal mortality is at least partially responsible for the lack of correlation in 1950-52 between infant mortality and socio-economic conditions. The post-neonatal rate remains significantly correlated with the three indices, though probably at a lower level than in 1920-22 (the differences between the two periods are not significant, except the percentage living more than two to a room).

The relationship between the social indices and infant mortality may rest partly on the population of the boroughs. Most boroughs conform to the official description of a large town having a population of over 50,000; they were divided arbitrarily into three groups* and the correlations found between the percentage living more than two to a room and infant mortality and neonatal mortality:

Population	No. of Boroughs	Percentage living more than two to a Room (1951) correlated with			
		Neonatal Mortality		Infant Mortality	
		<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
120,000 and Over	11	0.47	>0.1	0.89	<0.01
Over 60,000 and Under 120,000	11	-0.12	>0.1	-0.32	>0.1
Under 60,000 ..	6	-0.72	>0.1	-0.19	>0.1

In all three groups the neonatal mortality is insignificantly correlated with the overcrowding index. Infant mortality is significantly correlated with this index in the very large boroughs but not in the other two groups of smaller boroughs. No explanation suggests itself to account for this difference. The infant deaths were rather few in the third group of boroughs (27 and 37 in 1950-52 in the two smallest), but in the second group the smallest borough had 69 deaths. Paucity of deaths cannot be an explanation.

It is of some interest to see whether the relationship between the various indices of socio-economic status have changed during the period:

Correlations		1920-22 <i>r</i>	1930-32 <i>r</i>	1950-52 <i>r</i>
Percentage Occupied Males in Social Classes IV and V and	Persons per Room	0.744	0.739	0.757
	Percentage living more than two to a Room ..	0.658	0.722	0.314
Percentage living more than two to a Room and Persons per Room ..		0.899	0.934	0.617

* The City of London has been omitted from all the correlations in this paper since it has a very small and unusually constituted population.

The large significant correlation between the proportion of occupied males in Social Classes IV and V and the number of persons per room has remained constant over the 30 years. The relationship between the proportion of occupied males in Social Classes IV and V and the percentage living more than two to a room had fallen below the level of significance in 1950-52 although a large significant correlation was found in the other two periods. The correlation between the two indices of density, which was very large in the two earlier triennia, fell significantly in 1950-52 but was itself still significant. The decline in the size of the correlation coefficients with the percentage living more than two to a room is directly attributable to conditions arising from the second world war. The destruction of so many houses led to an acute shortage and the opportunity was taken in the rebuilding programme to re-house Londoners outside the county boundaries. The result of this policy is that the population of London was one million less in 1951 than in 1931 (Table I), a decline of 23.9 per cent. at all ages, and of 30.9 per cent. at ages 0-15 years. The magnitude of the change is shown by the densities for the whole:

Overcrowding Index	1911	1921	1931	1951
Percentage living more than Two to a Room	17.8	16.1	13.1	2.5
Average Persons per Room ..	1.14	1.05	0.98	0.83

SUMMARY

Between 1901 and 1931 the population of the County of London was approximately stationary. Between 1931 and 1951 it fell by over a million, and in seven of the 28 boroughs the population in 1951 was only about half that in 1931. The result of these changes was a great reduction in the proportion of persons living in overcrowded conditions. From 1901 to 1931 the proportion of the population living more than two persons to a room was between 1 in 6 and 1 in 8; by 1951 it had fallen to 1 in 40.

From 1901 to 1931 about 3 per cent. of the population of London was foreign-born; in 1951 the figure was 5 per cent. for the County, and over 10 per cent. in four boroughs: Hampstead (16 per cent.), Kensington (12 per cent.), Paddington (10 per cent.), and St. Marylebone (12 per cent.).

The downward trend of the death rate during the 20th century has been remarkably similar in the London boroughs, so that the boroughs with the highest and lowest rates in 1911-13 were in the same relative position in 1950-52. The fall, has, however,

been larger in the boroughs where the rate previously was highest so that the actual and relative range of the death rates between London boroughs in 1950-52 was somewhat smaller than in 1911-13. The general death rate (standardized) is still significantly correlated with the indices of socio-economic status (persons per room, and percentage in Social Classes IV and V).

The birth rate followed a trend similar to that of the death rate, and, generally, the relative level of the birth rate of a borough, high or low, has remained the same throughout the period. With the exception of the percentage of the population living more than two to a room, the correlations between the birth rate and the socio-economic indices have changed very little.

The very large fall in infant mortality in the London boroughs has been relatively greater in those boroughs where the initial level was highest. In 1911-13 and 1920-22, infant mortality was significantly correlated with the percentage of occupied males in Social Classes IV and V and with the two measures of overcrowding. In 1930-32 the correlations between infant mortality and overcrowding were reduced but still significant, while the percentage of occupied males in Social Classes IV and V was not significantly correlated with infant mortality. In 1950-52 the correlations between infant mortality and the three indices were not significant. The lack of correlation in 1950-52 was partly due to the increasing contribution made by neonatal mortality, and partly to the fact that the relationship is no longer demonstrable in the smaller boroughs although it still exists in the largest boroughs. If the neonatal component is excluded, the correlation of infant mortality for the first year of life is significant in 1950-52 for each of the three socio-economic indices. The successful efforts to reduce overcrowding have lessened the sensitivity of this index of socio-economic conditions. In 1911 the percentage of persons living more than two to a room ranged from 3.9 to 39.8 in the London boroughs, while in 1951 the range was only from 1.3 to 4.6; thus this index of overcrowding was no longer a measure of either the vital-statistical or socio-economic differences between the London boroughs in 1950-52.

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