CHAPTER XXV.

VITAL STATISTICS.

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§ 1. Births.

1. Male and Female Births, 1918 to 1922.—The total number of male and female births registered in Australia during the years 1918 to 1922 is shown in the two tables hereunder :—

	Year.	N.S.W.	Vie.	Q'land.	8. Aust.	W. Aust	Tas.	North. Ter.	Fed. Cap. Ter.	Aus- tralia.
1918		26.002	16.172	10.080	5.787	3.615	2.717	59	26	64.458
1919		24.924	16.225	9.746	5.776	3,477	2,718	55	10	62,931
1920		27,691	18,647	10,537	6,178	4,256	2,908	31	8	70,256
1921		28,005	18,288	10,638	6,122	3,988	2,944	39	15	70,039
	Single births	27,650	18,318	10,081	6,027	4,074	2,942	38	17	69,147
1000	Twins	562	413	182	120	89	53			1,419
19224	Triplets	6	7	• • •	3			1		16
	Total births	28,218	18,738	10,263	6,150	4,163	2,995	38	17	70,582

MALE BIRTHS, 1918 TO 1922.

FEMALE BIRTHS, 1918 TO 1922.

	Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust	Tas.	North. Ter.	Fed. Cap. Ter.	Aus- tralia.
1918 1919 1920 1921 1922	Single births Twins Triplets Total births	$24,707 \\ 23,608 \\ 26,251 \\ 26,631 \\ 26,385 \\ 564 \\ 3 \\ 26,952$	$15,425 \\ 15,394 \\ 17,566 \\ 17,303 \\ 17,156 \\ 378 \\ 16 \\ 17,550 \\ 17,550 \\ 15,150 \\$	9,456 8,953 9,719 9,691 .9,533 191 9,724	5,570 5,284 5,850 5,852 5,725 126 5,851	3,491 3,460 3,893 3,819 3,859 109 3,968	2,563 2,592 2,832 2,811 2,762 60 2,822	$ \begin{array}{c} 46 \\ 51 \\ 32 \\ 40 \\ 32 \\ \\ \\ \\ \\ 32 \\ \\ \\ \\ 32 \\ \end{array} $	$23 \\ 17 \\ 7 \\ 12 \\ 13 \\ 2 \\ \\ 15$	61,281 59,359 66,150 66,159 65,465 1,430 19 66,914

2. Total Births, 1918 to 1922.—The total number of births, viz., 137,496, was higher than for any other year, with the exception of 1914, when 137,983 births were registered; but the birth rate per 1,000 persons, viz., 24.69, was the second lowest on record, the lowest being 23.53 in 1919.

	Year.	N.8.W.	Vic,	Q'land.	S. Aust.	W. Aust	Tas.	North. Ter.	Fed. Cap. Ter.	Aus- tralia.
1918 1919	·· ··	50,709 48,532	31,597 31,619	19,536 18,699	11,357 11,060	7,106 6,937	5,280 5,310	$\begin{array}{c} 105\\ 106 \end{array}$	49 27	125,739 122,290
1920		53,942	36,213	20,256	12,028	8,149	5,740	63 50	15	136,406
1921		54,636	35,591	20,329	11,974	7,807	5,755	79	27	130,198
1099	Twins	54,035 1,126	(b) 791	(a) 373	246	(c)198	(a)113		$\frac{30}{2}$	2,849
19424	Triplets	9	(a) 23	10.007	3					35
	(Total births	55,170	36,288	19,987	12,001	8,131	5,817	70	32	137,496

TOTAL BIRTHS, 1918 TO 1922.

(a) One stillborn not included. (b) Three stillborn twins not included. (c) Ten stillborn twins not included.

3. Birth Rates, 1918 to 1922.—(i) Crude Birth Rate. Owing, doubtless, to the effects of the war, the crude rates throughout the States are uniformly low. There was a slight increase in 1920, but it was not maintained in the two years following, and the rate for Australia is considerably under that of pre-war years, the figures for 1922 being 11.5 per cent. below that for 1914. The rates in the Territories show considerable fluctuation, but the numbers concerned are too small to allow of any satisfactory deductions therefrom.

	Year.		N.S.W.	Vic.	Q'land.	S. Aust.	W.A.	Tas.	North. Ter.	Federal Capital Territory.	Aus- tralia.
1918			26.12	22.19	27.95	25.15	23.08	26.63	21.56	20.19	25.00
1919			24.28	21.46	25.80	23.61	21.71	25.90	22.77	11.68	23.53
1920			26.10	23.95	27.10	24.71	24.73	27.28	14.95	6.90	25.45
1921			25.93	23.16	26.64	24.08	23.39	26.98	20.22	10.87	24.95
1922			25.67	23.10	25.58	23.71	23.92	27.08	19.16	11.37	24.69
Densit squa	y (b) (No. re mile)	per 	7.02	18.10	1.18	1.35	0.35	8.35	0.007	2.72	1.89

CRUDE BIRTH RATE(a), 1918 TO 1922.

(a) Number of births per 1,000 of the mean annual population. (b) On 31st December, 1922.

The density of population for each State and for Australia as a whole is given in the table for the purpose of showing the influence, if any, of concentration of population on birth rate, in connexion with the disparities noticeable.

(ii) Birth Rates at Child-bearing Ages. The figures just given represent the "crude birth rate," *i.e.*, the number of births per thousand of mean annual population. The number of births per thousand of the female population of child-bearing ages, *i.e.*, from 15 to 45, furnishes, however, a more significant rate. This calculation has been made for the four last Census periods for which the information is available, and covers in each case the Census year, together with the year immediately preceding and the year immediately following. The following results have been obtained:—Total births per 1,000 women (married and unmarried) of ages 15 to 45:—Years 1880-82, 169.69; years 1890-92, 158.81; years 1900-02, 117.26; years 1910-12, 117.22. Nuptial births per 1,000 married women of ages 15 to 45:—Years 1880-82, 320.96; years 1890-92, 332.03; years 1900-02, 235.84; years 1910-12, 236.06.

4. Birth Rates of Various Countries.—(i) Crude Rates. A comparison with other countries shows that the Australian States occupy a rather low position, which is however, fortunately counterbalanced by a still lower position in regard to their death

rates, as will be seen from the table hereinafter in the section dealing with "Deaths." It will be noticed that, owing to the difficulty of procuring statistics in regard to the belligerent countries in the late war, a few of the rates quoted for continental countries are for rather remote years. Consequently it is not suggested that the comparison instituted in the attached table is exact. This does not however affect the fact that Australia takes a comparatively low position amongst the countries of the world as regards crude birth rate.

Country.	Year.	Rate.	Country.	Year.	Rate.
Russia, European	1909	44.0	Denmark	1920	25.4
Rumania	1914	42.5	Australia	1922	24.7
Cevlon	1921	40.8	Norway	1921	24.5
Bulgaria	1911	40.2	Western Australia	1922	24.0
Chile	1921	39.2	South Australia	1922	23.7
Serbia	1912	38.0	United States (b)	1920	23.7
Japan	1921	35.1	Scotland	1922	23.5
Jamaica	1921	35.0	New Zealand	1922	23.2
Spain	1921	30.4	Victoria	1922	23.1
Union of South Afr	ica		United Kingdom	1921	22.5
(whites)	1921	28.4	Austria	1920	22.4
Netherlands	1921	27.4	Belgium	1920	21.5
Tasmania	1922	27.1	Sweden	1921	21.4
Hungary	1920	26.9	France	1920	21.3
Canada (excluding Qu	1e-		Italy	1919	21.2
bec)	1921	26.3	Switzerland	1921	20.8
Prussia		25.9	England and Wales.	1922	20.6
Germany °	1920	25.9	Finland	1919	19.2
New South Wales	1922	25.7	Irish Free State	1922	18.6
Queensland	1922	25.5			

CRUDE BIRTH RATES(a) .-- VARIOUS COUNTRIES.

(a) Number of births per 1.000 of the mean population. (b) Figures for "provisional birth-registration area," which includes about 60 per cent. of the population.

(ii) Nuptial Birth Rates at Child-bearing Ages. The wide discrepancies among the crude birth rates of the various countries are, to some extent, due to differences in sex and age constitution and in conjugal condition. If the birth rates be calculated per 1,000 women of child-bearing ages, the comparison gives more reliable results. The following table of the nuptial births per 1,000 married women of ages 15 to 45 in a number of countries has been taken from the Annuaire International de Statistique, and shows that nuptial births per 1,000 married women, aged 15 to 45 years, varied from 280 in Bulgaria to a minimum of 114 in France, Australia with a rate of 198 being midway between maximum and minimum.

NUPTIAL	BIRTH-RATES	PER 1,000 M	ARRIED	WOMEN, A	GED 15	TO 45 \	YEARS.—
		VARIOUS	COUNTR	RIES.			

Country.		Period. Rate. Country.			Period.	Rate.	
Bulgaria Ireland Netherlands Finland Italy Norway Austria Spain Prussia Scotland	· · · · · · · · · · ·	· · · · · · · · · · · · ·	1910-11 1909-12 1905-14 1906-15 1907-14 1907-14 1908-13 1906-15	280 250 233 230 226 224 219 218 204 202	Australia Hungary Germany Sweden Denmark New Zealand Switzerland England and Wales. Belgium France	1906-15 1906-15 1907-14 1908-13 1906-15 1906-15 1906-15 1906-15 1908-13 1910-11	198 198 196 196 191 188 184 171 161 114

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· BIRTHS.

5. Masculinity of Births.—(i) General. The masculinity of births, *i.e.*, the excess of males over females per 100 births registered, during the last five years varied from 0.25 in Western Australia in 1919 to 4.66 in Queensland in 1921. On account of the smallness of the numbers, the returns from the Northern Territory and the Federal Capital Territory have not been taken into consideration. The following table, which gives the values for the States and Australia for 1918 to 1922, shows that for Australia there was a steady increase of masculinity from 1918 to 1920, followed by decreases in 1921 and 1922.

Year.	N.S.W.	Vict.	Q'land.	S. Aust.	W. Aust.	Tas.	Northern Territory.	Federal Capital Territory.	Australia.
1918 1919 1920 1921 1922	$2.55 \\ 2.71 \\ 2.67 \\ 2.51 \\ 2.29$	$2.36 \\ 2.63 \\ 2.99 \\ 2.77 \\ 3.27$	$3.19 \\ 4.24 \\ 4.04 \\ 4.66 \\ 2.70$	$1.91 \\ 4.45 \\ 2.73 \\ 2.25 \\ 2.49$	$1.75 \\ 0.25 \\ 4.45 \\ 2.16 \\ 2.40$	2.92 2.37 1.32 2.31 2.97	$12.38 \\ 3.77 \\ -1.59 \\ -1.27 \\ 8.77$	$\begin{array}{r} 6.12 \\ -25.93 \\ 6.67 \\ 11.11 \\ 6.25 \end{array}$	$2.53 \\ 2.92 \\ 3.01 \\ 2.85 \\ 2.67$

MASCULINITY (a) OF BIRTHS REGISTERED, 1918 TO 1922.

(a) Excess of males over females per 100 total births.

NOTE.-The minus sign - denotes an excess of females over males per 100 total births.

(ii) Masculinity of Ex-nuptial Births. The masculinity of ex-nuptial births was as follows :---

1	1						
33 - 1.68 93 0.22 87 8.20 94 2.72	5.078.9111.52 -0.94	$ \begin{array}{r} -6.14 \\ 4.84 \\ -2.22 \\ 6.10 \end{array} $	$ \begin{array}{r} -5.59 \\ -2.74 \\ 5.36 \\ 6.03 \end{array} $	$ \begin{array}{r} -0.36 \\ 7.98 \\ -3.63 \\ 1.26 \end{array} $	$ \begin{array}{r} 14.29\\ 0.00\\ -6.67\\ 15.38 \end{array} $	- 100.00	$0.24 \\ 4.03 \\ 5.60 \\ 2.96$
•	$\begin{array}{c c c} .33 \\ .93 \\ .93 \\ .93 \\ .87 \\ .94 \\ .11 \\ 1.75 \end{array}$	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

MASCULINITY(a) OF EX-NUPTIAL BIRTHS, 1918 TO 1922.

(a) Excess of males over females per 100 total births.

NOTE .- The minus sign - denotes an excess of females over males per 100 total births.

It is curious to note that while, so far as the total births are concerned, there has always been an excess of male births over female births in the period under review, this has not been the case in regard to ex-nuptial births, since in every State except New South Wales a negative masculinity has been experienced. Little weight, however, can be attached to these results on account of the small totals on which they are based, and for the same reason the figures for the Northern Territory and Federal Capital Territory are not taken into consideration.

(iii) Masculinity of Nuptial and Ex-nuptial Births, Various Countries.—There is ordinarily a very small difference between the masculinity of nuptial and ex-nuptial births. Thus, according to the following table, for the period about 1906 to 1913, the masculinity in various countries ranged from 4.63 to 1.91, and from 5.90 to 0.06 for nuptial and ex-nuptial births respectively.

		• 	Maseu Birt	linity of hs.(a)	1	1	Masculinity of Births.(a)		
Country	-	Period.	Nuptial Live Births.	Ex-nuptial Live Births.	Country.	Period.	Nuptial Live Births.	Ex-nuptial Live Births.	
Snain		1906-13	4 63	5 90	Treland	1906-12	2.61	1 63	
Portugal	•••	1906-10	3.93	0.06	New Zealand	1906-13	2.59	2.57	
Finland		1906-13	3.03	2.09	Australia	1906-13	2.52	2.27	
Sweden		1906-13	2.95	3.27	Netherlands	1906-13	2.49	1.53	
Hungary		1906-13	2.86	2.02	Denmark	1906-13	2.43	2.22	
Norway		1906-13	2.79	2.98	Switzerland	1906-13	2.38	1.21	
Prussia		1906 - 13	2.79	2.12	Japan	1906-13	2.32	0.87	
Russia, Et	ro.				France	1906 - 11	2.21	1.59	
pean		1906-09	2.77	2.00	Chile	1906-13	2.20	2.81	
Austria		1906-13	2.76	2.73	Belgium	1906-13	2.08	1.31	
Germany		1906 - 13	2.71	2.29	Scotland	1906-13	2.05	2.14	
Italy		1906-13	2.64	2.29	England and				
Serbia	••	1906-10	2 62	2 86	Wales	1906-13	1.91	2.07	

MASCULINITY OF BIRTHS .- VARIOUS COUNTRIES.

(a) Excess of males over females per 100 total births.

6. Ex-nuptial Births.--(i) General. The number of ex-nuptial births reached its maximum, 7,438, in 1913, but the numbers recorded in the last five years have been considerably less than those of the pre-war years.

It is, of course, possible that the number of ex-nuptial births is somewhat understated, owing to diffidence in proclaiming the fact of ex-nuptiality, and it is not unlikely that the majority of unregistered births are ex-nuptial.

Yea	r.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Northern Territory.	Federal Capital Territory.	Aus- tralia.
1918		2.625	1.849	1.066	456	286	279	21		6,582
1919		2.495	1.826	1.078	433	292	326	26	1	6,477
1920		2,582	1,902	1.033	450	317	303	15	•	6,602
1921		2,640	1,725	1.062	377	315	318	26		6,463
1922		2,667	1,602	932	356	337	265	117	• • •	6,176

EX-NUPTIAL BIRTHS, 1918 TO 1922.

(ii) Rate of Ex-nuptiality, 1918 to 1922. The rate of ex-nuptiality, *i.e.*, the percentage of ex-nuptial on total births has, on the whole, been fairly stationary during the last five years. The highest rate for the period occurred in 1919, and the lowest, 4.49 per cent., in 1922.

PERCENTAGE OF EX-NUPHAL ON IDIAL DIRITS, 1918 IV 192	PERCENTAGE	OF EX-NUPTIAL	ON TOTAL	BIRTHS,	1918 1	FO 1922.
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Yea	ar.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Northern Territory.	Federal Capital Territory.	Aus- tralia.
		·						· ·		··
		%	%	%	%	%	%	0/	%	%
1918		5.18	5.85	5.46	4.02	4.02	5.28	20.00	,,,	5.23
1919	• •	5.14	5.77	5.76	3.92	4.21	6.14	24.53	3.70	5.30
1920		4.79	5.25	5.10	3.74	3.89	5.28	23.81		4.84
1921		4.83	4.85	5.22	3.15	4.03	5.53	32.91		4.75
1922	••	4.83	4.41	4.66	2.97	4.14	4.56	24.29	• • •	4.49
		1		1					1	

BIRTHS.

A comparison of greater significance is obtained by calculating the number of ex-nuptial births per thousand of the single and widowed female population between the ages of 15 and 45. The calculation has been made for Australia for the last four Census periods for which the information is available, and covers in each case the Census year, together with the year immediately preceding and the year immediately following. The number of ex-nuptial births per 1,000 unmarried women of ages 15 to 45 has been found to be as follows:—Years 1880–82, 14.49; years 1890–92, 15.93; years 1900–02, 13.30; years 1910–12, 12.53. Corresponding figures for those countries for which the nuptial birth rates were shown in a preceding paragraph are given in the next table.

EX-NUPTIAL	BIRTHS	PER	1,000	UNMARRIEI	WOMEN	AGED	15	T0	45	YEARS	•
			VA	RIOUS COUN	TRIES.						

	Country.		Period.	Rate.	Country.	Period.	Rate.
Hungary Austria Sweden Denmark Germany	•••	 	1906–15 1908–13 1908–13 1906–15 1907–14	$38 \\ 30 \\ 26 \\ 24 \\ 23 \\ 21$	Norway Scotland Australia Belgium New Zealand	1907–14 1906–15 1906–15 1908–13 1906–15	13 13 12 12 9
Finland France Italy Spain	••• •• ••	•••	1907–14 1906–15 1901–11 1907–14 1906–15	$ \begin{array}{c} 21 \\ 17 \\ 16 \\ 14 \\ 14 \\ 14 \end{array} $	England and Wales Netherlands Ireland Bulgaria	1906–15 1906–15 1905–14 1909–12 1910–11	8 7 5 4 4

(iii) Comparison of Rates. Since the rate of ex-nuptiality might appear to increase by the mere decrease in the general birth rate, the following table has been prepared, which shows that this is not the case :—

CRUDE EX-NUPTIAL, NUPTIAL, AND TOTAL BIRTH RATES (a).—AUSTRALIA, 1918 TO 1922.

	Rates	3.	1918.	1919.	1920.	1921.	1922.
Ex-nuptial Nuptial			 $\begin{array}{r}1.32\\23.93\end{array}$	$\begin{array}{c}1.26\\22.52\end{array}$	$\begin{array}{r}1.24\\24.50\end{array}$	1.18 23.77	$\begin{array}{c}1.11\\23.58\end{array}$
Total		•••	 25.25	23.78	25.74	24.95	24.69

(a) Number of births per 1,000 of mean population.

7. Multiple Births.—Among the total number of 137,496 births registered in Australia in 1922 there were 134,612 single births, 2,849 twins, and 35 triplets. The number of cases of twins was 1,432, there being 15 stillbirths, and the number of cases of triplets, of which one was stillborn, 12. The total number of mothers was, therefore, 136,056, the proportion of mothers of twins being one in every 95, and of mothers of triplets one in every 11,338 of total mothers. The proportion of multiple births is remarkably constant.

PERCENTAGE OF MOTHERS OF MULTIPLE BIRTHS.—AUSTRALIA, 1918 TO 1922.

	Ycar,		Cases of Twins.	Cases of Triplets.	Cases of Quadruplets.	Percentage of Cases of Multiple Births on total Mothers.	Number of Mothers to each Multiple Birth.
1918		• •	1.370	8		1 10	90
1919			1.327	15	1	1 10	90
1920			1 521	16	-	1 12	88
1001	••		1,021	10		1.15	00
1921	• •	• •	1,453	12		1.09	92
1922	••		1,432	12		1.06	94

8. Ages of Parents.—(i) Single Births. The relative ages of the parents of children registered in 1922 have been tabulated separately for male and female births, twins and triplets being distinguished from single births, and are shown for single ages and for every State in "Australian Demography," No. 40, published by this Bureau. In the present work the exigencies of space allow only the insertion of corresponding tables showing the relative ages of parents in groups of five years. The largest number of fathers in the case of single births is found at ages 30 to 34, and of mothers at ages 25 to 29. When, however, the ages of both parents are considered together, the largest number of single births occurred where both father and mother were between 25 and 29.

Ages of Fathers and Sexes of	Total				Age	s of Mot	hers.			-
and Sexes of Children.	Children.	Under 15.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 and upwards.	Un- speci- fled.
Under 20	273 260 533	 1 1	192 184 376	78 67 145	3 7 10	 1 1	 	 		· · · · ·
20 to $24 \begin{cases} Males \\ Females \\ Total \end{cases}$	6,736 6,506 13,242	2 1 3	1,213 1,207 2,420	4,501 4,261 8,762	880 927 1,807	121 90 211	18 16 34	 4 4	 , ,	1 1
25 to 29 { Males Females Total	16,424 15,636 32,060	 1 1	659 596 1,255	6,325 6,178 12,503	7,782 7,314 15,096	1,450 1,387 2,843	$179 \\ 149 \\ 328$	22 10 32	 1	1 1
30 to 34 { Males Females Total	$17,782 \\ 16,814 \\ 34,596$	 	175 182 357	2,753 2,443 5,196	7,200 6,833 14,033	6,423 6,200 12,623	1,146 1,052 2,198	80 103 182	4 4	$1 \\ 1 \\ 2$
35 to 39 { Males Females Total	12,436 11,656 24,092	 	79 54 133	781 727 1,508	2,637 2,552 5,189	4,824 4,440 9,264	3,678 3,484 7,162	427 386 813	10 13 23	
40 to 44 { Males Females Total	7,104 6,832 13,936	 	14 14 28	213 208 421	796 807 1,593	1,958 1,861 3,819	2,757 2,677 5,434	1,344 1,228 2,572	32 36 68	 1 1
45 to $49 \begin{cases} Males \\ Females \\ Total \end{cases}$	3,306 3,117 6,423	 	3 7 10	70 70 140	250 247 497	609 560 1,169	1,255 1,207 2, 46 2	1,003 916 1,919	116 110 226	
50 to 54 $\begin{cases} Males \\ Females \\ Total \end{cases}$	1,318 1,172 2,490	 1 1	5 5 10	26 21 47	78 81 159	248 207 455	448 411 859	446 387 833	67 59 126	.
55 to $59 \begin{cases} Males \\ Females \\ Total \end{cases}$	436 392 828	 	$\frac{2}{1}{3}$	16 7 23	37 20 57	72 71 143	136 153 289	139 118 257	34 22 56	
60 to $64 \begin{cases} Males \\ Females \\ Total \end{cases}$	126 109 235	 	••	 4 4	8 11 19	.32 15 47	44 30 74	32 40 72	10 9 19	
65 and up- wards { Males Females Total	51 50 101	 	••	3 3	4 5 9	6 12 18	18 21 39	14 9 23	6 3 9	
$\begin{array}{c} \text{Not} \\ \text{stated} \end{array} \begin{cases} \text{Males} \\ \text{Females} \\ \text{Total} \\ \end{array}$	4 4 8	 	 	1 1	1 1	1 2 3	1 1	 	•••	:00:1
Nuptial { Males chil- { Females dren { Total	65,996 62,548 128,544	2 4 6	2,342 2,250 4,592	14,767 13,986 28,753	19,666 18,804 38,470	15,750 14,846 30,596	9,680 9,200 18,880	3,507 3,201 6,708	279 253 532	3 4 7
$ \begin{array}{c} {\bf Ex-} \\ {nuptlal} \\ {\bf children} \end{array} \begin{cases} {\bf Males.} \\ {\bf Females} \\ {\bf Total.} \end{cases} $	3,151 2,917 6,068	10 14 24	805 714 1,519	1,141 1,042 2,183	548 519 1,067	338 348 686	217 199 416	80 67 147	8 7 15	4 7 11
Total Males children Females Total	69,147 65,465 134,612	12 18 30	3,147 2,964 6,111	15,908 15,028 30,936	20,214 19,323 39,537	16,088 15,194 31,282	9,897 9,399 19,296	3,587 3,268 6,855	287 260 547	7 11 18

AGES OF PARENTS IN CASES OF SINGLE BIRTHS.—AUSTRALIA, 1922.

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BIRTHS.

(ii) Twins. The ages of parents of twins in 1922 are given hereunder :---

	Fathers and Sexes of					Ag	es of Mo	thers.		
Ages of	Fathers a Childre	nd Sexes of	Total Children.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 and upwards.
Under 20		les males tal	6 4 10	5 3 8	 	1 1 2	•••	 	••• •• ••	
20 to 24	$\cdots \begin{cases} Ma \\ Fe \\ To \end{cases}$	les males tal	86 105 191	13 11 24	48 65 113	24 26 50	1 1 2	 	2 2	
25 to 29	$\cdots \begin{cases} Ma \\ Fe \\ To \end{cases}$	les males tal	263 296 559	13 9 22	84 104 188	133 139 272	27 38 65	6 6 12	 	
30 to 34	$\cdots \begin{cases} Ma \\ Fe \\ To \end{cases}$	les males tal	411 357 768	4 4	40 40 80	156 117 273	175 159 334	31 37 68	5 4 9	•• •• ••
35 to 39	$\cdots \begin{cases} Ma \\ Fe \\ To \end{cases}$	les males tal	307 270 577	2 2	16 16 32	43 39 82	118 113 231	122 96 218	6 12	
40 to 44	$\dots \begin{cases} Ma \\ Fet \\ To \end{cases}$	les males tal	177 189 366	 	3 5 8	17 12 29	48 40 88	76 90 166	33 42 75	
45 to 49	$\dots \begin{cases} Ma \\ Fe \\ To \end{cases}$	iles males tal	89 88 177	 	2 4 6	7 7 14	28 18 46	36 44 80	14 15 29	2 2
50 to 54	$\cdots \begin{cases} Ma \\ Fer \\ To \end{cases}$	les males tal	30 31 61	 	 	1 1 2	5 7 12	9 7 16	15 16 31	
55 to 59	$\cdots \begin{cases} Ma \\ Fei \\ To \end{cases}$	les males tal	7 13 20	 	 	 2 2	4 4	8 8	3 3 6	
60 and ov	er { Ma Fe To	nles males • tal	2 8 10	 	 4 4	 	 	 4 4	2 2	
Not stated	I {Fer Tot	nales tal	2 2	 	 	 	 	2 2	••	
Nuptial children	$\begin{cases} Ma \\ Fe \\ To \end{cases}$	lles males tal	1,378 1,363 2,741	37 23 60	$193 \\ 238 \\ 431$	382 344 726	406 376 782	280 294 574	78 88 166	2 2
Ex-nupt childre	ial { Ma n { Fe To	iles males tal	41 67 108	11 11 22	13 15 28	7 19 26	2 8 10	6 12 18	2 2 4	··· ···
Total childre	$n $ $\begin{cases} Ma \\ Fe \\ To \end{cases}$	les males tal	1,419 1,430 2,849	48 34 82	206 253 459	389 363 752	408 384 792	286 306 592	80 90 170	2 2

AGES OF PARENTS OF TWINS.—AUSTRALIA, 1922.

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(iii) *Triplets*. Particulars regarding the ages of parents in cases of triplets are given in the next table :---

Ages of Fat	hers and Seves o	f Childr	on	Total	Ages of Mothers.						
		- cinar		Children.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.		
25 to 29	{ Males Females Total	•••	 	3 3 6	3 · . 3	 3 3	··· ··	· · · · ·	• 		
30 to 34	{ Males Females Total	 	 	3 2 5		3 3		•••	••		
35 to 39	{ Males Females Total	 	 	6 12 18	$\begin{array}{c} 2\\ 1\\ 3\end{array}$	3 3	1 5 6	 6 6	• • • • • •		
45 to 49	{ Males Females Total	•••	 	4 2 6	··· ···	 	 	2 1 3	$\frac{2}{1}$		
Nuptial children	{ Males Females Total	 	 	$ \begin{array}{r} 16\\19\\35\end{array} $	5 1 6	6 3 9	1 7 8	2 7 9	2 1 3		
Total children	{ Males Females Total	• •	 	16 19 35	5 1 6	6 3 9	1 7 8	2 7 9	2 1 3		

AGES OF PARENTS OF TRIPLETS .-- AUSTRALIA, 1922.

(a) Excluding 1 female still-born.

(iv) Influence on Masculinity. Valid deductions cannot, of course, be drawn from one year's figures as to variations in the masculinity of the births at different ages of the parents, but so far as the figures go the following conclusions are indicated :—In cases where the father is older than the mother the masculinity has a tendency to be above the average, while in cases where both parents belong to the same age group, or where the father is younger than the mother, the masculinity is rather below the average. It is also below the average in cases where the father, or both father and mother are under 25; and it is above the average where the mother alone is under 25.

9. Birthplaces of Parents.—The relative birthplaces of the parents of children whose births were registered during the year 1922 will be found tabulated in the Bulletin of "Australian Demography," published by this Bureau. A summary of the results of the tabulation is given hereunder.

Distinuis are	F	athers.		Mother Ch	s of Nup iildren.	Mothers of Ex- nuptial Children.		
bittipaces.	Single Births.	Twins.	Trip- lets.	Single Births.	Twins.	Trip- lets.	Single Births.	Twins.
AUSTRALASIA	-							
New South Wales	41.678	461	2	43.924	451	2	2.386	19
Victoria	33,955	362	4	32.866	371	5	1,457	17
Queensland	13,544	121		15,408	153		839	7
South Australia	11.668	129	1	11,334	126	2	360	3
Western Australia	2,285	28		3,052	33		246	2
Tasmania	5.870	69		5,854	62		348	
Northern Territory	26			38	1		19	
Federal Capital Territory	3							1
New Zealand	1,011	11	1	723	3	••	32	1

BIRTHPLACES OF PARENTS.—AUSTRALIA, 1922.

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BIRTHPLACES OF PARENTS .-- AUSTRALIA, 1922-continued.

Birthplaces	F	athers.		Mother Cl	s of Nup lildren.	tial	Mothers nuptial C	of Ex- hildren.
Distiplaces.	Single Births.	Twins.	Trip lets.	Single Births.	Twins.	Trip- lets.	Single Births.	Twins.
EUROPE-								
England Wales Scotland Ireland Isle of Man Other European British	11,294 302 2,565 1,393 17	128 3 19 20 1	4 	10,331 224 2,399 926 11	124 6 25 11 	3 	231 5 63 33 · ·	4 1
Possessions Austria-Hungary Belgium Denmark France Gremany Greece Italy Notway Spain Switzerland Other European Countries	$\begin{array}{c} 77\\ 60\\ 13\\ 155\\ 56\\ 469\\ 177\\ 329\\ 52\\ 90\\ 259\\ 32\\ 126\\ 47\\ 22\end{array}$	 1 5 1 1 1 	··· ··· ··· ··· ··· ··· ···	$56 \\ 25 \\ 29 \\ 45 \\ 75 \\ 154 \\ 97 \\ 212 \\ 20 \\ 14 \\ 108 \\ 18 \\ 10 \\ 19 \\ 18 \\ 18 \\ 10 \\ 19 \\ 18 \\ 18 \\ 10 \\ 19 \\ 18 \\ 10 \\ 19 \\ 18 \\ 10 \\ 18 \\ 10 \\ 19 \\ 18 \\ 10 \\ 18 \\ 10 \\ 19 \\ 18 \\ 10 \\ 10 \\ 10 \\ 18 \\ 10 \\ 10 \\ 10$	· 1 1 1 1 1 	· · · · · · · · · · · · · · · · · · · ·	1 1 2 6 2 1 2 1 	··· ··· ··· ··· ··· ···
ASIA— British India Other Asiatic British Possessions China Japan Syria Other Asiatic Countries	121 19 125 15 70 23	2 1 1 1	··· ·· ·· ··	79 35 10 39 5	1 	••• •• ••	2 1 	•••
AFRICA Union of S. Africa Other African Countries	$\frac{107}{27}$	2 		105 25	1 		8	
AMERICA— Canada United States of America Other American Countries	95 195 37	2 1		32 88 33	2 	 	 6 4	••
POLYNESIA— Fiji Other Polynesian Islands At Sea Unspecified	$17 \\ 38 \\ 66 \\ 14$	 	 	23 14 33 18	1 	 	 1 1 8	•••
Total	128,544	1,378	12	128,544	1,378	12	6,068	54

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CHAPTER XXV.---VITAL STATISTICS.

10. Occupations of Fathers.—(i) Year 1922. A summary of the occupations of the fathers of all nuptial children whose births were registered in 1922 is given in the following table :—

Occupations.	Number of Fathers.	Occupations.	Number of Fathers.
CLASS I.—PROFESSIONAL.		CLASS III.—COMMERCIAL—cont.	
General Government	851	Carriages and Vehicles	32
Local Government	116	Harness, Saddlery & Leatherware	7
Defence	432	Ships and Boats	2
Law and Order	1,214	Building Materials	2
Religion	409	Furniture	44
Charities		Chemicals and By-products	2
Health	1,092	Paper and Stationery	48
Literature	109	Dross	007 199
Civil Engineering Architecture	07	Fibrous Materials	10
and Surveying	438	Animal Food	2 560
Education	830	Vegetable Food	829
Fine Arts	117	Groceries, Drinks, Narcotics, and	
Music	150	Stimulants	1,318
Amusements	553	Living Animals	143
	·	Leather, Raw Materials	23
Total Professional	6,369	Wool and Tallow	62
		Hay, Corn, etc.	192
		Other Vegetable Matter n.e.i.	68
		Wood and Coal	153
		Stone, Clay and Glass	22
CLASS II.—DOMESTIC.	1	Merchants Importers	102
Hotelkeepers and Assistants	082	Shopkeepers and Assistants	1 315
Others engaged in providing	502	Dealers and Hawkers	334
board and lodging.	143	Agents and Brokers	591
Coachmen and Grooms	69	Clerks, Bookkeepers, etc.	4,659
Hairdressers	535	Commercial Travellers, Salesmen	1,899
Laundrymen	38	Others engaged in Commercial	
Others engaged in domestic occu-		Pursuits	1,466
pations	278	Speculators on Chance Events	62
Total Domestic	2,045	Total Commercial	18,731
			·····
CLASS III.—COMMERCIAL.			
D 1 1 1 17		CLASS IV TRANSPORT AND	
Banking and Finance	637	COMMUNICATION.	
Insurance and Valuation	545	A-istion	e
Property Rights noi	201	Aviation	5 488
Books Publications Advertising	159	Tramway Traffic	1 266
Musical Instruments	102	Road Traffic.	6.012
Prints, Pictures and Art Materiale	13	Sea and River Traffic	1.698
Ornaments and Small Wares	i	Postal Service	684
Sports and Games	ĩ	Telegraph and Telephone Service	638
Watches, Clocks, Jewellery	6	Messengers, etc	17
Arms and Ammunition	3	U	
Machinery	25	Total Transport & Communication	15,809

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OCCUPATIONS OF FATHERS OF NUPTIAL CHILDREN.-AUSTRALIA, 1922.

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OCCUPATIONS OF FATHERS OF NUPTIAL CHILDREN.—AUSTRALIA, 1922 —continued.

Occupations.	Number of Fathers.	Occupations.	Number of Fathers.
CLASS V.—INDUSTRIAL.		CLASS V.—INDUSTRIAL—cont.	
Books and Publications	831	Other Industrial Workers—	
Musical Instruments	57	Manufacturers, etc.	716
Prints. Pictures and Art Materials	53	Engineers, Firemen	3.225
Ornaments and Small Wares	173	Contractors	1.178
Equipment for Sports and Games	10	Labourers, undefined	24,746
Medals, Type, and Dies	22	Others	377
Watches, Clocks, and Scientific			
Instruments	138	Total Industrial	54,104
Surgical Instruments	19		
Arms and Ammunition	17		
Engines, Machines, Tools, and			
Implements	1,668		ĺ
Carriages and Vehicles	1,409	CLASS VI.—AGRICULTURAL,	
Harness, Saddlery & Leatherware	406	Pastoral, Mining, Etc.	
Ships, Boats, etc	126		1
Furniture	817	Agricultural	22,727
Building Materials	1,037	Pastoral	3,767
Chemicals and By-products	59	Dairy Farming	1,228
Textile Fabrics	232	Bees, Fisheries, and Wild Animals	453
Dress	1,948	Forestry	892
Fibrous Materials	52	Water Conservation and Supply	114
Animal Food	286	Mines and Quarries	3,484
Vegetable Food	1,452		
Groceries, Drinks, Narcotics, and		Total Primary Producers	32,665
Stimulants	328		
Animal Matter n.e.1	336		
Workers in wood n.e.l.	197		
Person	3	ULASS VII.—INDEFINITE.	
Faper	23	Indone dent Maana having no.	
Towellow and Presions Stones	929	Independent Means, having no	149
Metals other than Gold & Silver	200	Occupation not stated	140
Cas Electric Lighting etc	2,944	Occupation not stated	01
Building	1,100	Total Indefinite	904
Builders	615	10tal Indennito	204
Stopemasons	169		
Bricklavers	544		
Carnenters	3 080		
Slaters	79	CLASS VIII DEPENDENTS	
Plasterers	388		
Painters	1,197	Dependent Relatives	7
Plumbers	827	·	
Signwriters	73		
Others	15	Total Dependents	7
Roads, Railways, Earthworks	178	• - · · ·	-
Disposal of the Dead .	36		
	-		

(ii) Summary, 1918 to 1922. The next table gives a summary in classes of the occupations of fathers of nuptial children in each of the last five years, with the percentage of each class on the total number of fathers. In 1922, 41.64 per cent. of fathers were of the industrial class, and 25.14 per cent. were of the agricultural, pastoral, mining, etc., class. In the five years under review, the greatest variations in the percentages of the various classes were an increase in the industrial class from 39.41 to 41.64 per cent. and a decline in the professional class from 6.01 to 4.90 per cent.

Class.	1918.	1919.	1920.	1921.	1922.
	7.086	6.063	6.638	6.204	6.369
I. Professional { %	6.01	5.29	5.17	4.83	4.90
II. Domestic $(No.)$	2,082 1.77	$1,885 \\ 1.65$	2,165 1.69	2,319 1.81	2,045 1.57
III. Commercial $\begin{pmatrix} N_0 \\ N_0 \end{pmatrix}$	16,938	16,501	18,208	18,298	18,731
IV. Transport and Com- (No.	14.38	14.41	14.19 15,285	14.20	14.41 15,809
munication 1%	12.20	11.99	11.91	11.96	12.17
V. Industrial $\dots \begin{cases} No. \\ 0 \end{pmatrix}$	46,438	46,636 40.72	54,086 42.15	53,567	54,104 41 64
VI. Agricultural, pastoral, No.	30,805	29,591	31,744	32,405	32,665
mining, etc. \ldots 1%	26.14	25.83	24.74	25.25	25.14
VII. Indefinite \dots $\begin{cases} No. \\ o'_{\ell} \end{cases}$	0.08	0.09	$\begin{array}{c} 147 \\ 0.11 \end{array}$	169 0.13	204 0.16
VIII Dural (No.	6	22	55	13	7
VIII. Dependents { %	0.01	0.02	0.04	0.01	0.01
Total $\dots \int No.$	117,835	114,535	128,328	128,326	129,934
ι	100.00	100.00	100.00	100.00	100.00

OCCUPATIONS OF FATHERS OF NUPTIAL CHILDREN.---AUSTRALIA, 1918 TO 1922.

11. Mother's Age, Duration of Marriage, and Issue.—(i) General. A tabulation has been made showing, in age-groups, the duration of marriage and issue of mothers. The total number of nuptial confinements in 1922 was 129,934, but in 82 cases the necessary information was lacking, and the following series of tables refers, therefore, to 129,852 nuptial confinements, viz., 128,462 single births, 1,378 cases of twins, and 12 cases of triplets. Ex-nuptial children—previous issue by the same father—are included as previous issue, but children by former marriages, and stillborn children are excluded. The tables cannot be given in extenso, but the following are their most salient features. The complete tabulations are shown in "Australian Demography," No. 40.

(ii) Duration of Marriage and Issue of Mothers. The following table shows that the duration of marriage of mothers of nuptial children ranged from less than one year up to between 34 and 35 years, and that the average family increased fairly regularly with the duration of marriage. The average number of children of all marriages was 3.10, the corresponding figures for 1921 being 3.08; for 1920, 3.11; for 1919, 3.33; and for 1918, 3.34.

DURATION OF MARRIAGE AND ISSUE OF MOTHERS .--- AUSTRALIA, 1922.

								the second se
Dura of Marri	tion age.	Total Mothers.	Total Issue.	Average Number of Children.	Duration of Marriage.	Total Mothers.	Total Issue.	Average Number of Children.
Yea	rs.				Years.			
0-1	••	20,509	20,800	1.01	18–19	1,457	10,956	7.52
1–2		11.903	13.214	1.11	19–20	1,113	8,515	7.65
2-3		11.880	20.895	1.76	20-21	986	8,153	8.27
3-4		12.137	24.834	2.05	21–22	725	6,205	8.56
4-5		8.277	19,963	2.41	22–23	609	5,437	8.93
5-6		7.463	20.436	2.74	23-24	349	3,318	9.51
6-7		7.086	21,437	3.03	24-25	274	2,652	9.68
7-8		7,188	24.242	3.37	25-26	168	1,676	9.98
8-9		6.454	24,569	3.81	26-27	123	1,312	10.67
9-10		5,418	22,574	4 17	27-28	53	558	10.53
10-11		5,155	23,177	4 50	28-29	31	308	9.94
11-12		4,375	21,187	4 84	29-30	13	133	10.23
12-13		3,815	20.087	5 27	30-31	8	81	10.13
13-14		3 180	17 735	5 58	31-32	4	42	10.50
14-15	••	2,826	16 695	5 01	32-33	ī	9	9.00
15-16	•••	2,020	15 508	6 90	34-35	1 î	9	9.00
16-17		2,400	14 040	6 70	01 00		<u> · </u>	
17-18	••	1 700	19 199	7.00	Total	129 852	402.879	3.10
11.00	•••	,ruə_	شكلوني ل	1.09 "		1220,002		

BIRTHS.

(iii) Ages of Mothers and Issue. The ages of mothers, issue, and average family are given in the attached table, which shows that the average family increased fairly regularly to a maximum of 7.67 children in the age-group 45 years and over, and that the greatest number of mothers occurs in the group 25 to 29 years.

Ages of Mothers.	Total Mothers. Issue.		A verage Number of Children.	Ages of Mothers.	Total Mothers.	Total Issue.	Average Number of Children.	
Under 20 years	4,617	5,477	1.19	40-44 years	6,793 533	43,546	6.41	
25–29 ,	38,824	95,438	2.46	45 yrs. and over	000	4,007		
20–34 " ·· 35–39 " ··	30,984 19,161	110,532 94,769	$\begin{array}{c} 3.57 \\ 4.95 \end{array}$	All ages	129,852	402,879	3.10	

AGES AND ISSUE OF MOTHERS.-AUSTRALIA, 1922.

(iv) Previous Issue of Mothers, Various Ages. The previous issue, according to the age of the mother, is given in the following table. Three mothers aged 40-44 each had 18 children prior to their present confinement.

PREVIOUS ISSUE OF MOTHERS OF VARIOUS AGES .-- AUSTRALIA, 1922.

				Mother	s' Ages.			
Previous Issue.	Under 20 Years.	20-24 Years.	25–29 Years.	30–34 Years.	35–39 Years.	40–44 Years.	45 Years and Over.	Total.
0 1	3,852 707	15,092 9,297	12,144 11,210	5,057 6,169	1,708 2,083	391 411	23 24	38,267 29,901
2	· 52	3,375	7,211	5,710	2,605	587	26	19,566
3		929	4,426	4,895	2,778	707	27	13,767
4 5		200	2,390	3,740	2,018	738	41	9,040
6		2	306	1 525	1,230	703	64	4 540
ž		3	92	760	1.382	670	66	2,973
8			21	342	943	583	55	1,944
9			4	122	523	482	56	1,187
· 10	1			35	269	313	45	662
11			••	12	127	208	32	379
12			••	3	56	114	21	194
13	· · ·		••	••	10 :	50	8	68
14			••	3	7	22	2	34
15			••	••	2 ;	13	3	18
10	1		••	••		4		5
18					1 1	4t 2		5
10					1	J		3
0					·			
Total Mothers	4,617	28,940	38,824	30,984	19,161	6,793	533	129,852

(v) Previous Issue of Mothers of Twins and Triplets. Figures regarding the previous issue of mothers of twins and triplets show that 343 mothers had twins at their first confinement; 271 at their second; 212 at their third; 170 at their fourth; 117 at their

fifth; 80 at their sixth; 74 at their seventh; 52 at their eighth; 24 at their ninth; 13 at their tenth; 10 at their eleventh; 4 at their twelfth; 5 at their thirteenth; and 1 one each at their fourteenth, fifteenth, and seventeenth.

Of the 12 cases of triplets, 3 occurred at the first confinement; 3 at the second; 3 at the third; and one each at the sixth, seventh, and twelfth.

12. Interval between Marriage and First Birth.—(i) Interval and Sex of Children. The following table shows the interval between marriage and first birth, distinguishing the sexes of the children. Twins and triplets are included, the eldest born only being enumerated :—

Tatomal	Numbe	er of First (Children.	Tatomusl	Numbe	er of First C	hildren.
interval.	Males.	Females.	Total.	Interval.	Males.	Females.	Total.
Under 1 month 1 month 2 months 3 ", 4 ", 5 ", 6 ", 7 ", 8 ", 9 ", 10 ", 11 ", 12 ", 13 ", 14 ", 15 ", 16 ", 17 ", 18 ", 18 ", 20 ", 21 "	$\begin{array}{c} 191\\ 268\\ 368\\ 496\\ 638\\ 855\\ 1,042\\ 1,064\\ 772\\ 1,781\\ 1,744\\ 1,249\\ 965\\ 745\\ 646\\ 542\\ 428\\ 460\\ 394\\ 297\\ 269\\ 9001\\ \end{array}$	$\begin{array}{c} 163\\ 274\\ 394\\ 498\\ 575\\ 754\\ 955\\ 1,108\\ 768\\ 1,735\\ 1,603\\ 1,164\\ 930\\ 689\\ 596\\ 497\\ 424\\ 392\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 349\\ 342\\ 270\\ 9302\\ 349\\ 349\\ 349\\ 349\\ 349\\ 349\\ 349\\ 349$	354 542 762 994 1,213 1,609 1,997 2,172 1,540 3,516 3,347 2,413 1,895 1,434 1,242 1,039 852 852 852 743 639 539	2 years 3 ", 4 ", 5 ", 6 ", 8 ", 9 ", 10 ", 11 ", 12 ", 13 ", 14 ", 15 ", 16 ", 17 ", 18 ", 19 ", 20 ", 21 ", 23 ",	$1,701 \\ 796 \\ 369 \\ 231 \\ 203 \\ 124 \\ 68 \\ 45 \\ 35 \\ 25 \\ 17 \\ 12 \\ 11 \\ 8 \\ 3 \\ 2 \\ 3 \\ \\ \\ 1$	$\begin{array}{c} 1,611\\ 695\\ 355\\ 237\\ 159\\ 115\\ 60\\ 38\\ 23\\ 19\\ 16\\ 21\\ 7\\ 7\\ 9\\ 8\\ 6\\\\ 1\\ 2\\ 2\\\\ \end{array}$	$\begin{array}{c} 3,312\\ 1,491\\ 724\\ 468\\ 362\\ 239\\ 128\\ 83\\ 58\\ 44\\ 33\\ 58\\ 44\\ 33\\ 18\\ 17\\ 11\\ 9\\ 2\\ 4\\ 2\\ 5\\ 1\end{array}$
	268 236	$\begin{array}{c} 202\\256\\216\end{array}$	$\begin{array}{c} 553\\524\\452\end{array}$	Total	19,669	18,598	38,267

MILKIAL DEIMELM MARKIAGE AND TIRSI DIRIMAUSTRALIA, 176	AGE AND FIRST BIRTH.—AUSTRALIA, 1922.	MARRIAGE	BETWEEN	INTERVAL
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The masculinity of first births was 2.80 as compared with 2.67 for total births.

(ii) Ages of Mothers and Interval. The previous issue of mothers of ex-nuptial children is not recorded, but for the purposes of the following table all ex-nuptial births have been assumed to be first births. The table shows the ages of mothers in the cases of ex-nuptial first births, of nuptial first births occurring less than nine months after marriage, and of nuptial first births occurring nine months or more after marriage. A comparison of the combined total of the first two columns with the total of nuptial children born nine months or more after marriage shows that for all ages the ratio was about 2 to 3. At all ages up to and including 21, however, there was a great preponderance of ex-nuptial births and of births following on ante-nuptial conception. It must, of course, be understood that a certain number of premature births is necessarily included among the births which occurred less than nine months after marriage, but information in connexion therewith is not available.

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Age of Moth at Birth of Child.	Age of Mother at Birth of Child. Ex-nuptia Births.		Nuptial Births less than nine months after Marriage.	Total of two preceding columns.	Nuptial Births nine months after Marriage and later.	Total Nuptial First Births.	Nuptial First Births and Ex-nuptial Births.
12 years 13 " 14 " 15 " 16 ", 17 ", 18 ", 19 ", 20 ", 21 ", 22 ", 23 ", 24 ", 25 ", 26 ", 27 ", 28 ", 29 ", 30 ", 31 ", 32 ", 33 ", 34 ", 35 ", 36 ", 37 ", 38 ", 39 ", 41 ", 42 ", 43 ", 44 ", 45 ", 16 ", 17 ", 18 ", 19 ", 19 ", 20 ", 21 ", 22 ", 23 ", 24 ", 25 ", 26 ", 27 ", 28 ", 28 ", 29 ", 30 ", 31 ", 32 ", 33 ", 34 ", 35 ", 36 ", 37 ", 38 ", 39 ", 41 ", 42 ", 45		$\begin{array}{c} 1\\ 4\\ 19\\ 61\\ 175\\ 308\\ 459\\ 527\\ 553\\ 508\\ 435\\ 378\\ 323\\ 282\\ 263\\ 210\\ 180\\ 145\\ 185\\ 126\\ 137\\ 125\\ 118\\ 101\\ 84\\ 87\\ 73\\ 80\\ 55\\ 24\\ 40\\ 15\\ 15\\ 15\\ 15\\ 15\\ 17\\ 77\\ 73\\ 125\\ 16\\ 77\\ 125\\ 16\\ 16\\ 77\\ 125\\ 16\\ 16\\ 17\\ 77\\ 125\\ 16\\ 16\\ 17\\ 17\\ 125\\ 16\\ 16\\ 17\\ 17\\ 125\\ 16\\ 16\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 17\\ 17\\ 125\\ 16\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15\\ 15$	$\begin{array}{c} & & & & & & & & & & & & & & & & & & &$	$\begin{array}{c} 1\\ 4\\ 25\\ 77\\ 296\\ 772\\ 1,347\\ 1,762\\ 1,828\\ 1,907\\ 1,681\\ 1,285\\ 1,039\\ 941\\ 740\\ 558\\ 505\\ 403\\ 368\\ 247\\ 262\\ 204\\ 198\\ 161\\ 141\\ 129\\ 114\\ 95\\ 70\\ 33\\ 50\\ 20\\ 15\\ \circ\end{array}$	$\begin{array}{c} & & & & & & \\ & & & & & & & \\ & & & & $	$\begin{array}{c} & & & & & & & & & & & & & & & & & & &$	1 4 25 78 313 871 $1,685$ $2,429$ $2,879$ $3,507$ $3,871$ $3,609$ $3,423$ $3,257$ $3,024$ $2,600$ $2,358$ $1,985$ $1,677$ $1,281$ $1,139$ 885 766 619 502 389 356 267 216 116 115 66 27
46 ,, 47 ,, 48 ,, Unspecified	•••	4 2 2 11	··· ··· ··	* 4 2 2 11	5 3 2 	5 3 2 	9 5 4 11
Total	••	6,122	11,183	17,305	27,084	38,267	44,389

AGES OF MOTHERS AND INTERVAL BETWEEN MARRIAGE AND FIRST BIRTH, ETC.—AUSTRALIA, 1922.

13. Interval between Birth and Registration of Birth.—Information was obtained for the years 1911 to 1921 regarding the period which elapsed between birth and registration. A detailed table giving the results for 1921 is contained in Demography Bulletin No. 39, issued by this Bureau. The law relating to maternity allowances has tended to accelerate the registration of births; and during the year under review it was found that approximately 35 per cent. were registered in the first week.

The weighted average interval between the dates of birth and registration has been found to be about 13 days both for nuptial and ex-nuptial children since the granting of the maternity allowance.

§ 2. Marriages.

1. Marriages, 1918 to 1922.—The number of marriages registered in Australia in 1920 was 51,552, the highest number ever recorded. During 1922, 44,731 marriages were celebrated, and although this number did not reach the record of 1920, the number is very satisfactory. The number of marriages in each State for the years 1918 to 1922 is given hereunder :—

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed. Cap. Terr.	Aus- tralia.
1918	13,194	9,156	4,815	3,190	$1,612 \\ 2,194 \\ 2,932 \\ 2,656 \\ 2,446$	1,131	39	4	33,141
1919	15,809	11,706	5,429	3,855		1,513	25	9	40,540
1920	20,154	14,898	6,667	4,881		1,999	17	4	51,552
1921	18,506	13,676	5,963	4,383		1,668	15	2	46,869
1922	17,580	12,996	5,878	4,144		1,674	13		44,731

MARRIAGES, 1918 TO 1922.

2. Marriage Rates, 1918 to 1922.—The number of marriages registered per thousand mean population is given in the following table for the same period :—

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed. Cap. Terr.	Aus- tralia.
1918 1919 1920 1921 1922	6.797.919.758.788.18	$\begin{array}{r} 6.43 \\ 7.95 \\ 9.85 \\ 8.90 \\ 8.27 \end{array}$	$\begin{array}{r} 6.89 \\ 7.49 \\ 8.92 \\ 7.81 \\ 7.52 \end{array}$	7.078.2310.038.828.19	5.246.878.907.967.20	5.70 7.38 9.50 7.82 7.79	$8.01 \\ 5.37 \\ 4.04 \\ 3.84 \\ 3.56$	1.65 3.89 1.84 0.81 	6.59 7.80 9.62 8.59 8.03

CRUDE MARRIAGE RATES(a), 1918 TO 1922.

(a) Number of marriages (not persons married) per 1,000 of mean annual population.

As in some international tabulations the marriage rates are calculated per 1,000 of the unmarried population of 15 years and over, the corresponding rates have been worked out for Australia for the last four Census periods for which the particulars are available. The figures comprise in each case the Census year with the year immediately preceding and the year immediately following, and are as follows :---Years 1880-82, 48.98; years 1890-92, 45.74; years 1900-02, 42.14; years 1910-12, 50.10. These rates refer, of course, to persons married and not to marriages, as is the case in the preceding table.

3. Marriage Rates in Various Countries.—A comparison of the Australian marriage rate with those of other countries shows that until recent years it was occasionally surpassed by the rate for Ontario, and equalled by the rate for some of the countries of the East of Europe, and that it was higher than the rates for the countries of Central and Western Europe, and far in excess of those for countries of the North of Europe. Some remarkable changes have taken place in the rates for several European countries. For example, the rate for France, which in 1913 was 7.5 per 1,000, increased to 15.9 in 1920, while the rate for Germany increased from 7.7 per 1,000 in 1913 to 14.5 in 1920. The following table shows that Australia, with a rate of 8.0, occupies a favourable position in the list of countries for which recent information is available.

Country.	Year.	Crude Marriage Rate.	; Country.	Year.	Crude Marriage Rate.
France Germany	1920 1920 1920 1920 1920 1911 1919 1911 1921 192	$15.9 \\ 14.5 \\ 14.5 \\ 14.0 \\ 11.2 \\ 10.3 \\ 9.9 \\ 9.1 \\ 9.1 \\ 9.1 \\ 9.1 \\ 8.8 \\ 8.5 \\ 8.5 \\ 8.5 \\ 8.5 \\ 8.4 \\ 8.3 \\ 8.2 \\ 8.2 \\ 8.2 \\ 8.0 $	England and Wales Canada (excluding Quebec) Russia (European) Tasmania Spain New Zealand Queensland Scotland Norway Austria Sweden Chile Finland Ceylon Jamaica	1922 1921 1909 1922 1922 1922 1922 1922	$\begin{array}{c} 7.9 \\ 7.9 \\ 7.9 \\ 7.8 \\ 7.7 \\ 7.6 \\ 7.5 \\ 7.2 \\ 7.0 \\ 6.9 \\ 6.7 \\ 6.6 \\ 6.5 \\ 6.1 \\ 5.7 \\ 5.5 \\ 3.5 \end{array}$

CRUDE MARRIAGE RATES .--- VARIOUS COUNTRIES.

4. Age and Conjugal Condition at Marriage.—(i) General. The ages at marriage of bridegrooms and brides will be found in "Australian Demography," Bulletin No. 40. A summary in age groups is given in the table hereunder, the previous conjugal condition of the contracting parties being distinguished. No less than 1,854 males who were less than twenty-one years of age were married during 1922. The corresponding number of females was 8,445. At the other extreme there were 40 men of sixty-five years and upwards, who described themselves as bachelors, and 6 spinsters of corresponding age.

AGES AND CONJUGAL CONDITION OF PERSONS MARRIED.—AUSTRALIA, 1922.

Age at		Bride	grooms.		Brides.					
Marriage.	Bachelors.	Widowers.	Divorced.	Total.	Spinsters.	Widows.	Divorced.	Total.		
Under 20	859		· · ·	859	5,677	2	1	5.680°		
20-24 years	12,853	30	3	12,886	18,564	107	40	18,711		
25–29 [°] ,,	14,945	182	59	15,186	10,933	393	142	11,468		
30-34 "	7,284	437	120	7,841	3,842	478	183	4,503		
35-39 "	3,078	505	157	3,740	1,499	538	141	2,178		
40-44 "	1,192	418	97	1,707	564	338	65	967		
45-49 ,,	566	362	62	990	259	292	34	585		
50-54 ,,	230	313	32	575	100	179	10	289		
55–59 ,,	112	276	25	413	41	110	6	157		
6064 ,,	58	205	12	275	17	92	5	114		
65 years and					!					
over	40	207	1 7	254	6	66	2	74		
Unspecified	5	••		5	4	1		5		
Total	41,222	2,935	574	44,731	41,506	2,596	629	44,731		

(ii) *Relative Ages, Bridegrooms and Brides.* The relative ages of bridegrooms and brides are shown for single years in "Australian Demography," Bulletin No. 40; a condensation into age-groups of five years is given below :---

						Ages o	of Brides	•			
	Ages.	Bride- grooms.	Under 15.	15 to .19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 and upwards.	Not stated.
Ages of Bridegrooms.	Under 20 20 to 24 25 to 29 30 to 34 35 to 39 40 to 44 45 to 49 50 to 54 55 to 59 60 to 64 65 and upwards Not stated	859 12,886 15,186 7,841 3,740 1,707 575 413 275 254 5	3 5 1 1 1 	$\begin{array}{c} 609\\ 3,134\\ 1,400\\ 352\\ 127\\ 24\\ 13\\ 5\\ 3\\ 1\\ 1\\ 1\\ \cdots \end{array}$	232 7,903 7,194 2,393 727 168 63 22 7 1 1	14 1,628 5,374 2,867 1,074 303 134 42 21 8 3 	$1 \\ 171 \\ 1,005 \\ 1,634 \\ 960 \\ 419 \\ 175 \\ 85 \\ 34 \\ 15 \\ 4 \\ \cdots$	36 178 480 624 432 225 110 60 20 13 	 6 28 94 167 233 180 108 95 38 18 	 3 6 21 61 127 199 202 193 192 215 	··· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ··
	Total Brides	44,731	11	5,669	18,711	11,468	4,503	2,178	967	1,219	5

RELATIVE AGES OF PERSONS MARRIED.—AUSTRALIA, 1922.

(iii) Average Ages, Bridegrooms and Brides. The age at marriage of brides has remained fairly stationary during recent years at an average of about 26 years. The figures for the five years are :--1918, 26.11 years; 1919, 25.77 years; 1920, 26.11 years; 1921, 26.16 years; and 1922, 26.14 years. For the five years 1907-11 the average age was 25.70 years, compared with 25.92 years for the five years 1912-16, and 26.07 for the five years 1917-21. The average age of bridegrooms in 1918 was 29.55 years; in 1919, 29.10 years; in 1920, 29.55 years; in 1921, 29.74 years; and in 1922, 29.65 years. It follows, therefore, that brides are generally speaking rather less than three years and one-half younger than bridegrooms.

5. Previous Conjugal Condition.—The number of bachelors and spinsters, widowed and divorced persons, who were married during the year 1922 has already been given. The following table shows the conjugal condition of the contracting parties :—

DREVIOUS CONTIGAT CONDITION OF PERSONS MARRIED.—AUSTRALIA, 1923								
INCITOUS CONSCULL CONDITION OF I DESCRIPTION MEETING INTERNIED, MEETINGEN, 172	PREVIOUS	CONJUGAL	CONDITION	0F	PERSONS	MARRIED	-AUSTRALIA,	1922.

	Wetal	Brides.					
Corjugal Condition.	Bridegrooms.	Spinsters.	Widows.	Divorced.			
Bridegrooms Bridegrooms Bachelors Widowers Divorced	41,222 2,935 574	39,150 1,947 409	1,604 882 110	468 106 55			
Total Brides	44,731	41,506	2,596	629			

6. Birthplaces of Persons Married.—Information regarding the birthplaces of persons who were married in 1922 was not obtained in Western Australia; the totals in the following table, therefore, are exclusive of that State. As might be expected,

there were more brides than bridegrooms who were natives of Australia. In "Australian Demography," Bulletin No. 40, the relative birthplaces of bridegrooms and brides will be found tabulated in full detail.

	1	1 .	11	(1
Birthplaces.	Bride- grooms.	Brides.	Birthplaces.	Bride- grooms.	Brides.
·			· · · · · · · · · · · · · · · · · · ·		
AUSTRALASIA			ASIAcontinued.		
New South Wales	14,015	15,112	China	25	7
Victoria	11,933	12,120	Other Asiatic	15	
Queensland	4,571	5,087	Countries	11	9
Western Australia	3,911	0,003 949			1
Tasmania	1 872	1 934	-		
Northern Territory	1,012	1,004	AFRICA—		
Fed. Cap. Territory.		i		1	
New Zealand	379	282	Mauritius	4	2
			Union of South Africa	51	59
	[Other African Coun-		
EUROPE—			tries	4	2
17 1. 1	0.045	0.050			
England	3,245	2,350			
Sectland	01 767	602	AMERICA-		
Ireland	412	218	AMERICA		
Isle of Man	10	210	Canada	45	6
Other European			Other American Bri-	20	Ŭ
British Possessions	27	12	tish Possessions	4	3
Denmark	56	7	United States	73	38
France	20	16	Other American		
Germany	114	42	Countries	16	8
Greece	61	23			
Italy	78	41			
Netherlands	19		DOT VNIESTA		
Norway	21	- 1	FOLINESIA-		
Sweden	38	22	Polynesian British		
Other European	30	- 1	Possessions	12	9
Countries	46	21	South Sea Islands .	10	14
-			Atsea	8	$\mathbf{\tilde{5}}$
ASIA-			Not stated	6	8
British India	45	27	1		
Desconsione	e		Total	49 985	10 985
1 03503510118	0	*	1.00001	72,200	44,400

BIRTHPLACES OF PERSONS MARRIED.-AUSTRALIA (a), 1922.

(a) Exclusive of Western Australia.

7. Occupations and Ages of Bridegrooms.—A tabulation has been made of the occupations and ages of all males married in Australia, and in "Australian Demography," Bulletin No. 40, the figures for 1922 refer to orders of occupations. An abridgment of this tabulation is given below. The average ages of the persons falling under the twenty-eight subdivisions were determined, and it appears that, apart from the Indefinite class, which consists chiefly of persons who have retired from business and who are living on their own means, and amongst whom a high average age may naturally be expected, the average age ranges from 28.12 for those engaged in the manufacture of animal and vegetable substances to 32.73 years in the class providing board and lodging.

OCCUPATIONS AND AGES OF BRIDEGROOMS .- AUSTRALIA, 1922.

	P fessi	ro- ional.	Dom	estic.			Соп	nmerci	al.				Ċ	Fransp Commu	ort an nicatio	d on.
Ages at Marriage.	Government, Defence, and Law.	Others.	Board and Lodging.	Others.	Property and Finance.	Art. Mechanic, and Textile Products.	Food and Drinks.	Animal and Vege- table Substances.	Fuel, Light, and Metals.	Merchants and	Dealers.	Others.	Railways.	Roads and Trams.	Seas and Rivers.	Others.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & & \\ &$	$\begin{array}{c} \cdot \cdot \\ \cdot \cdot \\ 26\\ 26\\ 26\\ 75\\ 81\\ 12\\ 151\\ 115\\ 128\\ 108\\ 115\\ 82\\ 72\\ 74\\ 55\\ 44\\ 170\\ 87\\ 55\\ 44\\ 170\\ 87\\ 51\\ 68\\ \cdot \end{array}$	$\begin{array}{c} & \cdot & \cdot \\ & \cdot & \cdot \\ & 21 \\ & 24 \\ & 200 \\ & 25 \\ & 24 \\ & 200 \\ & 23 \\ & 23 \\ & 27 \\ & 15 \\ & 23 \\ & 23 \\ & 23 \\ & 15 \\ & 58 \\ & 32 \\ & 21 \\ & 58 \\ & 32 \\ & 21 \\ & 34 \\ & \cdot \end{array}$	 2 8 14 28 26 34 19 200 28 21 19 200 28 21 19 11 17 13 12 10 0 7 37 16 6 9 9 0 20	$ \begin{array}{c} 1 \\ 2 \\ $	$ \begin{array}{c} $	$\begin{array}{c} & 2\\ & 2\\ & 2\\ & 16\\ & 28\\ & 43\\ & 100\\ & 130\\ & 101\\ & 150\\ & 114\\ & 113\\ & 109\\ & 107\\ & 85\\ & 87\\ & 46\\ & 61\\ & 106\\ & 61\\ & 35\\ & 55\\ & 51\\ & 106\\ & 68\\ & 28\\ & 51\\ & & $	$\begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ 1 \\ 3 \\ 7 \\ 13 \\ 7 \\ 8 \\ 15 \\ 13 \\ 9 \\ 8 \\ 9 \\ 4 \\ 7 \\ 3 \\ 10 \\ 22 \\ 8 \\ 5 \\ 7 \\ \cdot \end{array}$	 1 1 1 1 5 2 2 7 7 6 6 4 4 7 5 5 5 5 2 2 6 6 6 6 8 3 3 6 6 8 3 8 6 1 2 2 2 2 2 7 7 7 6 6 6 7 1 1 1 1 1 1 1 1 1 1 1 1 1	1	$\begin{array}{c} \cdot \\ 1 \\ 5 \\ 11 \\ 9 \\ 41 \\ 43 \\ 662 \\ 664 \\ 68 \\ 83 \\ 666 \\ 63 \\ 666 \\ 63 \\ 663 \\ 664 \\ 441 \\ 441 \\ 199 \\ 190 \\ 100 \\ 10$		$\begin{array}{c} & & & & & \\ & & & & & & \\ & & & & & & $	$\begin{array}{c} & & & & & & \\ & & & & & & \\ & & & & & $	1 1 1 1 1 1 1 1	1 7 200 322 484 464 446 473 388 452 211 188 222 177 111 366 66
Total Average	1,050	1,722	468	371	643	374	1,633	159	86	1,0	62 4,5	295	1,446	2,132	633	529
year 1922	30 . 08	30 · 76	32 · 73	30·09	31 · 17	30 · 39	29.03	31 - 73	30 · 74	31 ·	82 29	·10	28.92	28·13	30 · 38	28.55
		é 1 2						1	1			P 10			ers.	
Ages at Marriage.	Art and Mechanic	Textiles an Fibrous	Materials. Food and	Drinks.	Vegetable Substances	Metals and Minerals.	Fuel, Light and Energy	Building and Con-	1 suruciou.	Ouliets.	Agri- cultural.		Pastoral.	Mining and Quarrying.	Others.	Indefinite.
15 years 16 , 16 , 17 , 18 , 19 , 20 , 21 , 22 , 23 , 24 , 25 , 26 , 27 , 28 , 29 , 30 , 31 , 32 , 33 , 35 to 39 35 to 39 35 to 30 30 , 35 to 30 30 and over Not stated	$\begin{array}{c} & & & \\ & & & & \\ & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ &$	628993665144001183384439901156 	1 1 1 19927 19	1 7 16 21 62 55 55 55 550 47 33 31 33 25 21 16 18 49 18 10' 21 21 21 25 25 25 25 25 25 25 25 25 25	$\begin{array}{c} \cdot \cdot \\ 1 \\ 1 \\ 5 \\ 10 \\ 29 \\ 16 \\ 10 \\ 12 \\ 7 \\ 12 \\ 7 \\ 12 \\ 8 \\ 4 \\ 4 \\ 4 \\ 5 \\ 4 \\ 4 \\ 5 \\ 3 \\ 3 \\ \cdot \\ 17 \\ 5 \\ 3 \\ 3 \\ \cdot \\ 17 \\ 5 \\ 3 \\ 3 \\ \cdot \\ 17 \\ 5 \\ 3 \\ 3 \\ \cdot \\ 17 \\ 5 \\ 3 \\ 3 \\ \cdot \\ 17 \\ 5 \\ 3 \\ 17 \\ 17 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$	1 100 23 41 766 105 116 90 69 700 69 700 69 700 69 700 69 700 69 700 28 24 24 24 24 24 25 28 	$\begin{array}{c} 1\\ 2\\ 1\\ 1\\ 9\\ 26\\ 42\\ 42\\ 42\\ 42\\ 42\\ 42\\ 16\\ 24\\ 16\\ 24\\ 13\\ 13\\ 13\\ 13\\ 38\\ 8\\ 8\\\\\\\\\\\\\\\\\\$	$\begin{array}{c} 1\\ 2\\ 4\\ 11\\ 16\\ 17\\ 223\\ 20\\ 17\\ 13\\ 13\\ 13\\ 13\\ 13\\ 10\\ 9\\ 6\\ 7\\ 7\\ 18\\ 5\\ 10\\ 0\\ 0\\ 10\\ 0\\ 18\\ 0\\ 10\\ 0\\ 0\\ 10\\ 0\\ 18\\ 0\\ 10\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0$	1 1 2 7 3 4 0 0 0 0 3 5 5 6 9 0 5 5 5 0 6 6 1 5 4 2 5 5 5 6 6 9 0 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6	1 20 79 187 304 641 699 665 691 628 483 538 483 538 4671 290 296 242 199 296 242 199 195 286 4	1 3 4 2 4 4 3 5 5 6 6 4 9 4 7 5 5 5 6 6 9 2 9 2 9 2 9 19 23	58788304807083167661981	1 1 2 7 7 13 57 77 76 77 76 77 76 77 76 85 77 76 85 77 76 85 77 76 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 85 77 76 85 77 76 85 77 76 85 77 76 85 77 76 85 77 76 85 77 76 77 76 85 77 76 85 77 76 85 77 76 85 77 76 85 77 76 182 77 76 182 77 78 182 78 182 182 182 182 182 182 182 18	$ \begin{array}{c} \cdot \\ \cdot \\$	· · · · 1 5 8 215 223 223 221 277 229 10 15 8 6 8 5 5 252 28 9 · · ·	······································
Total Average	2,88 	3 9 	16	594 -	175	1,328	507	2,52	5 9,1	121	7,25	4	1,437	828	313	147
age- vear 1922	28.4	9 28 -	34 ¹ 28	49 2	8.12	28.56	28.14	29.7	8 29	05	30 · 5	1	$31 \cdot 92$	<u>30 · 01 '</u>	29.12	<u>45 · 1</u> 7

MARRIAGES.

8. Fertility of Marriages.—The quotient obtained by division of the nuptial births registered, e.g., during the five years 1918 to 1922, by the number of marriages registered during the five years 1913 to 1917, i.e., the period antecedent by five years to the period of the births, has been called the "fertility of marriages." This works out at 3.22—in other words, the number of children to be expected from every marriage in Australia is about three. This method, while not absolutely accurate, generally furnishes results which agree fairly well with those found by more elaborate and careful investigation. For the year 1918 the result was 3.02; for 1919, 2.86; for 1920, 3.05; and for 1922, 3.22.

9. Registration of Marriages.—(i) Marriages in each Denomination. In all the States marriages may be celebrated either by ministers of religion whose names are registered for that purpose with the Registrar-General, or by certain civil officers—in most cases district registrars. Most of the marriages are celebrated by ministers of religion. The proportions so celebrated in 1922 were :—New South Wales, 95.27 per cent.; Victoria, 96.64 per cent.; Queensland, 96.57 per cent.; South Australia, 96.21 per cent.; Western Australia, 83.07 per cent.; and Tasmania, 97.85 per cent., the percentage for Australia being 95.34. The registered ministers in 1922 belonged to more than forty different denominations, some of which, however, can hardly be regarded as having any valid existence. A number of these have been omitted from the tabulation, and are bracketed under the heading "Other Christians." The figures for 1922 are shown in the following table :—

Denomination.	N.S.W.	Vic.	QId.	S.A.	W.A.	Tas.	N. Ter.	Aus- tralia.
Church of England Roman Catholic Presbyterian Church Methodist Baptist Church of Christ Lutheran Greek Orthodox Unitarian Salvation Army Seventh-Day Adventists Hebrew Hebrew Unspecified	$\begin{array}{c} 7,581\\ 3,596\\ 2,321\\ 2,213\\ 413\\ 259\\ 142\\ 266\\ 200\\ 12\\ 600\\ 27\\ 40\\ 38\\ 829\\ 3\end{array}$	$\begin{array}{c} 3,774\\ 2,286\\ 2,550\\ 1,834\\ 890\\ 567\\ 283\\ 59\\ 9\\ 3\\ 48\\ 10\\ 204\\ 42\\ 437\\ \ldots\end{array}$	1,799 1,284 913 972 138 160 34 134 44 5 184 3 199 9	1,111 496 218 1,243 195 246 205 200 3 45 7 16 2 157 	934 374 186 338 89 43 41 - 2 5 10 5 1 1 4 414 	671 266 157 304 48 81 63 7 2 38 1 36 	7 2 1 3	$\begin{array}{c} 15,877\\ 8,304\\ 6,345\\ 6,904\\ 1,773\\ 1,356\\ 768\\ 422\\ 34\\ 18\\ 214\\ 56\\ 483\\ 90\\ 2,075\\ 12 \end{array}$
Total	17,580	12,996	5,878	4,144	2,446	1,674	13	44,731

MARRIAGES IN EACH DENOMINATION.-AUSTRALIA, 1922.

(ii) Number and Percentage in each Denomination, 1918 to 1922.—The number of marriages according to denomination, and the percentages on total marriages, are shown in the next table :—

Denomination	L .	1918.	1919.	1920.	1921.	1922.
Church of England	$\cdots \begin{cases} Total \\ \% \end{cases}$	$11,471 \\ 34.62$	$14,264 \\ 35.19$	$18,859 \\ 36.58$	$16,499 \\ 35.20$	15,877 35.49
Roman Catholic	$\cdots \begin{bmatrix} Total \\ \% \end{bmatrix}$	6,425 19.39	7,390 18.23	9,141 17.73	8,458 18.05	8,304 18.57
Presbyterian	$\cdots { Total } \%$	4,479	5,570 13.74	7,097	$\substack{6,808\\.14.52}$	6,345 14.18
Methodist	$\cdots \begin{bmatrix} Total \\ \% \end{bmatrix}$	$5,052 \\ 15.24$	$6,321 \\ 15.59$	7,796	$\substack{7,320\\15.62}$	6,904 15.43
Congregational	$\cdots \begin{bmatrix} Total \\ \% \end{bmatrix}$	1,402 $\cdot 4.23$	1,698 4.19	2,308 4.48	$\substack{2,001\\4.27}$	1,773 3.96
Baptist	$\cdots \left\{ \begin{array}{c} \text{Total} \\ \% \end{array} \right\}$	1,041 3,14	$1,342 \\ 3.31$	1,744 3.38	1,461 3.12	1,356 3.03
Church of Christ	·· Total	626 · 1.89	$\begin{array}{c} 703 \\ 1.73 \end{array}$	839 1.63	870 1.86	$\begin{array}{c} 768 \\ 1.72 \end{array}$
Lutheran	\cdots	337 1.02	356 .88	386 .75	401	422
Greek Orthodox	\cdots	27	24	30 .06	$23 \\ 05$	34 .08
Unitarian	Total	8	15	21 04	21 04	18
Salvation Army	Total	217	234	302 59	227 48	214
Seventh-Day Adventi	ists $\begin{cases} Total \\ 0/ \end{cases}$	50	58	60 12	57 12	56
Other Christians	Total	468	533	628 1.22	527 1.12	483 1.08
Hebrew	f Total	96 30	104	111	113	90
Registrar's Office	·· Total	1,424	1,887	2,198 4,26	2,074	2,075
Unspecified	$\cdots \begin{cases} Total \\ \% \end{cases}$	18	41	32 .06	9 . 02	$12 \\ .03$
	• /0	33,141	40,540	51,552	46,869	44,731

MARRIAGES IN EACH DENOMINATION .-- AUSTRALIA, 1918 TO 1922.

§ 3. Deaths.

1. Male and Female Deaths, 1918 to 1922.—The total numbers of deaths registered in each year from 1918 to 1922 inclusive are given in the two following tables. The annual average of male deaths during the period was 31,633, and of female deaths 23,938, the details being as follow :—

Year		N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North Terr.	Fed. Cap. Terr.	Aus- tralia.
1918 1919 1920 1921 1922	•••	10,914 15,256 12,088 11,490 11,014	8,079 10,508 9,059 8,662 8,187	4,359 5,337 4,824 4,397 4,372	2,430 2,927 2,814 2,655 2,537	$1,774 \\ 2,340 \\ 2,161 \\ 2,209 \\ 1,994$	959 1,175 1,055 1,166 1,084	66 82 48 70 52	4 7 4 3 5	28,585 37,632 32,053 30,652 29,245
Rate (a),	1922	10.06	10.54	10.61	9.99	11.02	10.03	19.75	2.97	10.33

MALE DEATHS, 1918 TO 1922.

(a) Number of deaths per 1,000 of mean population.

DEATHS.

Year.	N.S W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed. Cap. Terr.	Aus- tralia.
1918 1919 1920 1921 1922	7,902 11,088 8,846 8,536 8,152	7,098 8,862 7,773 7,503 6,968	2,792 3,519 3,123 2,745 2,780	1,960 2,548 2,269 2,327 2,071	1,059 1,250 1,227 1,271 1,173	843 1,017 981 1,031 913	${8 \atop {3} \atop {15} \atop {10} \\ 8 \end{array}$	$2 \\ 11 \\ 2 \\ 1 \\ 1 \\ 1$	21,664 28,298 24,236 23,424 22,066
Rate (a), 1922	7.73	8.77	7.53	8.21	7.38	8.55	7.84	0.88	8.06

FEMALE DEATHS, 1918 TO 1922.

(a) Number of deaths per 1,000 of mean population.

2. Male and Female Death Rates, 1922.—The crude male and female death rates for 1922 only are given in the last line of the preceding tables. Western Australia has the highest rate for males, and Victoria for females, while South Australia has the lowest male, and Western Australia the lowest female death rate. The rates for the two Territories are based on very small numbers, and comparisons with the States would be misleading.

Owing to differences in age constitution in the six States, the crude rates are not, however, strictly comparable. A more satisfactory rate is furnished by the "Index of Mortality" (see sub-para. 13). The death rates for males and females in each State in five-year age groups for the three years 1920 to 1922, that is, for the Census year and for the year immediately preceding and following, are shown on page 993.

The large death rate in 1919 was due to the outbreak of influenza. The rates in the period 1918 to 1922, excluding 1919, were remarkably steady, averaging about 11.2 per 1,000 for males, and 8.6 per 1,000 for females.

Year.		1918.	1919.	1920.	1921.	1922.
Male rate Female rate	•••	11.50 8.51	$\begin{array}{c} 14.40\\ 10.95\end{array}$	$\begin{array}{c} 11.75\\ 9.20\end{array}$	$\frac{11.05}{8.72}$	$\begin{array}{c} 10.33\\ 8.06 \end{array}$
Crude total rate		9.99	12.69	10.50	9.91	9.21

MALE AND FEMALE DEATH RATES (a).—AUSTRALIA, 1918 TO 1922.

(a) Number of deaths per 1,000 of mean population.

3. Total Deaths, 1918 to 1922.—The total number of deaths during each of the five years 1918 to 1922 is given below :—

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed. Cap. Terr.	Australia.
1918 1919 1920 1921 1922	18,816	15,177	7,151	4,390	2,833	1,802	74	6	50,249
	26,344	19,370	8,856	5,475	3,590	2,192	85	18	65,930
	20,934	16,832	7,947	5,083	3,388	2,036	63	6	56,289
	20,026	16,165	7,142	4,982	3,480	2,197	80	4	54,076
	19,166	15,155	7,152	4,608	3,167	1,997	60	6	51,311

TOTAL DEATHS, 1918 TO 1922.

4. Crude Death Rates, 1918 to 1922.—The crude death rates for the five years 1918 to 1922 are given in the next table. The comparatively high rate in 1919 was due to the heavy mortality from influenza.

Yea	н г .	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed Cap Terr	Aus- tralia.
1918		03.0	10 66	10.23	9.72	9.20	9.09	15 19	2 47	9 99
1919		13.18	13.15	12.22	11.69	11.24	10.69	18.26	7.79	12.69
1920		10.13	11.13	10.63	10.44	10.28	9.67	14.95	2.76	10.50
1921		9.50	10.52	9.36	10.02	10.43	10.30	20.47	1.61	9.91
1922		8.92	9.65	9.15	9.11	9.32	9.30	16.42	2.13	9.21

CRUDE DEATH RATES (a), 1918 TO 1922.

(a) Number of deaths per 1,000 of mean population for year.

5. Death Rates of Various Countries.—A comparison with foreign Countries is, owing to the different age constitution of the population, apt to show Australia in too favourable a light, but even if an allowance for the different age constitution were made, it would still be found occupying a very enviable position. The following table gives particulars of the crude death rates of various countries for the latest available years :—

Country.	Year.	Crude Death Rate.	Country.		Year.	Crude Death Rate.
New Zealand	1922 1922	8.8	Belgium	••	1920 1922	13.5
South Australia	1922	9 Î	Scotland	•••	1922	14 9
Queensland	1922	9.1	Germany	••	1920	15 1
Australia	1922	9.2	Prussia	••	1920	16.3
Tasmania .	1922	9.3	France		1920	17.2
Western Australia	1922	9.3	Hungary		1920	18.6
Victoria	1922	9.7	Finland		1919	18.9
Union of South Africa	i		Italy		1919	19.0
(Whites)	1921	10.4	Austria		1920	19.0
Canada (excluding Que-		1	Serbia		1912	21.1
bec)	1921	10.6	Spain		1921	21.4
Netherlands	1921	11.1	Bulgaria .		1911	21.5
Norway	1921	11.5	Japan		1921	22.7
Sweden	1921	12.4	Rumania		1914	23.8
United Kingdom	1921	12.5	Jamaica		1921	28.4
Switzerland	1921	12.7	Russia, European		1909	28.9
Denmark	1920	12.9	Ceylon		1921	31.2
England and Wales	1922	12.9	Chile		1921	33.4
United States (Regis-		1				
tration Area)	1920	13.1				

DEATH RATES (a).---VARIOUS COUNTRIES.

(a) Number of deaths per 1,009 of mean population.

6. Infantile Deaths and Death Rate.—(i) Australia, 1918 to 1922. In the following table, which shows both the total number of deaths of children under one year and the rate per thousand births since 1918, males and females are distinguished. The universal

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DEATHS.

experience that during the first few years of life the excess of male births tends to disappear as a consequence of the higher death rate of male infants, is confirmed by the fact that out of 338,266 male infants born from 1918 to 1922, 23,756 died during their first year of life, while of 319,863 female infants the number who died was only 17,706.

INFANTILE DEATHS AND DEATH RATES.—AUSTRALIA, 1918 TO 1922.

		Registered	l deaths under	one year.	Rate of	Infantile Mort	ality.(a).
Yea	ı г .	Males.	Females.	Total.	Male?.	Females.	Australia.
1918 1919 1920 1921 1922	· · · · · · · · · · · · · · · · · · ·	4,178 4,802 5,386 5,111 4,279	3,186 3,662 4,045 3,841 2,972	7,364 8,464 9,431 8,952 7,251	$\begin{array}{c} 64.82 \\ 76.31 \\ 76.66 \\ 72.97 \\ 60.62 \end{array}$	51.99 61.69 61.15 58.06 44.42	58.57 69.21 69.14 65.73 52.74

(a) Number of deaths under 1 year per 1,000 births registered.

(ii) States, 1918 to 1922. Divided among the States and Territories the rates of infantile mortality during the last five years were as follows :---

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	North. Terr.	Fed. Cap. Terr.	Aus- tralia.
1918 1919 1920 1921 1922	59.02 71.83 69.41 62.56 53.60	$\begin{array}{c} 61.75 \\ 67.90 \\ 73.70 \\ 72.55 \\ 53.35 \end{array}$	56.66 71.88 63.24 54.16 50.38	51.25 64.01 67.34 65.48 47.50	57.13 61.12 66.02 78.26 55.59	$\begin{array}{c} 60.80\\ 64.97\\ 65.51\\ 78.02\\ 55.70\end{array}$	$\begin{array}{r} 28.57 \\ 66.04 \\ 190.48 \\ 63.29 \\ .57.14 \end{array}$	$\begin{array}{c} 20.41 \\ 111.11 \\ 66.67 \\ 74.07 \\ 31.25 \end{array}$	58.57 69.21 69.14 65.73 52.74

INFANTILE MORTALITY RATES (a), 1918 TO 1922.

(a) Number of deaths under 1 year per 1,000 births registered.

The infantile mortality rate for Australia in 1922 was the lowest recorded; while, notwithstanding the increase of population, the actual number of infantile deaths was less than in any year since 1873. South Australia had the lowest, and Tasmania the highest rate.

(iii) Districts. The total number of births, and of deaths of children under one year of age and the average rate of infantile mortality for the five years 1918 to 1922 are shown in the following table for each of the fifty-nine districts for which the vital statistics have been tabulated. To afford a better idea of the geographical position of the districts, the name of a town situated in a fairly central part of each district has been added. The figures for the Federal Capital Territory and for Lord Howe Island are included for the sake of completeness, but are too small to be used in comparison with others. Remarkable variations are shown in the mortality rate for the various districts. The lowest rate was experienced in the western district of South Australia (38.97 per 1,000 births), and the highest in the Trans-Darling Plains of New South Wales (114.88 per 1,000 births).

States and Territories.	Districts.		Towns.	Total Births, 1918–22.	Total Deaths of Children under one year, 1918–22.	A verage Infantile Mortality per 1,000 Births, 1918–22.
New South Wales	Metropolitan		Sydney	107.366	7.183	66.90
	North Coast		Grafton	21,900	1,001	45.66
"	Lower Hunter	••	Newcastle	28,280	1,989	70.33
"	South Coast	••	Nowra	14,404	792	56 21
"	Northern Tableland		Armidale	13,146	707	53.78
,,	Central Tableland		Bathurst	16,621	1,198	72.08
",	Southern Tableland	••	Goulburn	13,615	854	62.72
" ··	North-Western Slope	••	Moree	5,448	302	55.43
"	South-Western Slope	•••	Temora	10.461	481	45.98
,,	Riverina		Hay	6,014	342	56.87
",	Plains East of Darling	••	Cobar	1,658	120	72.38
" ··	Trans-Darling Plains	••	Broken Hill	4,544	520	114.88
Vietoria" ···	Metropolitan	••	Melbourne	89 775	6 551	72 07
*100011a	Central		Geelong	16,126	1.030	63.87
,,	North-Central	••	Kyneton	6,259	356	56.88
,,	Western	••	Hamilton	17,316	976	56.36
.,	Wimmera	••	Horsnam	7,128	427	59.90
,,	Northern	••	Rochester	15.911	961	60.40
,, .,	North-Eastern		Beechworth	4,693	227	48.37
	Gippsland		Sale	8,096	358	44.22
Queensland	Metropolitan	••	Brisbane	29,600	2,072	70.00
"	Wide Bay	• •	Ipswich	11,700	564	48.21
,,	Port Curtis	••	Rockhampton	7,607	491	64.55
,,	Edgecumbe		Townsville	9,822	550	55.99
,,	Rockingham	• •	Cairns	5,427	243	44.78
,,	York Peninsula	••	Cooktown	1,047	75	71.63
"	Carpentaria	••	Winton	1,820	132	72.29
,,	South-Western		Charleville	1,333	93	69.77
,,	Central		Blackall	3,141	170	54.12
,,	Maranoa	••	Roma	1,859	110	59.17
South Amsteolis	Downs	•••	Toowoomba	13,151	695	52.85
South Australia	Central	••	Gawler	11 831	541	45 73
,,	Lower North		Redruth	9,419	629	66.78
**	Upper North		Port Augusta	2,837	162	57.10
,,	South-Eastern	••	Mount Gambier	2,915	121	41.51
Western Australia	Metropolitan	••	Port Lincoln	2,412	94	38.97
Western Australia	Northern Agricultural		Geraldton	5,434	311	57.23
,,	South-Western		Katanning	8,843	425	48.06
,,	Eastern Goldfields	••	Kalgoorlie .	3,624	272	75.06
,,	Northern Goldfields	••	Pilbara	653	54	82.69
,	Northern	•••	Broome	179	16	80.38
Tasmania	Hobart		Hobart	7,545	563	74.62
"	Launceston	••	Launceston	4,418	329	74.47
,,	North-Eastern	••	Scottsdale	2,788	164	78.82
"	Midland	••	Stanley	7,047	431	61.16
,,	South-Eastern	•••	Sorell	2,694	153	56.79
** **	South-Western		Franklin	643	46	71.54
Northern Territory			Darwin	423	31	73.29
Federal Capital			Canberra	150	8	53.33
retritory	1			1	1	
	1			,	1	

INFANTILE MORTALITY.-STATE DISTRICTS, 1918 TO 1922.

(iv) Various Countries and Cities. Compared with other countries, the cities and States of Australia occupy a very favourable position, being surpassed by New Zealand only. It may be pointed out also in connexion with the rates hereunder, that a high birth rate is often, though not invariably, accompanied by a high infantile death rate. The figures in the subjoined tables relate to the latest years for which returns are available :---

Country.	Year.	Rate of Infantile Mor- tality. (a)	Crude Birth Rate. (b)	Country.		Year.	Rate of Infantile Mor- tality. (a)	Crude Birth Rate. (b)
	1000	49		Donmanlı		1090	01	
New Zealand	1922	42	40.4	Sootland	••	1920	101	20.4
South Australia .	1922	48	23.1	Delaium	••	1922	101	23.5
Queensland	1922	50	20.0	Elgium	••	1010	103	10.5
Australia	1922	53	24.7	France	••	1919	123	12.6
Victoria	1921	53	23.1	Germany	••	1920	131	25.9
New South Wales	1922	54	25.7	Finland	••	1919	135	19.2
Western Australia	1922	56	24.0	Italy :.		1917	140	19.0
Tasmania	1922	56	27.1	Prussia		1920	142	25.7
Norway	1921	63	24.5	Serbia		1911	146	36.2
Sweden	1921	65	21.4	Spain		1921	147	30.4
Trish Free State	1922	68	18.6	Bulgaria		1911	156	40.2
Netherlands	1921	76	27.4	Austria		1919	156	18.0
England and Wales	1922	77	20.6	Japan		1921	168	35.1
Union of South	1919	82	28.9	Jamaica		1920	173	40.8
Africa (Whites)				Rumania		1914	187	42.5
United Kingdom	1921	83	22.5	Cevlon		1921	192	40.8
Switzerland	1920	84	20.9	Russia, Europe	an	1909	248	44 0
United States (Re-	1920	86	23.7	Hungary		1915	264	23 5
ristration Area)	1		-9	Chile		1914	286	37 0
Canada (avaluding	1091	88	26.3					07.0
Quebec)	1021	50	20.0					
QUEDEC)		• •	-					

INFANTILE MORTALITY RATES (a) .--- VARIOUS COUNTRIES.

(a) Number of deaths under 1 year per 1,000 births registered. (b) Number of births per 1,000 of mean population.

INFANTILE	MORTALITY	RATES	(a).—VARIOUS	CITIES.
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City.		Year.	Rate of Infantile Mortality. (a)	City.		Year.	Rate of Infantile Mortality. (a)
Stockholm		1922	47	Liverpool		1922	94
Amsterdam		1922	49	Antwerp		1921	98
Christchurch		1921	54	Hamburg		1922	109
Auckland		1921	54	Monte Video		1916	iii
Zürich		1916	55	Dublin		1922	116
Rome		1915	56	Dresden		1922	116
Brisbane		1922	57	Glasgow		1922	120
Sydney		1922	58	Genoa		1916	126
Adelaide		1922	58	Leipzig		1922	128
Melbourne		1922	58	Munich		1922	131
Perth		1922	58	Cologne		1922	131
Wellington		1921	61	Prague		1922	131
Christiania		1922	66	Aberdeen		1922	133
Hobart		1922	72	Chicago		1916	145
Geneva		1916	73	Vienna		1922	149
London		1922	74	Marseilles		1916	157
New York		1922	74	Berlin		1922	163
Copenhagen		1922	76	Warsaw		1922	165
Birmingham		1922	85	Rio de Janeiro		1912	174
Washington		1919	85	Madrid		1915	177
Paris		1922	87	Breslau		1922	184
Edinburgh		1922	91	Florence		1916	192
Toronto		1917	92	Montreal	•• 1	1911	242
Buenos Aires		1916	94	Petrograd		1912	249
Manchester		1922	94	Madras		1922	300
Belfast	•••	1922	94	Bombay		1922	402

(a) Number of deaths under 1 year per 1,000 births registered.

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Information relative to the causes of death of children under one year of age will be found in sub-section 18.

7. Deaths in Age-Groups, 1918 to 1922.—A distribution into age-groups has been made of the 277,855 deaths which occurred in Australia from 1918 to 1922, and the results have been tabulated for each State. It is, however, sufficient here to show the results for Australia as a whole, which are as follows :—

Age-Group.	Males.	Females.	Total.	Percentage on Total Males.	Percentage on Total Females.	Percentage on Total.
Under 1 year 1 year and under 5 5 years and under 20 20 years and under 40 40 years and under 60 60 years and under 65 65 years and over Age unspecified	23,756 8,408 8,172 21,485 35,291 12,862 47,893 300	$17,706 \\ 7,250 \\ 6,663 \\ 19,303 \\ 22,439 \\ 7,519 \\ 38,753 \\ 55 \\ 55$	41,462 15,658 14,835 40,788 57,730 20,381 86,646 355	$15.02 \\ 5.32 \\ 5.17 \\ 13.58 \\ 22.31 \\ 8.13 \\ 30.28 \\ 0.19$	$14.79 \\ 6.06 \\ 5.57 \\ 16.12 \\ 18.75 \\ 6.28 \\ 32.38 \\ 0.05$	$14.92 \\ 5.64 \\ 5.34 \\ 14.68 \\ 20.78 \\ 7.33 \\ 31.18 \\ 0.13$
Total	158,167	119,688	277,855	100.00	100.00	100.00

DEATHS IN AGE GROUPS .-- AUSTRALIA, 1918 TO 1922.

8. Deaths at Single Ages and in Age-Groups, 1922.—(i) General. The 51,311 deaths registered in Australia in the year 1922 will be found tabulated under single years, and in groups of five years for each State and Territory, in Bulletin No. 40, "Australian Demography, 1922." It has been thought advisable to tabulate the deaths during the first two years of life in greater detail. The first month has, therefore, been shown in weeks, and the twenty-three months up to the end of the second year in months. The figures indicate that a great number of children died during the first week, and that the mortality lessens towards the end of the second year. A summary for Australia is given in the following table :—

DEATHS AT SINGLE AGES AND IN AGE-GROUPS .--- AUSTRALIA, 1922.

·			_						
Ages.		Males.	Females.	Total.	Ages.		Males.	Females.	Total.
Total under 1 month ,, 1 month and un ,, 3 months and un ,, 6 months and un	der 3 der 6 der 12	2,332 589 599 759	$1,623 \\ 408 \\ 383 \\ 558$	3,955 997 982 1,317	Total 20-24 years ,, 25-29 ,, ,, 30-34 ,, ,, 35-39 ,, ,, 40-44 ,,	· · · · · · ·	648 801 881 1,039 1,131	633 770 874 905 861	1,281 1,571 1,755 1.944 1,992
Total under 1 year		4,279	2,972	7,251	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	 	1,432 1,715 2,157 2,634	937 1,137 1,299 1,540	2,369 2,852 3,456 4,174
l year and under 2 -2 years 3 ", 4 ",	 	701 290 188 137	553 226 169 130	1,254 516 357 267	" 65-69 " " 70-74 " " 75-79 " " 80-84 " " 80-84 " " 90-94 " " 95-90 "	· · · · · · ·	2,580 2,202 2,053 1,492 930 325 64	1,667 1,581 1,764 1,461 976 331 95	4,247 3,783 3,817 2,953 1,906 656
'Total under 5 years	••	5,595	4,050	9,645	, 100 and over Age Unspecified	· · · ·	19 40	10 15	29 55
Total 5–9 years ,, 10–14 ,, ,, 15–19 ,,	 	$552 \\ 413 \\ 542$	444 325 391	996 738 933	Total All Ages		29,245	22,066	51,311

(ii) Rates. The following tables give the death rate per 1,000 living at each age for the three years 1920, 1921, and 1922, viz., the Census year 1921, and the years immediately preceding and following. The Northern Territory is included with South Australia, and the Federal Capital Territory with New South Wales :--

AVERAGE ANNUAL DEATH RATES.-AGE-GROUPS, 1920 TO 1922.

		Age-Gr	oup.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Australia.
-					N	IALES.				<u> </u>
0	to	4 ve	ars	21.49	22 61	20.73	20.01	23.88	20.72	21.64
5		9 [°] ,	,	1.85	2,15	1.96	2.25	2.24	2.04	2.02
10	' ,,	14,	,	1.59	1.61	1.58	1.56	1.42	1.83	1.59
15	,,	19,	,	2.16	2.07	2.90	2.42	2.37	2.66	2.30
20	,,	24,	,	2.74	3.06	3.54	3.33	3.96	3.23	3.10
25	.,,,	29,	,	3.36	3.60	4.37	3.64	4.08	5.05	3.70
30	,,	34,	,	4.13	3.70	4.58	4.00	5.40	4.59	4.16
35	,,	39,	• ••	5.36	5.32	5.95	5.18	6.42	4.79	5.48
40	,,	44 ,	• ••	7.85	6.60	7.86	6.20	7.90	5.98	6.89
45	,,	49,	,	9.61	9.80	10.60	8.81	12.09	8.71	9.91
50	,,	54 ,	,	12.38	12.24	14.23	11.76	17.18	11.51	12.90
55	"	59,	,	18.72	18.24	20.34	19.70	23.70	13.44	19.04
60	"	04 , 60	• • •	28.30	28.48	30.30	20.03	34.19	23.95	28.71
00	_ ,,	09,	,	45.00	44.00	44.93 64.56	42.31 69 01	49.01	59 55	43.14
70	,,	74 ,	• • •	105.51	107.84	102.20	106 92	115 56	100 46	106 52
0	, ,,	19, QA	,	150 19	163 74	159.06	161 73	184 40	139 47	160.55
85	"	80 ·	• ••	971 79	266 12	227 79	226 87	283 46	939 30	250 17
90	yy ar	, ou id over	,	368 58	387 01	314 96	387.09	566 67	350 00	376 08
				1000100	Fr	MALES.			1 000100	0.0.00
_				1 10 00	15 01	10.05	10.05	10.00	10.74	17.00
Ű	to	4 ye	ars	16.92	17.91	16.05	16.25	18.80	16.74	17.09
10	,,	9, 14	,	1.00	1.95	1.89	2.27	1.28	2.09	1.82
10	,,	14 ,	,	1.21	1.20	1.43	1.34	1.23	1.03	1.27
00	"	19,	.,	9.49	2.00	1.99	2.12	2 07	2.08	1.90
20	,,	24 , 90	·, ··	2.40	2.92	2.01	2.00	3.00	3 97	2.75
20	,,	20,	,	3 85	4 13	4 11	4 21	4 60	4 41	4 06
35	,,	39	,	4.64	4.98	5.80	5.18	4.90	5.98	5 00
40	,,,	44	,	5.15	5.74	6.03	4.98	6.39	5.48	5.51
45	"	49		6.71	6.91	6.76	6.40	8.12	7.31	6.87
50	,,, ,,,	54 .		9.35	9.11	9.11	9.10	10.62	8.61	9.27
55	,,	59 ,		13.17	12.87	13.60	10.85	12.81	14.23	12.92
60	·	64 ,	,	19.08	19.06	19.71	18.27	17.78	20.13	19.05
65	,,	69,	,	31.59	31.69	30.81	32.89	30.49	34.72	31.76
70	,,	74,	,	50.24	51.83	50.61	45.65	54.20	49.42	50.43
75	,,	79,	,	88.19	88.52	88.10	83.98	96.43	80.32	87.81
80	,,	84,	,	140.29	143.71	126.40	132.25	137.07	126.00	138.32
85	,,	89,	,	225.11	231.45	210.65	193.54	219.51	208.79	221.44
90	an	d over	·	380.95	321.79	288.89	337.50	478.26	352.94	341.68
					Pı	RSONS.				
0	to	4 ye	ars	19.24	20.30	18.45	18.17	21.39	18.75	19.40
5	,,	9Ĕ,	,	1.76	2.05	1.93	2.26	1.76	2.07	1.92
10	,,	14 ,	,	1.40	1.40	1.51	1.45	1.33	1.73	1.43
15	,,	19,	,	1.90	2.03	2.45	2.57	1.86	2.62	2.10
20	,,	24,	,	2.58	2.99	3.17	3.09	3.52	3.49	2.92
25	,,	29,	,	3.42	3.57	4.00	3.75	4.03	4.43	3.64
30	,,	34 ,	,	3.99	3.92	4.37	4.10	5.03	4.50	4.11
35	,,	39,	,	5.03	5.14	5.88	5.18	5.72	5.39	5.24
40	,,	44 ,	,	5.99	6.16	7.04	5.60	7.23	5.73	6.22
45	,,	49 ,	,	8.21	8.30	8.89	7.62	10.41	8.04	8.44
50	**	54 ,	,	10.97	10.67	12.04	10.46	14.58	10.16	11.20
55	,,	59,	,	10.19	10.60	17.57	15.32	19.01	13.80	10.22
00	,,	04,	,	24.11	23.93	20.99	ZZ.13	27.90	22.13 26 72	24.22
00	"	09 , 74	,	57.81	59.00	59.25 59.24	51.80	41.71	50.73	57 00
10	"	74 , 70	,	07.09	07.09	06.04	00.00	106 60	02 60	06 00
- 19 90	"	19,	,	91.02	152 40	144 74	94.82 145 40	169 59	198 21	140 00
85	"	80 ,	,	249 05	246 87	219 48	206 40	252 00	219 14	238 01
90	", an	d over	,	374.81	349.09	304.15	355.73	528.30	351.64	357.36

The tables show a high death rate for children under five years of age, but it rapidly diminishes until, at ages 10 to 14, the rate is 1.43 per 1,000, which is the lowest at any age. The rate thereafter gradually rises with increasing age until, at the ages 90 and over, more than one-third die every year.

9. Deaths of Centenarians, 1922.—Particulars concerning the twenty-nine persons who died in 1922 aged 100 years and upwards, are given in the following table. It must, of course, be understood that while the Registrars-General of the various States take the greatest care to have statements as to abnormally high ages verified as far as possible, absolute reliance cannot be placed on the accuracy of the ages shown, owing to the wellknown tendency of very old people to overstate their ages. No attempt has been made by the Commonwealth Bureau of Census and Statistics to verify the truth of the statements made. The fact must not be disregarded in connexion with this question that while parish registers in the United Kingdom often date very far back, compulsory registration of births dates practically only from 1874, the Act passed in 1836 having left many loop-holes open for those unwilling to register the births of their children.

	Age.	Locality where Death occurred.	State.	Cause of Death.	Occupation.	Birthplace.	Length of Residence in Australia.	Conjugal Condition.
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DEATHS	0E	CENTENADIANS AUSTRALIA	1022
DEATINS	UP	CENTENAKIANSAUSTKALIA,	1922.

110	Auburn	N.S.W	Senility	Carpenter	Ireland	60	years		Married
108	Brisbane	Queensiand	, ,	Labourer	Ireland	68	,,	••	Single
105	Deloraine	Tasmania	Pneumonia	Farmer	England	77	,,	• •	Married
104	Newtown	N.S.W	Bronchitis	Manufac- facturer	,,	30	,,	••	"
102	Goulburn		Senility	Farmer	Ireland .	72	.,		
102	Manly	,,	Chronic Cystitis	Gardener	,,	55	,,	• •	Single
102	St. Arnaud	Victoria	Senility	Farm	Scotland	67	•,	••	,,
102	Surrey Hills	,,	,,	Corn Mer-	England	30	,,		Married
				chant					
102	Brunswick	,, ····	"	Shipwright	,,	71	,,		,,
102	Benalla	,,	,,	Farmer	,,	74	,,		,,
102	Longford	Tasmania	,,	Labourer	,,	84	,,		.,
101	Echuca	Victoria		Gentleman	,,	60	,,	• •	,,
100	Paddington	N.S.W	,,	Miner	China .	73	,.		, , , , , , , , , , , , , , , , , , ,
100	Hawthorn	Victoria	,,	Gentleman	Syria	22	.,		· ,,
100	Clifton Hill			Miner	England	67			Single
100	Carlton		Myocarditis	Cab Driver	Ireland	70			Married
100	Mt. Margaret	W. Australia	Senility	Hotel Yard-	England	26	,,	• •	Unspecified
100	Wynyard	Tasmania		Grazier	Ireland	73			Married
100	Launceston		,,,	Pensioner	England	71			1

MALES.

FEMALES.

104	Caulfield	Victoria	Senility			England .	. 70 3	ears	Married
102	Tingha	[N.S.W		• •		N.S.W.	. Nat	ive	1 .,
102	Romsey	Victoria	.,,			Ireland .	. 70 y	ears	,,
102	Prahran	l	Pneuro	nia	l		. 171		
102	Charters Towers	Queensland	Senility	••		England .	32	,,	•,
101	Chatswood	N.S.W	,,			,, .	. 77	, ,	Single
101	Brisbane	Queensland			·	Ireland .	. : 46		
101	Longford	Tasmania	,,			England .	. 89	·· ·	Married
100	Portland	Victoria	· ,.				. 82	,, ,.	.,
100	Hindmarsh	S. Australia	,,	••		,, .	. 68	·, · ·	
		I			l	1	<u> </u>		1

10. Length of Residence in Australia of Persons who Died in 1922.---The length of residence in Australia of all persons whose deaths were registered in the year 1922 has been tabulated for all the States, and a summary of the results is shown below :----

DEATHS.

Length of Residence.	Male Deaths.	Female Deaths.	Total Deaths.	Length of Residence.	Male Deaths.	Female Deaths.	Total Deaths
Born in Australia Resident under 1 year , 1 year , 2 years , 3 ,, , 5 ,, , 6 ,, , 7 ,, , 8 ,, , 9 ,, , 10 to 14 years , 15 to 19 ,, 20 to 24	19,029 112 90 50 21 13 20 38 54 81 129 610 186 292	14,618 43 45 62 33 11 9 22 22 61 97 331 84 143	32,647 155 135 112 54 24 29 60 76 142 226 941 270 435	Resident 25 to 29 years , 30 to 34 ,, , 35 to 39 ,, , 40 to 44 ,, , 50 to 54 ,, , 55 to 59 ,, , 60 to 64 ,, , 65 yrs. and over Length of residence not stated	260 734 1,059 1,227 662 708 671 923 1,595 1,681 29,245	135 381 659 604 402 504 630 881 1,781 508 22,066	395 1,115 1,718 1,831 1,064 1,212 1,301 1,804 3,376 2,189 51,311

LENGTH OF RESIDENCE IN AUSTRALIA OF PERSONS WHO DIED IN 1922.

11. Birthplaces of Persons who Died in 1922.—The following table gives the birthplaces of persons whose deaths were registered in 1922. Full particulars will be found in "Australian Demography," Bulletin No. 40.

BIRTHPLACES OF PERSONS WHO DIED IN 1922.-AUSTRALIA.

Birthplace.		Males.	Femalcs.	Total.	Birthplace.	Males.	Females.	Total.
				-	ASTA - A - A	1		
AUSIKALASIA New Senth W	1 (- 1	0 700	F 000	10 /07	ASIA—continuea.	001		0.07
Wietorio	ales	5 610	0,008	12,437	Lanan	291	4	290
Ouconaland	••	9,018	4,413	2 5 14	Japan		1	23
Queensiand South Austrol	· · ·	2,007	1,007	0,014	Other Asiatic			50
Woston Austral	nalia	1,919	1,519	3,438	Countries	44	8	52
Termania	rana	1 001	000	1,127				
Lasmama Northorn Tor	•••	1,091	998	2,089	AEDICA			
Normern ten	nory	5	0	11	Inion of Sth Africa	04	1 11	0.5
Nor Zooland		177	100	000	Other African Deit	24	11	30
New Zealand	••	111	109	280	Other African Brit.	10	_	00
FIDADE			i		Possessions	10	1	23
EUNULE		1 001	9 400	0 909	Compteilog			4
Waloa	••	4,901	3,404	0,000	Countries	2	2	4
Sectland	••	1 200	120	0 070]	
Incland	••	1,320	948	2,270	AMEDICA			
Islo of Man	••	2,007	2,012	4,139	AMERICA-	40	10	64
Other Euro	•••	°	1	9	Other American	40	18	04
Brit Posses	rione	99	0	41	Diner American	_	4	1
Austria Hung	0 777	90	0	41	Drit. Possessions	Э	4	9
Donmark	ary	120	0	40	United States of	50	00	· • •
France	••	159	04	110	America	- 58	20	04
Cormonu	••	447	941	600	Countries	01	· _	00
Greece	••	96	241	000	Countries	21	1	28
Ttoly	••		19	104				
Norwow	••	92		104	DOLYNIESTA			
Russia	••	06	95	191	Polymonian Prit			
Sweden	••	100	20	121	Possessions	16	=	01
Switzerland	••	100	10	27	South Son Jalanda	10	6	49
Other Euro	·· nean	20	ฮ	31	Bouth Sea Islands	37		40
Countries	Joan	20	0	40	At Sea	62	51	114
Countries	••	34	0	40	At Sea	03	1 51	114
ASIA	i				Unspecified	615	142	757
British India		88	29	117		010		
Other Asiatic	Brit.							
Possessions		13	4	17	Total Deaths	29.245	22.066	51.311
			-	- '			,	
				\	۱۱		•	3

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12. Occupations of Males who Died in 1922.—(i) Australia, 1922. Information as to the occupations of the 29,245 males who died in Australia in 1922 is contained in the following statement :--

Occupation.	No. of Deaths.	Occupation.	No. of Deaths.
CLASS I.—PROFESSIONAL.		CLASS III.—COMMERCIAL—cont.	1
General Government	163	Leather, raw materials	1
Local Government	30	Wool and tallow	12
Defence	167	Hav. corn. etc.	8
Law and order	193	Other vegetable matter	20
Religion	86	Wood and coal	28
Health	207	Stone, clay, glass	1
Literature	48	Ironmongery	20
Science	16	Merchants	141
Civil and mechanical engineering.		Shopkeepers and assistants	210
architecture and surveying	82	Dealers and hawkers	151
Education	140	Agents and brokers	136
Fine arts	31	Clerks, hookkeepers, etc.	640
Music	42	Commercial travellers and salesmen	271
Amusements	112	Others engaged in commercial	
		nursuits	180
Total Professional	1,317	Speculators on chance events	23
		Total Commercial	9 871
CLASS IIDOMESTIC.		i otar commerciar	
Hotelkeepers and assistants	465		
Others engaged in providing hoard		CLASS IVTRANSPORT AND	
and lodging	13	COMMUNICATION.	
Coachmen and grooms	40	Railway traffic	519
Hairdressers	70	Tramway traffic	64
Laundrymen	19	Road traffic	610
Others engaged in domestic occu-		Sea and river traffic	501
nations	138	Postal service	80
Patrons		Telegraph and telephone service	48
Total Domestic	745	Messengers, etc.	18
		Aviation	2
CLASS III.—COMMERCIAL.		Total Transport and Commu-	
Banking and finance	97	nication	1,842
Insurance and valuation	85		
Land and household property	48		
Books, publications and advertising	g 36	CLASS V.—INDUSTRIAL.	
Musical instruments	1	Books and publications	163
Prints, pictures, and art materials	1	Musical instruments	14
Ornaments and small wares	1	Prints, pictures and art materials	7
Watches, clocks, jewellery	1	Ornaments and small wares	21
Machines, tools and implements	1	Designs, medals, type and dies	2
Carriages and vehicles .	1	Watches and clocks	31
Harness and saddlery	1	Arms and ammunition	6
Ships and boats	2	Engines, machines, tools, etc.	119
Building materials	10	Carriages and vehicles	143
Furniture	6	Harness, saddlery and leatherware	81
Chemicals and by-products	2	Ships, boats and equipment	43
Paper and stationery	7	Furniture	104
Textile fabrics	76	Building materials	105
Dress	32	Chemicals and by-products	5
Fibrous materials	5	Textile fabrics	49
Animal food	318	Dress	348
Vegetable food	80	Fibrous materials	9
Groceries and stimulants	184	Animal food	19
Living animals	34	Vegetable food	171
.			

OCCUPATIONS	0F	MALES	WH0	DIED	IN	1922.	—AUSTRALIA.
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OCCUPATIONS OF MALES WHO DIED IN 1922.-AUSTRALIA-continued.

Occupation.	No. of Deaths.	Occupation.	No. of Deaths.
CLASS V.—INDUSTRIAL—cont. Groceries and stimulants Animal matter Workers in wood not elsewhere classed Paper Stone, clay, glass	$73 \\ 40 \\ 15 \\ 4 \\ 72$	CLASS VI.—AGRICULTURAL, PAS- TORAL, MINING PURSUITS, ETC. Agricultural	3,281 807 39 112 120
Jewellery and precious stones	41	Water conservation and supply	13
Gas electric lighting etc.	457	Mines and quarries	1,292
Building—		Total Primary Producers	5,664
Builders	135		
Stonemasons Bricklayers	81 92	CLASS VII.—INDEFINITE.	
Slaters	3	Independent means, having no	
Carpenters	463	specific occupation	532
Plasterers	62	Occupation unspecified	846
Painters and glaziers	207		1.000
Plumbers	95	Total Indefinite	1,378
Signwriters	9		
Disposal of the dead	04	CLASS VIII.—DEPENDENTS.	
Disposal of refuse	97	Dependent relatives (including per-	
Other industrial workers	– – – –	sons under 20 years of age with	
Manufacturers	80	no specified occupation)	6.783
Engineers, firemen	452	Supported by voluntary and State	
Contractors	254	contributions	53
Labourers, undefined	4.332		
Others	22	Total Dependents	6,836
Total Industrial	8,592	Total Male Deaths	29,245

(ii) Australia, 1918 to 1922. The male deaths in Australia grouped according to the main classes of occupations, and the percentage of each class on the total male deaths for the five years 1918 to 1922, are shown in the table hereunder :---

OCCUPATIONS OF MALES WHO DIED IN AUSTRALIA, 1918 TO 1922.

	Occupati	on.		1918.	1919.	1920.	1921.	1922.
Class			('Estal	1 495	1.044	1 201	1 207	1 917
I.	Professional	••	Per cent.	1,485	1,944	4.34	4.26	4.50
11.	Domestic		{ Total Per cent.	731	1,059	739 2.30	830 2.71	$\frac{745}{2.55}$
111.	Commercial		(Total) Per cent.	2,451	3,694	2,814	2,739	2,871
IV.	Transport and c munication	om-	Total Per cent.	1,778 6.22	2,706	1,910	1,841	1,842
V.	Industrial		Total Per cent.	7,952	11,397 30,29	8,849 27.61	8,613 28.10	8,592 29.38
VI.	Agricultural, toral, Mining,	Pas- etc.	{ Total { Per cent.	5,764 20.16	6,966 18.51	5,786 18.05	$5,711 \\ 18.63$	$5,664 \\ 19.37$
VII.	Indefinite	••	j Total) Per cent.	1,090 3.81	$\substack{1,529\\4.06}$	1,595 4.98	$1,436 \\ 4.68$	1,378 4.71
VIII.	Dependents	•	{ Total Per cent.	7,334 25.66	8,337 22.15	8,969 27.98	8,175 26.67	6,836 23.37
	Total		••	28,585	37,632	32,053	30,652	29,245

13. Index of Mortality.—(i) For Year 1922. The death rates—those for age-groups on page 993 excepted—so far quoted are crude rates, i.e., they simply show the number of deaths per thousand of mean population, without taking the age constitution into consideration. It is, however, a well-known fact that the death rate and age constitution of a people are intimately related; thus, other conditions being equal, the death rate of a country will be lower if it contains a large percentage of young people (not infants). In order to obtain a comparison of the mortality of various countries on a uniform basis so far as age constitution is concerned, the International Statistical Institute in its 1895 session recommended the universal adoption of the population of Sweden in five agegroups, as ascertained at the Census of 1890, as the standard population by which the "Index of Mortality," as distinguished from the crude death rate, should be ascertained. The calculation for 1922 is shown below for each of the States and Territories and for Australia, the distribution of the mean population of 1922 into age-groups being in accordance with the distribution as found at the Census of 1921 :—

			2		
Age-Group.	Mean Popula- tion, 1922, distributed according to Results of Census of 1921.	Number of Deaths, 1922.	No. of Deaths per 1,000 of Mean Population, 1922, in each Age-Group.	Age Distribution per 1,000 of Standard Population.	Index of Mortality.
NEW SOUTH WALES.					
Under 1 year 1 year and under 20 20 years ,, 40 40 ,, 56 60 ,, and upwards Total	. 54,513 . 820,651 . 703,990 . 413,458 . 155,982	2,960 1,913 2,452 3,875 7,966 	54.30 2.33 3.48 .9.37 51.07 8.92	25.5 398.0 269.6 192.3 114.6 1,000.0	1.39 0.93 0.94 1.80 5.85 10.91
VICTORIA.		-			
Under 1 year	. 35,792 . 567,057 . 502,859 . 333,125 . 130,268 . 1,571,101	1,937 1,229 1,777 3,204 7,008 15,155	54.12 2.17 3.53 9.56 53.80 9.65	25.5 398.0 269.6 192.3 114.6 	1.38 0.86 0.95 1.84 6.17 11.20
QUEENSLAND.					
Under 1 year 1 year and under 20 20 years ,, 40 40 ,, ,, 60 60 ,, and upwards Total	21,029 308,314 256,166 144,332 53,049 782,890	1,010 892 1,016 1,468 2,766 7,152	48.03 2.89 3.97 10.17 52.14 9.14	25.5 398.0 269.6 192.3 114.6 1,000.0	1.22 1.15 1.07 1.96 5.98 11.38
SOUTH AUSTRALIA.					
Under 1 year	12,007 190,738 164,514 96,893 42,088	570 460 591 887 2,100	$\begin{array}{r} 47.47\\ 2.41\\ 3.59\\ 9.15\\ 49.90\end{array}$	$\begin{array}{r} 25.5\\ 398.0\\ 269.6\\ 192.3\\ 114.6\end{array}$	$1.21 \\ 0.96 \\ 0.97 \\ 1.76 \\ 5.72$
Total	. 506,240	4,608	9.10	1,000.0	10.62

HIDLA OF MONTABLES IND	IN	ĪD	EX	0F	MOR	FAL I	ITY,	1922
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DEATHS.

			1		
Age-Group.	Mean Popula- tion, 1922, distributed according to Results of Census of 1921.	Number of Deaths, 1922.	No. of Deaths per 1,000 of Mean Population, 1922, in each Age-Group.	Age Distribution per 1,000 of Standard Population.	Index of Mortality.
WESTERN AUSTRALIA					
Under 1 year	7,952 132,904 100,113 78,278 20,177	453 339 430 890 1,055	56.972.554.3011.3752.29	25.5 398.0 269.6 192.3 114.6	1.45 1.01 1.16 2.19 5.99
Total	. 339,424	3,167	9.33	1,000.0	11 80
TASMANIA.					
Under 1 year	. 5,669 . 88,359 . 64,273 . 39,544 . 17,029	324 231 281 331 830	57.15 2.61 4.37 8.37 48.74	$\begin{array}{r} 25.5\\ 398.0\\ 269.6\\ 192.3\\ 114.6\end{array}$	1.46 1.04 1.18 1.61 5.59
Total	. 214,874	1,997	9.29	1,000.0	10.88
NORTHERN TERRITORY.				•	
Under 1 year	. 77 . 905 . 1,194 . 1,061 . 419	4 1 10 26 19	$51.95 \\ 1.11 \\ 8.38 \\ 24.51 \\ 45.35$	$\begin{array}{r} 25.5\\398.0\\269.6\\192.3\\114.6\end{array}$	$1.32 \\ 0.44 \\ 2.26 \\ 4.71 \\ 5.20$
· lotal	. 3,656	60	16.41	1,000.0	13.93
FEDERAL CAPITAL TERRITORY					
Under 1 year	- 68 - 1,150 - 976 - 474 - 146	1 2 1 2	14.71 1.74 1.02 13.70	25.5 398.0 269.6 192.3 114.6	0.38 0.69 0.27 1.57
Total	. 2,814	6	2.13	1,000.0	2.91
A USTRALIA.					
Under 1 year	. 137,107 . 2,110,078 . 1,794,085 . 1,109,165 . 419,158	7,259 5,067 6,558 10,681 21,746	52.94 2.40 3.66 9.63 51.88	25.5 398.0 269.6 192.3 114.6	$1.35 \\ 0.96 \\ 0.99 \\ 1.85 \\ 5.95$
Total	. 5,569,593	51,311	9.21	1,000.0	11.10

INDEX OF MORTALITY, 1922-continued.

NOTE.—The small number of persons whose ages were not ascertained at the 1921 Census has been proportionately distributed among the various age-groups, and the same plan has been followed in regard to the persons who died in 1922, and those whose ages were not stated in the certificate of death.

Among the States Western Australia had the highest index and Victoria the highest crude rate, while South Australia had the lowest index and New South Wales the lowest crude rate. The range of the indexes was above that of the crude rates, the latter varying from 8.92 per thousand in New South Wales to 9.65 per thousand in Victoria,
a range of 0.73 per thousand, while the index varied from 10.62 per thousand in South Australia to 11.80 per thousand in Western Australia, a range of 1.18 per thousand.

(ii) Years 1918 to 1922. For purposes of comparison with previous years the index of mortality is shown in the following table for each of the five years 1918 to 1922:---

Yea	n r .	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Northern Territory.	Federal Capital Territory.	Aus- tralia.
				<u></u>			·			
1918		12.86	13.23	13.94	12.53	13.69	11.70	15.40	2.37	13.07
1919		16.48	15.51	15.97	14.59	15.50	13.29	17.42	8.76	15.75
1920		13.32	13.72	14.36	13.49	15.63	12.28	18.27	3.20	13.65
1921		12.27	12.85	12.30	12.47	15.60	13.16	22.38	2.15	12.66
1922		10.91	11.20	11.38	10.62	11.80	10.88	13.93	2.91	11.10

INDEX OF MORTALITY, 1918 TO 1922.

14. Causes of Death.—(i) General. The classification adopted by the Commonwealth Bureau of Census and Statistics is that of the International Institute of Statistics, as amended by the Committees of Revision which met in 1909 and 1920. The detailed classification groups causes of death under 205 different headings in fifteen categories, as follows :—

- i. Epidemic, Endemic, and Infectious Diseases.
- ii. General Diseases not included in (i).
- iii. Diseases of the Nervous System and Organs of Sense.
- iv. Diseases of the Circulatory System.
- v. Diseases of the Respiratory System.
- vi. Diseases of the Digestive System.
- vii. Diseases of the Genito-urinary System and Adnexa.

viii. Puerperal Condition.

- ix. Diseases of the Skin and Cellular Tissue.
- x. Diseases of the Organs of Locomotion.
- xi. Malformations.
- xii. Early Infancy.
- xiii. Old Age.
- xiv. External Causes.
- xv. Ill-defined Diseases.

(ii) Compilation of Vital Statistics for 1907 and Subsequent Years in Commonwealth Bureau. The vital statistics of Australia from the year 1907 onward have been tabulated according to this classification in the Commonwealth Bureau, and the system is being employed in all the State offices in the preparation of their monthly and quarterly bulletins of vital statistics.

(iii) Classification of Causes of Death, 1918 to 1922, according to Abridged International Classification. An abridged classification which enumerates thirty-eight diseases and groups of diseases according to the revised classification, is in use in many European and American States, while the Australian statistics have been compiled on the detailed classification. A table has been prepared showing the causes of death according to the abridged classification, so that the results may be compared with those of countries which use the abridged index.

The compilations for the years 1918 to 1922 will be found in full in Bulletins Nos. 36 to 40 of "Australian Demography"; here it will suffice to give the abridged classification under thirty-eight headings for the year 1922.

CAUSES OF DEATH .--- MALES, 1922.

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	' Canse.	N.S.W.	Vic.	Q'land.	S. Aus.	W. Aus.	Tas.	Nor. Ter,	Fed. Cap. Ter.	Aus- tralia.
1	Typhoid Fever	62	17	26	11	14	8		•	· 138
$\hat{2}$	Typhus		••				••			
3	Malaria		2	5		7	••	5		19
4	Small-pox		••	2						2
5	Measles	4	1	3	3	1				12
6	Scarlatina	6	7	2	1	1	3			20
• 7	Whooping Cough	36	21	19		5	3			- 84
8	Diphtheria and Croup	110	70	35	27	10	32			284
9	Influenza	50	19	15	1	8	2	1		95
9 A	Pneumonic Influenza	38	15	33	5	6	2	1	1	99
10	Asiatic Cholera		• •							
11	Cholera Nostras									
12	Other Epidemic Diseases	41	26	36	15	8	5			131
13	Tuberculosis of the Lungs	653	489	212	172	177	61	11		1,775
14	Tuberculosis of the Men-			1		1	Ì	1	i i	
	inges	27	32	1	10	10	8			88
15	Other forms of Tuber-				1		l	ł	4	
	culosis	55	48	11	13	11	12			150
16	Cancer and other Malig-				1]	1		
	nant Tumours	950	791	380	248	175	94	1	1	2,639
17	Meningitis	130	76	47	18	17	20			308
18	Congestion, Hæmorrhage				1			1	Ì	
	and Softening of Brain	536	377	193	151	83	40	1		1,381
19	Organic Diseases of the		l		ļ		[ł	l	1
	Heart	1.068	840	390	278	172	121	3	2	2,874
20	Acute Bronchitis	58	25	21	21	4	1	1		130
21	Chronic Bronchitis	139	139	63	34	28	12	1	1	415
22	Pneumonia	527	394	172	96	m	62		1	1,363
23	Other Diseases of the		1					1	1	, i
	Respiratory System								ł	
	(Tuberculosis excptd.)	452	479	209	89	114	45	3	1	1,391
24	Diseases of the Stomach	ļ				1			1	
	(Cancer excepted)	102	87	57	16	15	9	1		286
25	Diarrhœa and Enteritis	}			}		1	1	1	
	(children under 2									
	years only)	405	266	158	82	88	31	1		1,030
26	Appendicitis & Typhlitis	104	59	47	12	13	12	1		248
27	Hernia, Intestinal Ob-						1			Ì
	struction	125	97	45	23	14	14	1	1	318
28	Cirrhosis of the Liver	91	48	30	23	8	7		1	207
29	Nephritis and Bright's			1		}		{		4
	Disease	503	447	216	110	50	28	1		1,354
30	Non-cancerous Tumours	1	ļ	Į	l	l	[Į –	ł	l
	and other Diseases of		1			1	1			
	Female Genital Organs				1			1		
31	Puerperal Septicæmia	}		1	1	i i				
	(Puerperal Fever,		ĺ	í						}
	Puerperal Peritonitis,	Į				[{	(
	Puerperal Phlebitis)							1		
32	Other Puerperal Acci-			· ·					i	
	dents of Pregnancy	1		1			}	1)	
	and Confinement			}	1					
33	Congenital Debility and		{	{	1	1	ļ	•	}	
- ·	Malformations	820	554	307	174	117	95	1	1	2,069
34	Senile Debility	865	601	305	196	128	85	8		2,188
35	Violence	757	516	343	159	166	66	9		2,016
36	Suicide	163	106	76	32	52	11	• •	1	441
37	Other Diseases	1,980	1;438	871	465	338	181	3	1	5,276
38	Unspecified or Ill-defined				-		1			
	Diseases	157	100	42	52	43	15	5		414
	The test I Market	11.01	0.107	1.0=2		1-000	1.001			
	Males	11,014	8,187	4.372	2,537	1,994	1,084	52	5	29,245

CHAPTER XXV.-VITAL STATISTICS.

CAUSES	0F	DEATH.	FEMALES,	1922.
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	Cause.	N.S.W.	Vic.	Q'land.	S. Aus.	W. Aus.	Tas.	Nor. Ter.	Fed. Cap. Ter.	Aus- tralia.
1	Typhoid Fever	35	13	14	8	12	7			
2	Typhus									••
3	Malaria			1				1		2
4	Small-pox									
5	Measles	7	1	6	1	1				16
6	Scarlatina	4	7	1	2		4			18
7	Whooping Cough	43	23	21	2	6	3			98
8	Diphtheria and Croup	95	67	25	34	12	26			259
9	Influenza	34	15	12	1	4	1			67
9	Pneumonic Influenza	46	14	24		4	6			94
10	Asiatic Cholera					_				
11	Cholera Nostras				1					1
12	Other Enidemic Diseases	40	30	22	12	4	3	2		113
13	Tuberculosis of the Lungs	400	422	92	151	74	42	1		1.182
14	Tuberculosis of the Men-	100	112		101			_		-,
	inges	27	34	2	14		9			88
15	Other forms of Tuber-		0.	-		-	~			
10	culosis	- 21	43	7	14	6	13			114
16	Cancer and other Malig.	01	- 10	•		Ŭ	-0		•••	
10	nant Tumours	806	776	980	934	126	92			2413
17	Meningitis	75	110	200	204	120	8			2,110
10	Congestion Homowhage	10	40	51	21	1 1	0	•••		210
10	and Softaning of Brain	400	509	126	165	94	60			1 4 5 9
10	Organia Diseases of the	499	908	130	105	04	00	•••	•••	1,402
19	Urganic Diseases of the	050	===0	960		04	07			0 994
90	A sute Describition	892	139	209	233	94	91	'i		2,204
20	Acute bronchitis	1071	42	21	12	·;,	10	1	•••	100
21	Chronic Bronchitis	137	128	48	38		19	•••	•••	381
22	Pneumonia	280	248	104	00	50	34		••	188
Z3	Other Diseases of the	[[[[[1 1	
	Respiratory System									•••
~ .	(Tuberculosis excptd.)	311	293	102	58	31	22	•••		817
24	Diseases of the Stomach				·		• •			
.	(Cancer excepted)	56	55	33	14	13	10		•••	181
25	Diarrhœa and Enteritis			1						
	(children under 2	}	l							
	years only)	288	178	120	45	70	12			713
26	Appendicitis & Typhlitis	66	43	22	10	9	4			154
27	Hernia, Intestinal Ob-				l					
	struction	82	76	30	19	5	15			227
28	Cirrhosis of the Liver	54	36	14	8	2	2			116
29	Nephritis and Bright's	ļ]					
	Disease	343	351	165	66	33	21			979
30	Non-cancerous Tumours									
	and other Diseases of									
	Female Genital Organs	62	· 54	20	19	6	8			169
31	Puerperal Septicæmia	1								
	(Puerperal Fever,	1						ľ		
	Puerperal Peritonitis.		t i	1	1]		}		
	Puerperal Phlebitis)	97	39	23	<u>`11</u>	11	15			196
32	Other Puerperal Acci-									
-	dents of Pregnancy							Į.	1	
	and Confinement	158	97	80	39	32	18	1		425
33	Congenital Debility and			Û.						
	Malformations	572	386	180	134	107	73			1.452
34	Senile Debility	605	707	186	205	79	80		l'i	1 856
35	Violence	228	150	- 20	40	42	16		1.1	574
36	Suicide	40	94	16		2	3			92
37	Other Diseases	1 529	1 994	592	351	226	175	l i		4 042
38	Unspecified or Ill-defined	1,002	± نهند ر د	000		220	110	*	• •	1,072
50	Diseases	80	22	99	37	14	Q	1		251
									<u> </u>	
	Total—Females	8,152	6,968	2,780	2,071	1,173	913	8	1	22,066



BIRTHS-1860 TO 1922.

EXPLANATION.—The base of each small square represents an interval of one year for both Australia and States, and the vertical height represents 2,000 persons for Australia and 1,000 for the States.

The scale on the left relates to Australia and that on the right to the States.

The names of the States to which the curves refer are written thereon, and the characters of the lines used are as follows:-Australia, _____; New South Wales, _____; Victoria, ____; Victoria, _____; Queensland, _____; South Australia, _____; Western Australia, _____; Tasmania, _____; South Australia, _____;

MARRIAGES-1860 TO 1922.



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DEATHS-1860 TO 1922.

EXPLANATION.—The base of each small square represents an interval of one year for both Australia and States, and the vertical height represents 1,000 persons for Australia and 500 for the States.

The scale on the left relates to Australia, and that on the right to the States.

The names of the States to which the curves refer are written thereon, and the lines used are similar to those for births on page 1003.



GENERAL BIRTH, NATURAL INCREASE, DEATH (MALE, GENERAL AND FEMALE) AND MARRIAGE RATES—AUSTRALIA, 1860 TO 1922.

EXPLANATION.—The base of each small square represents one year's interval, and the vertical height one half per thousand of the population—the basic line being five per thousand of the population.

STATE BIRTH-RATE GRAPHS. (See next page.)

EXPLANATION.—The base of each small square represents one year's interval, and the vertical height one birth per thousand of the population—the basic line for each State being twenty per thousand of the population.

STATE DEATH-RATE GRAPHS. (See next page.)

EXPLANATION.—The base of each small square represents one year's interval, and the vertical height one death per thousand of the population. The zero for each State is shown by a thickened line.







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DEATHS.

CAUSES OF DEATH.—PERSONS, 1922.

	Cause.	N.S.W.	Vic.	Q'land.	S. Aus.	W. Aus.	Tas.	Nor. Ter.	Fed. Cap. Ter.	Aus- tralia.
- 1	Typhoid Fever	97	30	40	19	26	15			227
2	Typhus									
3	Malaria	••	2	6		7	••	6		21
4	Small-pox	••		2			••	••	••	2
5	Measles	11	2	9	4	2	••			28
6	Scarlatina	10	14	3	3	1	7	•••	••	38
•7	Whooping Cough	79	44	40	2		6	••	••	182
8	Diphtheria and Croup	205	137	60	61	22	58	••	••	543
. 9	Influenza	84	34	27	2	12	3	••	••	102
9A 10	Agiatia Cholora	04	29	- 57	5	10	0	••	••	195
11	Cholera Nostras	•••	•••	••		•••	•••	•••		
12	Other Epidemic Diseases	81	56	58	27	12		$\frac{\cdot \cdot}{2}$		244
13	Tuberculosis of the Lungs	1.053	911	304	323	251	103	12^{-12}		2,957
14	Tuberculosis of the Men-									
	inges	54	66	3	24	12	17			176
15	Other forms of Tuber-									
	culosis	86	91	18	27	17	25			264
16	Cancer and other Malig-	1			100		100	.		- 0-0
	nant Tumours	1,846	1,567	669	482	301	186	1		5,052
17	Meningitis	205	124	98	39	24	28		••	919
18	Congestion, Hæmorrhage	1 025	005	220	216	167	100	1		9 8 3 3
10	Organic Diseases of the	1,050	000	329	510	107	100	T		2,000
, 15	Heart	1 920	1 579	659	511	266	218	3	2	5 158
20	Acute Bronchitis	129	67	42	33	4	6	$\frac{3}{2}$		283
$\overline{21}$	Chronic Bronchitis	276	267	m	72	39	$3\check{1}$			796
$\overline{22}$	Pneumonia	813	642	276	162	161	96		1	2,151
23	Other Diseases of the									
	Respiratory System									
	(Tuberculosis excptd.)	763	772	311	147	145	67	3	•••	2,208
24	Diseases of the Stomach									10.0
	(Cancer excepted)	158	142	90	30	28	19	••	••	467
25	Diarrhœa and Enteritis									
	(children under 2	602	111	978	197	159	13			1 743
26	Appendicitie & Typhlitie	170	102	69	22	100	16	i		402
27	Hernia Intestinal Ob-	110	102	00			10	-		102
	struction	207	173	75	42	19	29			545
28	Cirrhosis of the Liver	145	84	44	31	10	9			323
29	Nephritis and Bright's									
	Disease	846	798	381	176	83	49			2,333
30	Non-cancerous Tumours									
	and other Diseases of	60		90	10	0				160
91	Female Genital Organs	62	94	20	19	ט	0		•••	109
91	(Puerneral Fever									
	Puerperal Peritonitis.									
	Puerperal Phlebitis	97	39	23	11	11	15			196
32	Other Puerperal Acci-									
	dents of Pregnancy									
	and Confinement	158	97	80	39	32	18	1		425
33	Congenital Debility and	1 000	.	40-		0.00	100			0 501
	Malformation	1,392	940	487	308	224	168	1	1	3,521
34	Senile Debility	1,470	1,308	491	401	200	165	8	Т	4,044
- 30 - 36	violence	980 902	070	432	199	208	82 14	9	·;	∠,∂9U 533
30	Other Diseases	3.512	2 662	1.404	816	564	356			9,318
38	Unspecified or Ill-defined	0,014	 ,002	2,101		007	500	Ŧ		0,010
00	Diseases	237	188	64	89	57	24	6		665
	Total—Persons	19,166	15,155	7,152	4,608	3,167	1,997	60	6	51,311

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The classification for the years 1918 to 1922 is shown for Australia in the following table, and for purposes of comparison the figures for the year 1922 have been repeated from the preceding table. Male and female deaths for 1918 are shown on pages 197 and 198 of the twelfth issue, for 1919 on pages 188 and 189 of the thirteenth issue, for 1920 on pages 129 and 130 of the fourteenth issue, and for 1921 on pages 122 and 123 of the fifteenth issue of this book.

CAUSES OF DEATH .-- AUSTRALIA, 1918 TO 1922.

PERSONS.

	Cause.		1918.	1919.	1920.	1921.	1922.
1	Typhoid Fever	• 	251	272	312	352	227
2	Typhus						••••••
- 2	Small nov	• ••	41	34	19	43	21
5	Magelag	• ••			199	92	กอ้
6	Scarlating	• ••	81	60	402	42	20
7	Whooning Cough	• • • •	234	911	561	428	189
ġ	Diphtheria and Croun	• ••	645	581	829	917	543
ğ	Influenza		6 848	1.289	230	308	162
9,	A Pneumonic Influenza		1	10.263	218	346	193
10	Asiatic Cholera			,			
11	Cholera Nostras		2	1	1	2	1
12	Other Epidemic Diseases		174	157	124	232	244
13	Tuberculosis of the Lungs		3,035	3,479	3,098	3,205	2,957
14	Tuberculosis of the Meninges		208	188	214	218	176
15	Other forms of Tuberculosis		292	281	295	264	264
16	Cancer and other Malignant Tumours .		4,246	4,421	4,511	4,768	5,052
17	Meningitis .		583	481	596	558	518
18	Congestion, Hæmorrhage and Softening	g of the		0.405			0.000
10	Brain .		2,297	2,467	2,495	2,472	2,833
19	Organic Diseases of the Heart		3,976	5,864	5,370	5,166	5,158
20	Acute Bronchitis		399	420	398	386	283
22	Proumonie Broncintis	• ••	1,121	1,047	962	9,066	9151
23	Other Disasses of the Bognizatory Syste		2,141	2,000	2,099	2,000	2,151
-0	culosis excented)	m (ruber-	2 1 9 9	2 413	9 597	2 304	2.208
24	Diseases of the Stomach (Cancer excented)		409	478	443	439	467
25	Diarrhoea and Enteritis (Children under	two vears	100		710	100	201
	only)	, jours	1.732	2.520	3.067	2.589	1.743
26	Appendicitis and Typhlitis		371	352	382	351	402
27	Hernia, Intestinal Obstruction		543	530	541	480	545
28	Cirrhosis of the Liver		297	315	340	323	323
29	Nephritis and Bright's Disease		2,144	2,221	2,286	2,139	2,333
30	Non-cancerous Tumours and other Disea	ses of the					
••	Female Genitàl Organs		159	132	154	166	169
31	Puerperal Septicamia (Puerperal Fever, I	eritonitis,	1				100
00	Phiepitis)		183	166	250	208	196
0 4	other Puerperal Accidents of Pregnancy	and Con-	400	404	40.0	495	495
99	Conconital Dability ato	• ••	2 409	9005	433	400	2 5 2 1
24	Sonile Debility	• ••	3,404	0,000	4,040	3,730	4 044
35	Violence	• ••	4,004	4,040	4,030	9,901	9 500
36	Suicide	• ••	409	2,199	4,191	691	533
37	Other Diseases	• ••	0.99R	9 300	10 049	9 995	9.318
38	Unspecified or Ill-defined Diseases	• ••	664	707	805	721	665
	suspension of in defined processs .	• ••	001	' [~] '	000	,	
	Total		50 210	65 930	56 280	54 076	51,311
		• ••	50,215	00,000	50,200	51,010	

15. Certification of Deaths.—Information was obtained in 1922 as to the persons by whom the 51,311 deaths which occurred in Australia were certified. Approximately 90.3 were certified by medical practitioners, 9.5 by coroners after inquests or magisterial inquiries, while in 0.2 per cent. of the cases no certificate was given or particulars were not available. The percentages for 1921 were 89.4, 10.3, and 0.3 respectively.

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The results are given in detail in Bulletin No. 40 of "Australian Demography"; a summary thereof is supplied in the table hereunder :---

Death Certified by—	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Fed. Cap. Ter.	Aus- tralia.
Medical practitioner Coroner	17,275 1,882	13,368 1,787	6,784 303	4,182 426	$2,819 \\ 319$	1,868 129	18 26	5 1	46,319 4,873
Not certified or not stated	9		65		29		16		119
Total Deaths	19,166	15,155	7,152	4,608	3,167	1,997	60	6	51,311

CERTIFICATION OF DEATHS, 1922.

Of the cases certified by coroners, violent deaths numbered 2,473, senile decay 335, organic heart disease 417, ill-defined causes 337, congenital debility 52, cerebral hæmorrhage and apoplexy 115, pneumonia 92, Bright's disease 89, diarrhœa and enteritis 65, pulmonary tuberculosis 73, and broncho-pneumonia 70.

Of uncertified causes of death, senile debility numbered 30, ill-defined causes 20, and violent deaths 15.

16. Deaths from Special Causes.—The table on p. 1010 furnishes comparisons for the last five years only, and comparisons will, therefore, generally be restricted to that period.

(i) Typhoid Fever. The number of deaths from typhoid fever in 1922 was 227, which was equivalent to 4 per hundred thousand living. This rate was lower than those for 1918 to 1921. In 1922 the rate varied from 8 per hundred thousand persons living in Western Australia to 2 in Victoria.

(ii) Typhus. No deaths from typhus have been registered from 1918 to 1922.

(iii) Malaria. Deaths from malarial diseases are practically confined to the tropical districts of Northern Queensland and Western Australia, and to the Northern Territory, 6 out of 21 deaths registered in 1922 having occurred in Queensland, 7 in Western Australia, and 6 in the Northern Territory.

(iv) Small-pox. The number of deaths from small-pox in Australia is very small, four deaths only resulting in the five years under review.

(v) Measles. Though no serious epidemic of measles has occurred, the deaths vary considerably from year to year. The greatest number occurred during 1920, when 482 were registered, while the minimum was reached in 1922 with a total of 28 deaths. During 1922 there were 12 male and 16 female deaths from measles, of which 11 were registered in New South Wales and 9 in Queensland.

(vi) Scarlatina. The mortality from this source is very light, the average of deaths from 1918 to 1922 being 64 per annum.

(vii) Whooping Cough. In 1920 the number of deaths was 561, the highest number registered in the period 1918 to 1922. In 1922 there were 182 deaths, equal to a death rate of 3 per 100,000 persons. Seventy-nine deaths occurred in New South Wales, 44 in Victoria, 40 in Queensland, 2 in South Australia, 11 in Western Australia, and 6 in Tasmania.

(viii) Diphtheria and Croup. The number of deaths due to diphtheria and croup has varied from a minimum of 543 in 1922 to a maximum of 917.in 1921. Of the 543 registered in 1922, 522 were attributed to diphtheria, which gives a death rate of 9 per 100,000 of population. The corresponding rates for the separate States ranged from 6 per 100,000 in Western Australia to 26 in Tasmania.

(ix) Influenza. In 1918 there was rather a serious outbreak of influenza, the deaths numbering 848, while the full effect of the world-wide epidemic was experienced in 1919, the number of deaths in Australia reaching 11,552, of which almost exactly one-half

occurred in New South Wales. The deaths in States were as follows:—Ordinary influenza—New South Wales, 568; Victoria, 345; Queensland, 247; South Australia, 47; Western Australia, 42; Tasmania, 29; and Northern Territory, 11; total, 1,289. Pneumonic influenza—New South Wales, 5,215; Victoria, 3,110; Queensland, 799; South Australia, 471; Western Australia, 470; Tasmania, 196; Northern Territory, 1; and Federal Capital Territory, 1; total, 10,263.

During 1922, 162 deaths were ascribed to ordinary influenza and 193 to pneumonic influenza, compared with 308 and 346 respectively for 1921.

(x) Asiatic Cholera. No deaths from Asiatic cholera have been recorded in Australia.

(xi) Cholera Nostras. For the five years under review only seven deaths have been due to this cause.

(xii) Other Epidemic Diseases. The deaths registered under this heading numbered 244 in 1922. The list in 1922 includes the following diseases :- Erysipelas 64, lethargic encephalitis 60, dysentery 44, acute poliomyelitis 42, plague 14, leprosy 6, and other epidemic diseases 14. There were no deaths from plague in the years 1918 to 1920. Outbreaks occurred in 1921 and 1922, causing 61 deaths in Queensland and 10 in New South Wales.

(xiii) Tuberculosis of the Lungs and Acute Miliary Tuberculosis. The deaths in 1922 numbered 2,957, viz., 1,775 males and 1,182 females, or 53 per 100,000 persons. The figures for the years 1918 to 1921 were 3,035, 3,479, 3,098, and 3,205 respectively. Of the deaths in 1922, 1,053 occurred in New South Wales, 911 in Victoria, 304 in Queensland, 323 in South Australia, 251 in Western Australia, 103 in Tasmania, and 12 in the Northern Territory.

(xiiia) Tuberculosis of the Respiratory System. Of the various forms of tuberculosis prevalent in Australia, that which has attracted the most attention is phthisis, or tuberculosis of the lungs. The intimate relation, however, between tuberculosis of the lungs and of other parts of the respiratory system renders it desirable that all forms of tuberculosis of the respiratory system should be brought under one head for investigations concerning the age incidence and duration of this disease.

(xiv) Tuberculosis of the Meninges. The number of deaths ascribed to this cause has varied very slightly during the last five years. The greatest number, viz., 218, occurred in 1921, and the least number, viz., 176, in 1922.

(xv) Other Forms of Tuberculosis. The deaths in 1922 include the following:— Tuberculosis of the intestines and peritoneum, 92; tuberculosis of the spinal column, 59; tuberculosis of the joints, 23; tuberculosis of other organs, 53; and disseminated tuberculosis, 40.

(xva) All Forms of Tuberculosis.—(a) General. A complete tabulation of all the different tubercular diseases from which deaths occurred in 1922 will be found in Bulletin No. 40 of "Australian Demography." The total number of deaths due to tubercular diseases was 3,397, viz., 2,013 males and 1,384 females.

(b) Ages at Death. The following table shows the ages of these 3,397 persons :--

-	A	ges.		Male.	Female.	Total.			Ages.		Male.	Female.	Total.
Und 5 v	er 5 ye ears ar	ears	er 10	62 27	70 22	$\begin{array}{c} 132 \\ 49 \end{array}$	55	years	and under	r 60 65	165 142	64 28	229 170
10		•••	15	24	23	47	65	.,	,,	70	75	29	104
15	,,	,,	20	71	102	173	70	,,	,,	75	33	12	45
20	,,	,,	25	152	205	357	75	,,	,,	80	13	11	24
25	,,	,,	30	223	211	434	80	,,	over	••	5	2	7
30	,,	,,	35	213	199	412							
35	,,	,,	40	203	148	351	Un	specif	ied	••	2		2
40	· ,,	,,	45	198	113	311	1	-			I		
45	,,	,,	50	215	80	295							
50	,,	,,	55	190	65	255		Tota	l Deaths	••	2,013	1,384	3,397

TUBERCULAR DISEASES .- DEATHS IN AGE-GROUPS, AUSTRALIA, 1922.

(c) Occupations at Death, Males. A tabulation has been made of the occupations of males dying from tubercular diseases during 1922. A summary is given hereunder :---

Occupation.	No. of Deaths.	Occupation.	No. of Deaths.
PROFESSIONAL CLASS-	1	INDUSTRIAL CLASS-	
Government, Defence, Law	99	Art and Mechanic Productions	76
Others	62	Textiles and Fibrous Materials	46
	1	Food and Drinks	16
Domestic Class—	{ ·	Animal and Vegetable Sub-	1
Board and Lodging	48	stances	5
Others	30	Metals and Minerals	46
		Fuel, Light and Energy	11
Commercial Class-		Building and Construction	91
Property and Finance	10	Others	413
Art, Mechanic and Textile 110-	17	Achterrary Diemonia	
Guers	50	Mauricolitoral, PASTORAL,	1
Animal and Vagatable Sub	50	A mining, ETC., OLASS	145
Animal and vegetable Sub-		Agricultural	140
Stances	. 2	Mastoral	170
Fuel, Light and Metals	3	Mining and Quarrying	176
Merchants and Dealers	50	Uthers	11
Others	172	-	
m a	1	INDEPENDENT MEANS	24
TRANSPORT AND COMMUNICATION		_	1
CLASS—		DEPENDENTS	155
Railway Traffic	45		
Road and Tramway Traffic	62	OCCUPATION NOT STATED	49
Sea and River Traffic	39	-	
Others	23	TOTAL MALE DEATHS	2,013
		Į	1

OCCUPATIONS OF MALES WHO DIED FROM TUBERCULAR DISEASES.— AUSTRALIA, 1922.

(d) Length of Residence in Australia. The length of residence in Australia of persons who died from tubercular diseases in 1922 is given in the next table :---

LENGTH OF RESIDENCE IN AUSTRALIA OF PERSONS WHO DIED FROM TUBERCULAR DISEASES, 1922.

Length of Residence in Australia.	Male.	Fem.	Total.	Length of Residence in Australia.	Male.	Fem.	Total.
Born in Australia Resident under 1 year , 1 year , 2 years , 3 ,, , 5 ,, and under 10	$1,447 \\ 13 \\ 22 \\ 9 \\ 4 \\ 2 \\ 51$	1,204 6 5 11 5 2 14	2,651 19 27 20 9 4 65	Resident 10 years & under 15 , 15 ,, 20 , 20 , over Length of residence not stated Total Deaths	89 28 261 87 	34 1 89 13 1,384	123 29 350 100

(e) Death Rates. The preceding table and the table on page 995 show that, among persons who had lived less than five years in Australia, 480 deaths occurred, and of these 79, or 16.5 per cent., were due to tubercular diseases.

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In order to show the prevalence of tuberculosis in the several States, the death rates from tubercular diseases are given in the following table, together with the proportion which deaths from tuberculosis bear to 10,000 deaths from all causes :--

State	Death	n Rates (a) fi Tuberculosis	rom	Proportion per 10.000 Deaths.			
·		Males.	Females.	Total.	Males.	Females.	Total.
New South Wales Victoria Queensland South Australia Western Australia Tasmania Northern Territory	·· ·· ·· ··	67 73 57 77 109 75 418	43 63 27 71 52 60 98	56 68 42 74 83 68 328	$\begin{array}{c} 667\\ 695\\ 513\\ 769\\ 993\\ 747\\ 2,115\\ \end{array}$	$562 \\ 716 \\ 363 \\ 865 \\ 699 \\ 701 \\ 1,250$	$622 \\705 \\454 \\812 \\884 \\726 \\2,000$
Australia		71	51	- 61	688	627	662

TUBERCULOSIS .--- DEATH RATES (a) AND PROPORTION OF TOTAL DEATHS, 1922.

(a) Number of deaths from tuberculosis per 100,000 of mean population.

(f) Death Rates, Various Countries. The following table, which gives for a number of countries the death rates from pulmonary and miliary tuberculosis per 100,000 persons living, shows that Australia occupies a very enviable position when compared with other countries :—

PULMONARY AND MILIARY TUBERCULOSIS.—DEATHS PER 100,000 PERSONS LIVING, VARIOUS COUNTRIES.

Country.	Year.	Death Rate.	Country.		Year.	Death Rate.
Rumania Union of South Africa (Whites) New Zealand Ontario (Canada) Ceylon Scotland Denmark England and Wales United States (Regis- tration Area) United Kingdom Quebec (Canada) Belgium	1914 1919 1922 1922 1919 1920 1921 1920 1921 1920 1919 1919	40 41 50 53 69 70 81 82 88 101 106 111 112	Spain Netherlands Switzerland Japan Jamaica Sweden France Germany Ireland Prussia Chile Finland Austria Serbia	··· ··· ··· ··· ··· ··· ···	1921 1919 1919 1921 1915 1917 1917 1917 1911 1918 1919 1918 1914 1918 1912 1911	$126\\131\\146\\147\\147\\157\\164\\180\\180\\192\\217\\255\\258\\283\\324$
Italy	1917	118	Hungary		1912	349

(xvi) Cancer and other Malignant Tumours.—(a) General. The number of deaths from cancer has increased continuously to 5,052 in 1922. Of the deaths registered in 1922, 2,639 were those of males, viz., 950 in New South Wales, 791 in Victoria, 380 in

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Queensland, 248 in South Australia, 175 in Western Australia, 94 in Tasmania, and 1 in the Northern Territory; while 2,413 were those of females, viz., 896 in New South Wales, 776 in Victoria, 289 in Queensland, 234 in South Australia, 126 in Western Australia, and 92 in Tasmania. Bulletin No. 40 of "Australian Demography" contains a complete tabulation of the various types of cancer and of the seat of the disease.

(b) Type and Seat of Disease. Tables showing the type and seat of disease, in conjunction with age, and also with conjugal condition, of the persons dying from cancer in 1922 will be found in Bulletin No. 40 of "Australian Demography." A summary showing type and seat of disease for the year 1922 is given hereunder :---

DEATHS FROM CANCER.-TYPE AND SEAT OF DISEASE, AUSTRALIA, 1922.

Type of Disease.		Male.	Female.	Total.	Seat of Disease.	Male.	Female.	Total.
Cancer Carcinoma Epithelioma Malignant disease Neoplasm Rodent ulcer Sarcoma Other types	· · · · · · · · · · · ·	$543 \\ 1,428 \\ 131 \\ 284 \\ 21 \\ 40 \\ 167 \\ 25$	$\begin{array}{r} 491 \\ 1,397 \\ \cdot \ 43 \\ 279 \\ 16 \\ 29 \\ 116 \\ 42 \end{array}$	$1,034 \\ 2,825 \\ 174 \\ 563 \\ 37 \\ 69 \\ 283 \\ 67$	Buccal cavity Stomach and liver Peritoneum, intes- tines and rectum Female genital organs Breast Skin Other organs	282 1,135 395 125 702	27 679 376 484 414 72 361	$309 \\ 1,814 \\ 771 \\ 484 \\ 414 \\ 197 \\ 1,063$
Total Deaths	•••	2,639	2,413	5,052	Total Deaths	2,639	2,413	5,052

(c) Ages at Death. The ages of the 5,052 persons who died from cancer in 1922 are given in the following table, which shows that while the ages below 35 are not by any means immune from the disease, the great majority of deaths occurred at ages from 35 upwards, the maximum being found in the age-group 60 to 65 :=

	DEATHS	FROM	CANCER.—AGES,	AUSTRALIA,	1922.
--	--------	------	---------------	------------	-------

	Ag	es.		Male.	Female.	Total.		Age	3.		Male.	Female,	Total.
Unde 15 yez 20 25 30 35 40 45 50 55	r 15 y arsan "' "' "'	7ears d und """"""""""""""""""""""""""""""""""""	er 20 25 30 35 40 45 50 55 60	26 10 12 20 26 56 76 127 248 379	$ \begin{array}{r} 17 \\ 3 \\ 12 \\ 9 \\ 53 \\ 89 \\ 155 \\ 229 \\ 273 \\ 318 \\ \end{array} $	$\begin{array}{r} 43\\13\\24\\29\\79\\145\\231\\356\\521\\697\end{array}$	60 ye 65 70 75 80 85 ye Unsp	ars an ,, ,, ,, ars an ecified fotal I	d unde ", ", d over Deaths	er 65 70 75 80 85 	493 438 329 240 102 53 4 2,639	331 318 239 202 91 72 2 2,413	824 756 568 442 193 125 6 5,052

(d) Occupations at Death. A summarized tabulation of the occupation of males who died from cancer is given hereunder :---

Occupation,	No. of Male Deaths.	Occupation.	No. of Male. Deaths.
Professional Class Domestic Class Commercial Class Transport and Communication Class Industrial Class	147 96 326 205 1,008	Agricultural, Pastoral, Mining, etc., Class Independent Means Dependents Occupation not specified Total Male Deaths	$ \begin{array}{r} 673 \\ 53 \\ 35 \\ 96 \\ \hline 2,639 \end{array} $

DEATHS FROM CANCER.—OCCUPATIONS (MALES), AUSTRALIA, 1922.

(e) Death Rates. The following table shows that the death rate for males is higher than that for females in every State :---

State.	Death R	ates (a) from	n Cancer.	Propor	tion of 10,00 Deaths.	00 Total
	Males.	Females.	Total.	Males.	Females.	Total.
New South Wales Victoria Queensland South Australia Western Australia Tasmania Northern Territory	 87 102 92 98 97 87 38	85 98 78 93 79 86	86 100 85 95 89 87 27	863 966 869 978 878 878 867 192	1,099 1,114 1,040 1,130 1,074 1,008 	963 1,034 936 1,046 951 931 167
Australia	 93	88	91	902	1,094	985

DEATHS FROM CANCER.-RATES (a) AND PROPORTIONS, 1922.

(a) Number of deaths from cancer per 100,000 of mean population.

(f) Comparison with Tuberculosis. In recent years the death rate from tuberculosis has shown a tendency to decrease, while that for cancer has displayed an almost continuous increase. The table hereunder shows that for each of the years under review, the death rate for cancer has been greater than that for tuberculosis, the excess varying from 9 per 100,000 persons in 1919 to 30 in 1922. Taking the sexes separately, however, the rate for males for tuberculosis exceeded that for cancer in 1919. During the whole period the mortality of females from cancer was always greater than that from tuberculosis.

TUBERCULOSIS AND CANCER.—DEATH RATES (a), AUSTRALIA, 1918 TO 1922.

	37.			Death Ra	te (a) from Tul	erculosis.	Death R	Death Rate (a) from Cancer.				
	re	ar.		Males	Females.	Total.	Males.	Females.	Total.			
1918				82	59	70	91	78	84			
1919				90	62	76	88	82	85			
1920	••			79	55	67	86	82	84			
1921				78	56	68	88	87	87			
1922	••			71	51	61	93	88	91			

(a) Number of deaths per 100,000 of mean population.

(g) Deaths, Various Countries. The following table shows the Australian death rate from cancer in comparison with that for other countries :---

fiour	try	-	Voar	Rate	Country	Vear	Bate
coun	UI 3 -]	I car.	Itate.	eountry.	10.011	nave.
			1000	10	T	1010	0.0
Ceylon	••	••	1920	10	France	1913	83
Rumania	••	••	1914	13	United States (Regis-		1
Serbia			1911	14	tration Area)	1920	83
Jamaica	••		1915	17	Germany	1918	84
Chile		•••	1914	36	New Zealand	1922	85
Hungary	••		1912	47	Prussia	1918	88
Quebec (Can	ada)	••	1919	51	Australia	1922	91
Union of Sc	outh	Africa			Norway	1917	96
(Whites)			1919	55	Netherlands	1919	107
Spain			1921	60	United Kingdom	1919	110
Italy			1917	64	Sweden	1917	116
Belgium	••		1919	67	England and Wales	1921	122
Japan			1921	71	Scotland	1921	122
Ontario (Can	ada)		1919	77	Switzerland	1919	126
Ireland	••		1919	79	Denmark	1920	136
Austria	•••		1912	81	<u> </u>		

CANCER.-DEATHS PER 100,000 PERSONS LIVING, VARIOUS COUNTRIES.

The fifth issue of this Year Book contains on pages 230, et seq., a paper dealing, inter alia, with the incidence of cancer in Australia.

(xvii) Meningitis. The deaths during 1922 from cerebro-spinal meningitis numbered 58, and from all other forms of meningitis 460. Of the former, 23 occurred in New South Wales, 11 in Victoria, 17 in Queensland, 3 in South Australia, 2 in Western Australia, and 2 in Tasmania.

(xviii) Apoplexy, Hæmorrhage and Softening of the Brain. The deaths under this heading have been remarkably uniform in number during the period under review. The figures for 1922 are made up as follows:—Cerebral hæmorrhage and apoplexy, 1,334 males and 1,405 females; softening of the brain, 47 males and 47 females.

(xix) Organic Diseases of the Heart. The number of deaths in 1922 was 5,158, viz., 2,874 males and 2,284 females. Of these deaths, New South Wales contributed 1,068 males and 852 females; Victoria, 840 males and 739 females; Queensland, 390 males and 269 females; South Australia, 278 males and 233 females; Western Australia, 172 males and 94 females; Tasmania, 121 males and 97 females; Northern Territory, 3 males; and Federal Capital Territory, 2 males. The death rates and proportions per 10,000 deaths in 1922 were as follows:—

State.	Death I	Rates (a) from Heart Diseas	n Organic e.	Proportion of 10,000 Deaths.			
	Males.	Females.	Total.	Males.	Females.	Total.	
New South Wales	98	81	89	970	1,045	1,002	
Victoria	108	93	101	1,026	1,061	1,042	
Queensland	95	73	84	892	968	922	
South Australia	. 109	92	101	1,096	1,125	1,107	
Western Australia	95	59	78	863	801	840	
Tasmania	112	91	101	1,116	1,062	1,092	
Northern Territory	114		82	577		500	
Federal Capital Territory	120		71	4,000		3,333	
Australia	102	83	93	983	1,036	1,005	

DEATH RATES (a) FROM ORGANIC HEART DISEASE AND PROPORTION OF 10,000 TOTAL DEATHS, AUSTRALIA, 1922.

(a) Number of deaths from Organic Heart Disease per 100,000 of mean population.

(xx) Acute Bronchitis. Deaths from bronchitis are classified under the following headings:—(a) Acute, (b) chronic, (c) unspecified, under five years of age, and (d) unspecified, five years and over. For the purpose of the abridged classification, (a) and (c) are treated as "acute," and (b) and (d) as "chronic" bronchitis. Acute bronchitis is credited with 399 deaths in 1918, 420 in 1919, 398 in 1920, 386 in 1921, and 283 deaths in 1922, viz., 130 males and 153 females.

(xxi) Chronic Bronchitis. The adjustment mentioned above gives a total of 796 deaths in 1922.

(xxii) *Pneumonia*. The numbers for 1922 were 1,363 males and 788 females, giving a total of 2,151.

(xxiii) Other Diseases of the Respiratory System. This heading was established in 1910, the figures previously being included in "Other Diseases" (No. xxxvii). Deaths in 1918 numbered 2,199; in 1919, 2,413; in 1920, 2,527; in 1921, 2,304; and in 1922, 2,208. The total for 1922 is made up as follows, viz. —Diseases of the nasal fossae, 4; diseases of the larynx, 45; broncho-pneumonia, 1,168; capillary bronchitis, 15; pleurisy, 153; pulmonary congestion and apoplexy, 252; gangrene of the lungs, 17; asthma, 159; pulmonary emphysema, 12; chronic interstitial pneumonia, 307; other diseases of the respiratory system (tuberculosis excepted), 76.

(xxiv) Diseases of the Stomach (Cancer excepted). In 1922 this heading includes ulcer of the stomach, 104 males, 50 females; ulcer of the duodenum, 39 males, 5 females; and other diseases of the stomach (cancer excepted), 143 males, 126 females; a total of 467.

(xxy) Diarrhea and Enteritis (Children under two years only). The number of deaths due to these causes is always a large one, varying from 1,732 in 1918 to a maximum of 3,067 in 1920. The total for 1922 was 1,743. During 1922, 8,505 children died before reaching their second birthday, and of these, 1,743, or 20.5 per cent., died from diarrhea and enteritis. The age distribution of children dying from these diseases during the first year of life will be found on page 1026.

The number of deaths, the death rates, and proportions of 10,000 deaths due to infantile diarrhœa and enteritis are given below :----

State.	Numbe Infa ar	er of Death ntile Diarn nd Enterit	ns from Thœa is.	Death Infa ar	Rates (a) ntile Diarr nd Enteriti	from hœa is.	Proportions of Total Deaths.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
New South Wales Victoria Queensland South Australia Western Australia Tasmania	$ \begin{array}{r} 405 \\ 266 \\ 158 \\ 82 \\ 88 \\ 31 \end{array} $	$288 \\ 178 \\ 120 \\ 45 \\ 70 \\ 12$	$693 \\ 444 \\ 278 \\ 127 \\ 158 \\ 43$	$ \begin{array}{r} 37 \\ 34 \\ 38 \\ 32 \\ 49 \\ 29 \\ 29 \end{array} $	27 22 32 18 44 11	32 28 36 25 47 20	$368 \\ 325 \\ 362 \\ 323 \\ 441 \\ 286$	353 255 432 217 597 131	362 293 389 276 499 215
Australia	1,030	713	1,743	36	26	31	352	323	340

DEATHS, DEATH RATES (a), ETC., INFANTILE DIARRHŒA AND ENTERITIS.— AUSTRALIA, 1922.

(a) Number of deaths from these diseases per 100,000 of mean population.

(xxvi) Appendicitis and Typhlitis. Deaths under this heading numbered 371 in 1918, 352 in 1919, 382 in 1920, 351 in 1921, and 402 in 1922; the total for the last year including 248 males and 154 females.

(xxvii) Hernia, Intestinal Obstruction. The deaths under this heading have not varied greatly from year to year, the number registered in 1922 being 545, viz., hernia 171, and intestinal obstruction, 374.

(xxviii) Cirrhosis of the Liver. There was little variation in the number of deaths from this cause from 1918 to 1922. A total of 323 deaths was recorded in 1922, viz., 207 males and 116 females.

(xxix) Nephritis and Bright's Disease. The number of deaths attributable to these diseases from year to year is very large. In 1918 there were 2,144; in 1919, 2,221; in 1920, 2,286; in 1921, 2,139; and in 1922, 2,333, viz., 1,354 males and 979 females. Of the deaths registered in 1922, 170 were ascribed to acute nephritis, and 2,163 to Bright's disease. New South Wales was responsible for 846 deaths; Victoria for 798; Queens-land for 381; South Australia for 176; Western Australia for 83; and Tasmania for 49.

(xxx) Non-Cancerous Tumours and other Diseases of the Female Genital Organs. Deaths in 1918 numbered 159; in 1919, 132; in 1920, 154; in 1921, 166; and in 1922, 169. Included in the 169 deaths in 1922 were the following:—Cysts, etc., of the ovary, 33; salpingitis and pelvic abscess, 40; benign tumours of the uterus, 46; uterine hæmorrhage (non-puerperal), 5; other diseases of the female genital organs, 45.

(xxxi) Puerperal Septicamia (Puerperal Fever, Puerperal Peritonitis, Puerperal Phlebitis). The number of deaths varied from a maximum of 250 in 1920 to a minimum of 166 in 1919. In 1922 there were 196 deaths.

(xxxii) Other Puerperal Accidents of Pregnancy and Confinement. The deaths under this heading in 1918 numbered 409; in 1919, 404; in 1920, 433; in 1921, 435; and in 1922, 425. Included in the 425 deaths in 1922 were the following :—Accidents of pregnancy, 94; puerperal hæmorrhage, 91; other accidents of childbirth, 87; puerperal albuminuria and convulsions, 95; puerperal phlegmasia alba dolens, embolus, sudden death, 49; death following childbirth, 9.

(xxxiia) All Puerperal Causes. The 621 deaths in 1922 under the two preceding headings correspond to a death rate of 23 per 100,000 females. It may be expressed in other terms by stating that 1 out of every 219 women confined in 1922 died from puerperal causes. The corresponding ratios for married women were 1 out of every 223 married women, and for single women 1 out of every 157. More detailed information will be found in a series of tables in Bulletin No. 40, "Australian Demography."

The ages of the mothers who died varied from 15 to 47 years as shown in the following table :---

Age at Death.	Married Women.	Single Women.	Total.	Age at Death.	Married Women.	Single Women.	Total.
15 years 16 ,, 17 ,, 18 , 19 , 20 , 21 , 22 , 23 , 24 , 25 , 26 , 27 , 28 , 29 , 30 , 31	2 1 2 6 10 11 16 32 22 16 27 27 28 35 31 24	1 3 5 1 6 2 3 4 3 3 1 1	2 1 3 9 15 12 22 34 25 20 30 27 31 36 32 25	33 years 34 ,, 35 ,, 36 ,, 37 ,, 38 ,, 39 ,, 40 , 41 ,, 42 ,, 43 ,, 44 ,, 45 ,, 46 ,, 47 ,, Unspecified	27 28 32 37 28 25 22 13 14 9 7 6 4 3 2 1	··· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ··	27 28 32 28 25 22 13 14 9 9 6 5 3 2 1
32 "	34		34	Total Deaths	582	39	621

DEATHS FROM PUERPERAL CAUSES.—AGES OF MOTHERS, AUSTRALIA, 1922.

The total number of children left by the married mothers was 1,603, an average of 2.8 children per mother.

Thirty of the mothers who died had been married less than one year, 87 between one and two years, and 63 between two and three years. The duration of marriage ranged up to 29 years, apart from 9 cases in which the date of marriage could not be stated. A tabulation, distinguishing the ages at marriage, will be found in Bulletin No. 40, "Australian Demography," which also gives a table showing in combination the duration of marriage and previous issue.

(xxxiii) Congenital Debility, Premature Birth, and Malformations. The deaths under this heading in 1922 numbered 3,521, of which 3,396 were of children under one year of age. Over 46 per cent. of the deaths of children under one year of age are due to these causes. Returns for 1922 are given in the next table :--

Stata	Congeni	ital Malfor	mations.	Pre and 1	mature Bi Injury at I	rth, 3irth.	Congenital Debility, Icterus, Sclerema.		
State.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
New South Wales Victoria Queensland South Australia Western Australia Tasmania North'n Territory Fed. Cap. Terr.	140 86 48 42 30 19 	$ \begin{array}{c} 115 \\ 72 \\ 40 \\ 29 \\ 16 \\ 24 \\ \\ \\ \end{array} $	255 158 88 71 46 43 	$476 \\ 302 \\ 185 \\ 91 \\ 67 \\ 54 \\ 1 \\$	339 214 104 81 69 39 	815 516 289 172 136 93 1	$204 \\ 166 \\ 74 \\ 41 \\ 20 \\ 22 \\ \cdots \\ 1$	118 100 36 24 22 10 	322 266 110 65 42 32 1
Australia	365	296	661	1,176	846	2,022	528	310	838
Number of deaths under one year per 1,000 births	4.39	3.38	3.90	.16.66	12.64	14.71	7.48	4.64	6.09

DEATHS FROM CONGENITAL DEBILITY, ETC., AND MALFORMATIONS, 1922.

(xxxiv) Senile Debility. The deaths ascribed to "old age" form a large group, and are in excess of those due to infantile debility. In 1922, 4,044 deaths were attributed to this cause, as follows: 1,470 occurred in New South Wales, viz., 865 males and 605 females; 1,308 in Victoria, viz., 601 males and 707 females; 491 in Queensland, viz., 305 males and 186 females; 401 in South Australia, viz., 196 males and 205 females; 200 in Western Australia, viz., 128 males and 72 females; 165 in Tasmania, viz., 85 males and 80 females; 8 males in the Northern Territory; and 1 female in the Federal Capital Territory.

Of the males whose deaths were described as due to senility, eight were aged between 55 and 59, and the deaths ranged up to fifteen over the age of 100. Of the females, two were aged between 55 and 60, and nine were of the age of 100 or over.

(xxxv) Violence. A very large number of deaths is due every year to external violence, and, as may be expected, male deaths largely predominate. The figures quoted are exclusive of suicides, which have been treated in a separate group. Deaths ascribed to violence numbered in 1918, 2,641, viz., 2,039 males and 602 females; in 1919, 2,799, viz., 2,161 males and 638 females; in 1920, 2,791, viz., 2,159 males and 632 females;

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in 1921, 2,892, viz., 2,301 males and 591 females; and in 1922, 2,590, viz., 2,016 males and 574 females. Of the deaths in 1922, those of 757 males and 228 females occurred in New South Wales; those of 516 males and 159 females in Victoria; those of 343 males and 89 females in Queensland; those of 159 males and 40 females in South Australia; those of 166 males and 42 females in Western Australia; those of 66 males and 16 females in Tasmania; and those of 9 males in the Northern Territory.

The following table shows the various kinds of violent deaths which occurred in 1922, distinguishing males and females :—

Cause of Death.		-	Males.	Females.	Total.
			,		
Poisoning by food			17	12	29
Venomous bites and stings	••		19	4	23
Other acute poisonings			37	18	55
Conflagration		· · · }	3	5	8
Burns (conflagration excepted)	••		118	159	277
Absorption of irrespirable gase	es (conflag	ration		1	
excepted)	••		18	. 5	23
Accidental drowning			400	84	484
Accidental mechanical suffocation			36	11	47
Traumatism by firearms	••		81	5	86
Traumatism by cutting or piercing	instrument	s	7	1	8
Traumatism by fall			260	56	316
Traumatism in mines or quarries			43		43
Traumatism by machines			33	1	34
Traumatism by other crushing (v	ehicles, rail	lways,		1	1
etc.)	••	· · ·	494	85	57.9
Wounds of war	••		10		10
Injuries by animals			50	· 8	58
Starvation, thirst, fatigue			32	3	35
Excessive cold			1		1
Effects of heat	••		19	10	29
Lightning ·			9	1	9
Other accidental electric shocks			12	1	13
Homicide by firearms			15	9	24
Homicide by cutting or piercing ins	struments		2	2	4
Homicide by other means			35	17	52
Fractures (cause not specified)			119	54	173
Other external violence (cause spec	ified)		52	9	61
Other external violence (cause unsp	pecified)		94	15	109
TI. 4.1 The effect			9.010		
Death Deater and 100 000			2,016	0/4	2,390
Death Rate per 100,000 of r	uean popula	ition	71		47

DEATHS FROM EXTERNAL VIOLENCE.-AUSTRALIA, 1922.

In every kind of violent death there was, therefore, an excess of males, with the exception of conflagration, burns, and homicide by cutting or piercing instruments.

(xxxvi) Suicide. (a) General. Deaths by suicide have remained fairly stationary during recent years, the number in 1918 being 498, viz., 408 males and 90 females; in 1919, 546, viz., 440 males and 106 females; in 1920, 636, viz., 516 males and 120 females; in 1921, 621, viz., 510 males and 111 females; and in 1922, 533, viz., 441 males and 92 females. (b) Modes Adopted. The modes adopted by persons who committed suicide in the years 1918 to 1922 were as follows :--

	Mal	es.	Fema	iles.	Total.		
Mode of Death.	Total of 4 years. 1918–21.	1922.	Total of 4 years 1918–21.	1922.	Total of 4 years 1918-21.	1922.	
Poisoning Poisonous gas Hanging or Strangulation Drowning Firearms Cutting or piercing instruments Jumping from a high place Crushing Other Modes	331 15 248 148- 661 374 23 37 37 37	91 2 70 39 119 101 3 11 5	187 6 69 70 33 26 17 8 11	$ \begin{array}{c} 44 \\ \\ 9 \\ 22 \\ 3 \\ 9 \\ 1 \\ 1 \\ 3 \end{array} $	518 21 317 218 694 400 40 45 48	$ \begin{array}{r} 135 \\ 2 \\ 79 \\ 61 \\ 122 \\ 110 \\ 4 \\ 12 \\ 8 \\ \end{array} $	
Total	1,874	441	427	92	2,301	533	

SUICIDES, MODES ADOPTED .- AUSTRALIA, 1918 TO 1922.

(c) Death Rates. The death rates from suicide and the proportion per 10,000 of total deaths are given in the following table :---

SUICIDE-DEATHS, DEATH RATES (a), AND PROPORTION OF TOTAL DEATHS, 1922.

State.	Nur	nber of De	aths.	Death	n Rates (a) Suicide.	from	Proportion of 10,000 Total Deaths.			
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	
New South Wales	163	40	203	15	4	9	150	49	106	
Victoria	106	24	130	14	3	8	129	34	86	
Queensland	76	16	92	18	4	12	174	58	129	
South Australia	32	. 6	- 38	13	2	7	126	29	82	
Western Australia	52	3	55	29	· 2	16	261	26	174	
Tasmania	l ii	3	14	10	3	6	101	33	71	
Fed. Cap. Terr	1		1	59		36	2,000		1,666	
Australia	441	92	533	16	3	10	151	42	104	

(a) Number of deaths from suicide per 100,000 of mean population.

(d) Ages. From the following table, which shows the ages of the persons who committed suicide in 1922, it will be seen that both extreme youth and extreme old age are represented :---

AGES OF PERSONS WHO COMMITTED SUICIDE.-AUSTRALIA, 1922.

	Ag	es.		М.	F.	Total.	Ages.	М.	F.	Total.
10 ye 15 20 25 30 35 40 45 50	ars an ,, ,, ,, ,, ,, ,, ,, ,,	d und ,, ,, ,, ,, ,, ,, ,,	er 15 20 25 30 35 40 45 50 55	1 18 22 33 35 46 47 52 46	$ \begin{array}{c} 2\\ 8\\ 8\\ 11\\ 11\\ 13\\ 6\\ 9\\ 7\\ 7 \end{array} $	$ \begin{array}{r} 3\\26\\30\\44\\46\\59\\53\\61\\53\end{array} $	60 years and under 65 65 ,, ,, 70 70 ,, ,, 75 75 ,, ,, 80 80 ,, ,, 85 85 ,, ,, 90 Not stated	48 13 19 11 5 3 4	4 4 3 	52 17 22 11 5 3 4

(e) Occupations of Males. The following table gives the occupations of the 441 males who committed suicide in 1922 :--

Occupation.	Deaths.	Occupation.	Deaths.
PROFESSIONAL CLASS-		INDUSTRIAL CLASS-	
Government, Defence, Law	12	Art and Mechanic Productions	17
Others	13	Textiles and Fibrous Materials	8
Domestic Class-	J	Food and Drink	6
Board and Lodging	10	Animal and Vegetable Sub-	
Others	3	stances	1
Commercial Class-		Metals and Minerals	9
Property and Finance	2	Building and Construction	17
Art. Mechanic and Textile	1	Others	107
Products	5	AGRICULTURAL, PASTORAL,	
Food and Drinks	19	MINING. ETC., PURSUITS-	2
Animal and Vegetable Sub-		Agricultural	60
stances	3	Pastoral	16
Merchants and Dealers	13	Mining and Quarrying	20
Others	23	Others	10
TRANSPORT AND COMMUNICATION		INDEPENDENT MEANS	2
CLASS-	1	DEPENDENTS	4
Railways	5	OCCUPATION NOT STATED	22
Roads and Trams	16	OCCOLATION NOT STATED	
Soon and Rivers	10	1 · · ·	
	14	Total Mala Dootha	441
Others	4	Total male Deaths	441

OCCUPATIONS OF MALES WHO COMMITTED SUICIDE .- AUSTRALIA, 1922.

(f) Frequency. It has been said that suicide has become more frequent during recent years, but an examination of the figures from the year 1871 onwards shows that the assertion needs qualification. The absolute figures have certainly increased, but proportionately to the population the figures for 1916-20, 1921, and 1922 were less than those for 1886-90 and 1891-95. The figures for the five years 1911-15, showed, however, an increase, not only absolutely, but in proportion to the population. The rate of 131.17 suicides per million persons living was the highest of any quinquennium for which figures are obtainable. The five years 1916-1920 show lower figures and percentages than the average of the previous thirty years. No particulars are available for Western Australia prior to 1886, and from 1886 to 1895 the sexes are not distinguished. The figures for the first five periods are, therefore, exclusive of Western Australia :---

Period.	Num	ber of Suic	ides.	Suicide of]	es per One Persons Li	Suicides of Females to 100 Suicides of Males. Based on		
	Males.	Females.	Total.	Males.	Females .	Ţotal.	Absolute Figures.	Rates.
1871-75 1876-80 1881-85 1886-90 1891-95 1896-1900 1901-05 1906-10	7158789991,3941,5741,8382,0542,031	150 145 183 292 337 410 380 437	$\begin{array}{r} 865\\ 1,023\\ 1,182\\ (a) \ 1,686\\ (b) \ 1,911\\ 2,248\\ 2,434\\ 2468\end{array}$	150.94 159.69 152.58 179.20 181.34 191.11 201.78 186 11	$\begin{array}{r} 37.56\\ 31.06\\ 32.90\\ 43.97\\ 44.09\\ 47.88\\ 40.88\\ 43.22\end{array}$	99.07 100.62 97.61 (c) 116.92 (d) 117.07 123.65 124.98 117.39	$\begin{array}{r} 20.98\\ 16.51\\ 18.32\\ 20.95\\ 21.41\\ 22.31\\ 18.50\\ 21.51\end{array}$	24.88 19.45 21.56 24.54 24.31 25.05 20.26 23.22
1911–15 1916–20 1921 1922	2,546 2,238 510 441	577 521 111 92	2,408 3,123 2,759 621 533	$ \begin{array}{r} 100.11 \\ 206.15 \\ 175.46 \\ 183.89 \\ 155.78 \end{array} $	40.93 41.33 33.61	117.35 131.17 108.27 113.76 95.72	$21.31 \\ 22.66 \\ 23.28 \\ 21.76 \\ 20.86$	$23.22 \\ 24.43 \\ 23.33 \\ 22.47 \\ 21.58$

SUICIDES.—AUSTRALIA, 1871–75 TO 1922.

(a) 1705 inclusive of Western Australian figures.
 (b) 1984 inclusive of Western Australian figures.
 (c) 116.49 inclusive of Western Australian figures.
 (d) 110.11 inclusive of Western Australian figures.

CHAPTER XXV.-VITAL STATISTICS.

(xxxvii) Other Diseases. The number of causes included under this heading is very large, amounting to no less than 85 of the items shown in the detailed classification, and deaths were recorded under every one of these with the exception of the following :-- Glanders, rabies, diseases of the parathyroid glands, chyluria, and ringworm, diseases of the scalp, itch. The total number of deaths under "other diseases" in 1918 was 9,226, viz., 5,290 males and 3,936 females; in 1919, 9,390, viz., 5,316 males and 4,074 females; in 1920, 10,048, viz., 5,740 males and 4,308 females; in 1921, 9,995, viz., 5,627 males and 4,368 females; and in 1922, 9,318, viz., 5,276 males and 4,042 females. Some of the diseases included here account for very considerable numbers of deaths. Particulars of the daths included in 1922 are shown in the following table :--

				· · · · · · · · · · · · · · · · · · ·			
Causes.	м.	F.	Total.	Causes.	М.	F.	Total.
	•						
	:						
Purulent Infection and Septi-				Embolism and Thrombosis			
cæmia	61	60	121	(not cerebral)	67	73	140
Anthrax	3		3	Diseases of the Veins			
Mycoses	70	20	3	cers Hemorrhoids)	9	18	97
Beri-beri	24	ň	25	Diseases of the Lymphatic	5	10	-1
Rickets	7	ŝ	10	System	9	9	18
Syphilis	71	37	108	Hæmorrhage (without speci-			
Gonococcus Infection	2			fied cause)	12	16	28
Soft Chancre				Other Diseases of the Cir-		~=	100
Other Infectious Diseases	1	2))	Diseases of the Mouth and	51	15	120
the female genital organs			!	its Associated Organs	9	11	90
excepted)	19	22	41	Diseases of the Pharvnx	27	31	58
Acute Rheumatic Fever	$\bar{9}\bar{2}$	106	198	Diseases of the Œsophagus	īi	4	15
Chronic Rheumatism and				Diarrhœa and Enteritis of			
Gout	81	95	176	Children over two years			
Scurvy	2	•••	2	of age and Adults	287	320	607
Pellagra	0.00	402	601	Aukylostomiasis	6		8
Diseases of the Pituitary	204	404	00+	Other Diseases of the In-	••	1	1
Gland	3	2	5	testines	69	43	112
Exophthalmic Goitre	4	54	58	Acute Yellow Atrophy of the			
Diseases of the Thyroid			} {	Liver	6	15	21
Gland	6	45	51	Hydatid Tumours of the			
Diseases of the Thymus			{ _ }	Liver	30	19	49
Gland	10	12	20	Other Diseases of the Liver	36	100	119
Addison's Disease	12	10	30	Diseases of the Panereas	90	109	205
Leucemia	40	28	68	Peritonitis (without specified			0.5
Hodgkin's Disease	34	20	54	cause)	40	101	141
Anæmia, Chlorosis	192	166	358	Other Diseases of the Diges-			
Acute and Chronic Alcoholism	89	16	105	tive System	4	2	6
Chronic Lead Poisoning	21	4	25	Other Diseases of the Kid-	110		1.00
Other Chronic Poisonings	25	1		Colouli of Urinowy Doctorio	110	83	193
Uther General Diseases		77	176	Diseases of the Bladder	126	90	155
Locomotor Ataxia	55	iö	65	Other Diseases of the Urethra.	140		100
Other Diseases of the Spinal				Urinary Abscesses, etc.	35	2	37
Cord	161	99	260	Diseases of the Prostate	265		265
Paralysis without specified				Non-venereal Diseases of the		i	
cause	145	126	271	Male Genital Organs	4	•••	4
General Paralysis of the	109	16	110	Reast (Cancer excepted)		5	5
Other Forms of Mental Alien-	105	10	11.5	Gangrene	50	45	95
ation	39	36	75	Furuncle	16	11	27
Epilepsy	100	104	204	Phlegmon, Acute Abscess	63	44	107
Convulsions (non-puerperal)	8	13	21	Other Diseases of the Skin	<u>.</u>		
Convulsions of Children under			000	and Adnexa	21	34	55
five years of age	145	94	239	Non-tuberculous Diseases of	50	- 00	01
Nouralgia and Neuritis	8	14	22	Other Diseases of the Joints	- 59	32	ar
Other Diseases of the Ner-	0			(Tuberculosis and Rhen-			1
vous System.	162	120	282	matism excepted)	9	12	21
Diseases of the Eye	3	3	6	Other Diseases of the Organs	_		1
Diseases of the Ear	33	30	63	of Locomotion	2	2	4
Pericarditis	48	29	77	The provide the provider to	974	049	617
Muccarditis	30.5	262	571	Lack of Care (Infants)	014 R	293 7	19
Angina Pectoria	150	57	207	inora of care (infanto)			
Diseases of the Arteries.	100		~~·	Total Deaths	5,276	4,042	9.318
Atheroma, Aneurism	605	283	888			,	.,
			F I	1		i .	

DEATHS FROM "OTHER DISEASES."-AUSTRALIA, 1922.

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DEATHS.

(xxxviii) Unspecified or Ill-defined Diseases. A considerable number of cases must be included under this heading from year to year, comprising 664 in 1918, 707 in 1919, 805 in 1920, 721 in 1921, and 665 in 1922. The detailed classification distinguishes these ill-defined diseases under two headings—sudden death, including syncope; and unspecified or ill-defined causes, of which the following are specimens :—Asthenia, coma, dentition, exhaustion, heart failure, dropsy, ascites and general ædema, etc. In 1922 the number of cases of death which came under the first of these categories was 34, and those belonging to the second, 631. It is, of course, true that some cases must always occur in which the disease is not well characterized, or respecting which sufficient information is not procurable to allow of a clear definition being given in the certificate of death, but in the majority of cases included a more complete diagnosis and consequently a more satisfactory certificate would no doubt have been possible.

17. Causes of Deaths in Classes.—The figures in the preceding sub-sections relate to certain definite causes of death, and it must be acknowledged that they are of greater value in medical statistics than a mere grouping under general headings. The classification under fifteen general headings adopted by the compilers of the International Nomenclature is, however, shown in the following table, together with the death rates and percentages on total deaths pertaining to those classes :—

	. To	tal Deat	ths.	Deat	h Rate	s. (a)	Proportion of 10,000 Deaths.		
Class.	м.	F.	Total.	М.	F.	Total.	M.	F,	Total.
1. Epidemic, Endemic, and Infectious Diseases	3,112	2,263	5,375	110	82	96	1,064	1,026	1,048
2. General diseases not included above	3,589	3,437	7,026	127	125	126	1,227	1,558	1,369
3. Diseases of the Nervous System and of the Organs of Sense	2,751	2,409	5,160	97	88	93	941	1,092	1,006
4. Diseases of the Circulatory System	4,128	3,112	7,240	146	114	130	1,412	1,410	1,411
6. Diseases of the Digestive Organs 7. Diseases of the Genito-Urinary	2,727	2,154	4,881	96	79	87	932	976	951
System and Adnexa	1,911	1,276	3,187	67	47	57	653	578	621
9. Diseases of the Skin and of the		021	621		23	1 11	••	281	121
Cellular Tissue	150	134	284	5	5	5	51	61	55
10. Diseases of the Bones and Organs	70	10	110					01	0.0
11 Malformations	265	908	110	12	11	19	195	194	120
12 Farly Infancy	2 084	1 406	3 400	74	51	63	719	637	680
13 Old Age	2188	1 856	4 044	77	68	73	748	841	788
14. External Causes	2.457	666	3,123	87	24	56	840	302	608
15. Ill-defined Diseases	414	. 251	665	15	9	12	142	114	130
Total	29,245	22,066	51,311	1,033	806	921	10,000	10,000	10,000

DEATHS, DEATH RATES (a), ETC., IN CLASSES.—AUSTRALIA, 1922.

(a) Number of deaths per 100,000 of mean population.

18. Causes of Deaths of Children under one Year.—"Bulletin No. 40, Australian Demography," contains tables showing for twenty-six causes the ages at death of children dying during the first year of life. In the Bulletin mentioned, the particulars are given for males and females separately for Australia, but the totals for Australia only are shown hereunder for both sexes combined :—

CAUSES OF DEATHS OF CHILDREN UNDER ONE YEAR.-AUSTRALIA, 1922.

Age at Death.		Measles.	Whooping	Cough.	Diphtheria.	Croup.	Erysipelas.	Pulmonary Tuberculosis.	Tubercular Meningitis.	Tuberculosis, other forms.	Syphilis.	Simple Meningitis.	Cerebro-Spinal Meningitis.	Convulsions.	Bronchitis.
$ \begin{array}{c} \mbox{Under 1 week} & . & . \\ \mbox{I week and under 2} \\ \mbox{2 weeks} & , & 3 \\ \mbox{3} & , & , & . & . \\ \mbox{I month} & , & 2 & . \\ \mbox{months} & , & 3 & . \\ \mbox{2 months} & , & 3 & . \\ \mbox{2 months} & , & 3 & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{3} & , & , & . & . \\ \mbox{4} & , & , & . & . \\ \mbox{5} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{6} & , & , & . & . \\ \mbox{7} & , & , & . & . \\ \mbox{8} & , & , & . \\ \mbox{9} & , & , & . \\ \mbox{9} & , & , & . \\ \mbox{9} & , & , & . \\ \mbox{10} & , & , & . \\ \mbox{11} & , & , & . \\ \mbox{12} & , & . \\ \mbox{13} & , & . \\ \mbox{14} & , & . \\ \mbox{14} & , & . \\ \mbox{14} & , & . \\ \mbox{16} & , & . $	 ths 	··· ··· ··· ··· ··· ··· ··· ··· ··· ··		$ \begin{array}{c} 1 \\ 2 \\ $	$ \begin{array}{c} 1 \\ \cdot \\ 3 \\ 2 \\ 3 \\ 4 \\ \cdot \\ 1 \\ 2 \\ 1 \\ 3 \\ 7 \\ 5 \\ 6 \\ \cdot \\ \end{array} $	··· ··· ··· ··· ··· ··· ··· ···	$ \begin{array}{c} 1 \\ 2 \\ 1 \\ 8 \\ 5 \\ 1 \\ 2 \\ 1 \\ 2 \\ 1 \\ 1 \\ \dots \\ \dots \\ \dots \\ \dots \\ \dots \\ \dots \\ \dots \\ $	··· ··· ··· ··· ··· ··· ··· ···	2 2 2 3 8 3 2 6 2 2	··· ·· ·· ·· ·· ·· ·· ·· ··	$ \begin{array}{c} 6 \\ .2 \\ 1 \\ 6 \\ 8 \\ 4 \\ 2 \\ 2 \\ 1 \\ .1 \\ .1 \end{array} $	4 3 4 6 7 9 8 13 12 8 13 12 8 13 14 9	···· ··· ··· ··· ··· ··· ··· ··· ··· ·	$ \begin{array}{c} 85\\ 25\\ 15\\ 8\\ 14\\ 5\\ 6\\ 5\\ 4\\ 7\\ 2\\ 7\\ 1\\ 2 \end{array} $	$ \begin{array}{c} 7\\9\\10\\24\\15\\6\\7\\5\\8\\5\\6\\6\\4\\3\end{array} $
Total under 1 year		5	11	7	39	6	25	3	29	6	44	113	9	190	123
Number of deaths from e cause per 1,000 births	ach	.04	. 8	35	.28	.04	.18	.02	. 21	.04	. 32	.82	.07	1.3	8 .89
Age at Death.	Broncho- Pneumonia,	Pneumonia.	Pleurisy.	Other Diseases of Stomach.	Diarrhœa and and Enteritis.	Hernia.	Intestinal Obstruction.	Malformations.	Congenital Debility, Icterus and Sclerema.	Premature Birth.	Injury at Birth.	Other Diseases peculiar to Early Infancy.	Lack of Care.	Other Causes.	Total.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 9\\17\\18\\7\\25\\30\\27\\18\\29\\23\\14\\18\\24\\\end{array}$	$ \begin{array}{c} 12\\ 10\\ 8\\ 11\\ 21\\ 17\\ 9\\ 17\\ 14\\ 15\\ 17\\ 19\\ 13\\ 8\\ 18\\ \end{array} $			$\begin{array}{c} 10\\ 15\\ 17\\ 24\\ 117\\ 125\\ 143\\ 162\\ 144\\ 97\\ 97\\ 91\\ 75\\ 79\end{array}$	2 1 4 1 1 	1 1 5 7 8 8 6 5 6 2	258 52 39 16 45 32 27 10 18 12 45 59 45 59 45 59 45 52 45 32 27 10 18 12 45 59 45 59 10 12 45 59 10 12 45 59 12 45 59 10 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 12 45 59 45 59 45 59 45 59 45 59 45 59 45 59 45 59 45 59 45 59 45 59 59 45 59 59 45 59	$\begin{array}{c} 351 \\ 97 \\ 42 \\ 27 \\ 87 \\ 66 \\ 55 \\ 38 \\ 28 \\ 13 \\ 12 \\ 7 \\ 5 \\ 6 \\ 10 \end{array}$	$1,538 \\ 164 \\ 95 \\ 45 \\ 858 \\ 28 \\ 4 \\ 3 \\ 1 \\ 2 \\ 3 \\ . \\ 1$	45 6 1 1 	526 50 16 10 10 1 2 1 1 	12 1 	85 40 29 25 53 38 23 22 23 22 22 18 22 23 17	2,961 497 304 193 577 420 362 311 309 290 232 208 222 183
Total under 1 year	350	209	5	92	1334	10	57	536	838	1,969	53	. 617	13	459	7,251
Number of deaths from each cause per 1,000 births	2.53	1.52	.04	. 67	9.70	.07	.42	3.90	6.09	14.32	.39	4.49	.10	8.34	52.74

Premature birth, diarrhœa and enteritis, congenital debility, and "other diseases peculiar to early infancy," accounted for 4,758 deaths, or more than 65 per cent. of the total deaths under one year. The last line of the table shows the number of deaths from each cause per 1,000 births.

Among the more important causes, the maximum number of deaths from syphilis, convulsions, bronchitis, pneumonia, malformations, premature birth, congenital debility, and other diseases of early infancy occurred in the first month of life, while whooping cough and broncho-pneumonia were most fatal during the second month. Diarrhœa and enteritis carried off more children in the sixth month than in any other, the numbers gradually decreasing toward the end of the year. DEATHS.

19. Ages at Death of Married Males and Females, and Issue.—" Bulletin No. 40, Australian Demography," contains a number of tables for Australia, showing the age at marriage, age at death, duration of life after marriage, birthplaces, and occupations, in combination with the issue of married persons who died in 1922. A short summary of the tables mentioned is given hereunder. Deaths of married males in 1922 numbered 15,177, and of married females, 14,030. The tabulations which follow deal, however, with only 14,978 males and 13,932 females, the information in the remaining 297 cases being too incomplete to be utilized. The total number of children in the families of the 14,978 males was 73,863; and of the 13,932 females, 71,068. The average number of children is shown for various age-groups in the following table :—

AGES	AT	DEATH	0F	MARRIED	MALES	AND	FEMALES,	AND	AVERAGE	ISSUE.—
				A	USTRA	LIA,	1922.			

Age at Death		Average Family of Males.	A verage Family of Females.	Age at Death.		A verage Family of Males.	Average Family of Females.
Under 20 years 20 to 24 years 25 ,, 29 ,, 30 ,, 34 ,, 35 ,, 39 ,, 40 ,, 44 ,, 45 ,, 49 ,, 50 ,, 54 ,, 55 ,, 59 ,, 60 ,, 64 ,, 65 ,, 69 ,,	· · · · · · · · · · · · ·	$1.00 \\ 0.72 \\ 1.31 \\ 1.99 \\ 2.65 \\ 3.20 \\ 3.43 \\ 3.86 \\ 4.27 \\ 4.80 \\ 5.44$	$\begin{array}{c} 0.67\\ 1.14\\ 1.69\\ 2.89\\ 3.39\\ 3.65\\ 3.81\\ 3.91\\ 4.54\\ 5.47\\ 5.96\end{array}$	70 to 74 years 75 ,, 79 ,, 80 ,, 84 ,, 85 ,, 89 ,, 90 ,, 94 ,, 95 ,, 99 ,, 100 years and wards Age unspecified All ages	 up- 	5.92 6.46 6.84 7.00 7.03 7.45 9.14 4.67 $$	$\begin{array}{r} 6.33\\ 6.59\\ 6.54\\ 6.77\\ 6.35\\ 5.52\\ \hline 5.22\\ 3.45\\ \hline 5.10\\ \end{array}$

The figures in the preceding table include the issue both living and dead, the proportion between them, taking the issue of deceased males and females together, being about 1,000 to 299. The totals are shown in the following table :---

ISSUE OF MARRIED MALES AND FEMALES.—AUSTRALIA, 1922.

lssue of Married Males.	Males.	Females.	Total.	Issue of Married Females.	Males.	Females.	Total.
Living Dead	29,505 8,982	28,674 6,702	58,179 15,684	Living Dead	26,748 9,886	26,663 7,771	53,411 17,657
Total	38,487	35,376	73,863	Total	36,634	34,434	71,068

These figures show a masculinity in the births of 3.66, which agrees fairly well with the experience of the birth statistics.

20. Ages at Marriage of Deceased Males and Females, and Issue.—While the table giving the average families of married males and females naturally shows an increase in the averages with advancing ages at death, the following table, which gives the average families of males and females according to the age at marriage of the deceased parents, shows a corresponding decrease in the averages as the age at marriage advances :—

Age at Marria	Average Family of Males.	Average Family of Females.	Age at Marriage	Age at Marriage.				
Under 20 years		6.42	7.14	50 to 54 years		1.83		
20 to 24 ,,		5.88	5.55	55 , 59 ,		1.34		
25 ,, 29 ,,		5.15	4.04	60 , 64 ,	• •	1.02		
30 ,, 34 ,,		4.47	2.76	65 years and upwa	ards	.72		
35 ,, 39 ,,		3.65	1.58	Age unspecified		5.38	5.27	
40 ,, 44 ,,		3.14	.58]			!	
45 ,, 49 ,,	••	2.25	.005	All ages	••	4.93	5.10	

AGES AT MARRIAGE OF DECEASED MALES AND FEMALES, AND AVERAGE ISSUE.—AUSTRALIA, 1922.

21. Duration of Life after Marriage of Males and Females.—The duration of life after marriage has been tabulated for males and females both in combination with the age at marriage, and with the total and average issue. The tables containing the result do not, however, lend themselves to condensation, and are, therefore, omitted here. They will be found in Bulletin No. 40 of "Australian Demography," pages 193 to 199.

22. Birthplaces of Deceased Married Males and Females, and Issue.—The following table shows the birthplaces of married males and females who died in 1922, together with their average issue. No generalizations can, of course, be made in those cases in which the number of deaths was small, but where the figures are comparatively large, as in the case of natives of Australia, differences occur between the averages of the individual States which appear inexplicable on any other ground than that of different age-constitution of the locally-born population of the various States due to the different dates of the foundation of settlement. Thus, New South Wales and Tasmania, owing to their early settlement, contain a larger number of locally-born inhabitants of advanced ages than Victoria and Queensland, in which colonization was begun almost fifty years after the foundation of New South Wales. It will be noted that the differences occur both in the male and female averages. Although the figures apply to Australia as a whole, it must be borne in mind that the vast majority of deaths of natives of any one State are registered in that particular State.

BIRTHPLACES	0F	DECEASED	MARRIED	MALES	AND	FEMALES,	AND	AVERAGE
		ISS	UE.—AUSTI	RALIA,	1922.			

			· · · · · · -					·	
	Маг Ма	ales. Females.		ried ales.		Married Males.		Married Females.	
Birthplace.	Deaths.	A verage Family.	Deaths.	A verage Family.	Birthplace.	Deaths.	Average Family.	Dcaths.	Average Family.
New South Wales	2,766	4.85	3,002	5.14	British India	40	3.03	27	5.00
Queensland	2,542 493 972	4.18 3.86 4.73	2,346	4.15 3.51 4.86	tish Possessions China	5 62	$2.00 \\ 3.21$	2 4	$1.50 \\ 9.50$
Tasmania	524	5.29	639	5.25	tries	18	3.11	4	6.50
Northern Terntory New Zealand England	$115 \\ 3.784$	1.00 2.82 5.30	78 3.088	2.92	Possessions	22	3.77	13	4.08
Wales Scotland	151 987 1.410	$5.15 \\ 5.21 \\ 5.79$	117 833 1.759		tries Canada Other American Bri-	$1 \\ 26$	$10.00 \\ 3.77$	1 17	5.82
Isle of Man Other European Bri-	8	4.83	1	4.00	tish Possessions United States	4 35	6.75 3.86	$\frac{3}{22}$	$1.33 \\ 4.36$
Denmark	100	5.19	30 17	4.07	Countries South Sea Islands	15 16	$\frac{4.47}{2.44}$	6 5	$4.67 \\ 3.60$
Germany Italy Norway	339 52 40	6.24 5.25 4.08	231 8 6	$6.68 \\ 6.38 \\ 3.67$	Unspecified	50 47	$5.76 \\ 4.62$	$\frac{43}{26}$	6.35 4.27
Russia	52 58	$3.85 \\ 5.28$	25 9	5.40 5.78	Total	14,978	4.93	13,932	5.10
tries	78	4.31	26	3.81	-				

23. Occupations of Deceased Married Males, and Issue.—A final tabulation shows the average issue in combination with the occupation of deceased males.

Occupation.	Deaths of Married Males.	A verage Family.	Occupation.	Deaths of Married Males.	A verage Family.
PROFESSIONAL CLASS			INDUSTRIAL CLASS-		
Government, Defence, and Law	409	4.10	Art and Mechanic Products	582	4.59
Others	540	3.97	Textiles and Fibrous Materials	290	4.46
			Animal and Vegetable Sub-	198	4.67
DOMESTIC CLASS			stances	48	4.56
Board and Lodging	295	3.74	Metals and Minerals	446	4.93
Others	192	3.87	Fuel, Light and Energy	50	3.64
			Building and Construction	958	4.70
COMMERCIAL CLASS			Others	2,769	5.00
Property and Finance	204	4.17			
Art, Mechanic and Textile			AGRICULTURAL, PASTORAL,		
Products	134	3.63	MINING, ETC., CLASS		
Food and Drinks	454	4.81	Agricultural	2,478	6.26
Animal and Vegetable Sub-			Pastoral	598	5.58
stances	56	4.25	Mining and Quarrying	823	5.16
Fuel, Light and Metals	33	5.00	Others	125	5.14
Merchants and Dealers	475	4.52			Ì
Others	771	3.47	INDEPENDENT MEANS	385	5.41
TRANSPORT AND COMMUNICA-			DEPENDENTS	3	2.00
Railways	421	4 86	OCCUPATION NOT STATED	366	3 30
Roads and Trama	106	4 37	COOLING NOT STRIED	500	0.00
Seas and Rivers	283	4 12	· ·		
Others	96	3.88	Tota!	14,978	4.93

OCCUPATIONS OF DECEASED MARRIED MALES, AND AVERAGE ISSUE.— AUSTRALIA, 1922.

§ 4. Graphical Representation of Vital Statistics.

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1. General.—The progressive fluctuations of the numbers of births, marriages, and deaths are important indexes of the economic conditions and social ideals of a community. Graphs have accordingly been prepared which show these fluctuations. It should be remembered, however, that, normally, the increase of births and marriages should be proportional to the growth of population.

2. Graphs of Annual Births, Marriages, and Deaths.— The outstanding features of the graph representing births are:—An almost continuous rise in the numbers from 1860 to 1891; a decline till 1898, associated with the commercial crisis of 1891-3; a sharp fall in 1903 which accompanied a severe drought; an uninterrupted increase from 1903 to 1914, the total for 1914 being the highest recorded; a rapid docline until 1920, the result of war conditions. The figures for the last three years show a tendency to return to normal.

The graph for marriages up to 1914 discloses approximately the same features as that for births—financial crises and droughts having a similar effect. The numbers for 1914 and 1915 showed a considerable increase over previous years. From 1916 to 1918 there was a rapid fall, the numbers being much below those of pre-war years. During 1919 and 1920 the recovery was very rapid, the total for the latter year being the highest ever recorded. The totals for 1921 and 1922 were not so favourable.

The characteristic feature of the graph of deaths is its irregular nature. On the whole, however, there is an increase which is due to the growth of population.

3. Graphs of Annual Birth, Marriage, and Death Rates, and Rate of Natural Increase.—The graph of the birth rate indicates a well-marked decline throughout the whole period. This reduction of rate has been subject to fluctuations, there being two periods of arrested decline, viz., from 1877 to 1890 and from 1903 to 1912.

The variations in the marriage rates are less abrupt than those in the birth and death rates, the rate for 1920, viz., 9.62 per thousand, does not differ very much from that for 1860, viz., 8.42. The lowest rate for the period was 6.08 in 1894, which marked the culmination of the commercial depression.

On the whole, the graph for the death rate furnishes clear evidence of a satisfactory decline during the period. The graph brings into prominence six years in which the rates were very high when compared with adjacent years, viz., 1860, 1866, 1875, 1884, 1898, and 1919. Epidemics of measles were largely responsible for the high rates in the first five years, while influenza caused the increase during 1919.

The graph of natural increase shows roughly the same variations as that for the birth rate, but the influence of the death rate is indicated by the very low rates of natural increase for 1875, 1898, and 1919, which resulted from the exceptionally high death rates of those years.

G

Diphtheria.*

1. Gravity of the Disease.—Much study and a gradually widening experience have combined to make the diphtheria problem acute, at least to such investigators and administrators as take a scientific interest in medical treatment and community welfare. The problem may be stated thus: "Assuming that diphteria," as Dr. Northup said in 1902, "is the disease of which we have the greatest knowledge as to causation, clinical symptoms, treatment and prevention, how comes it that while the case mortality may be generally decreasing, the total deaths registered from this disease during the past ten years show in some places an increase that is causing anxiety, if not alarm, and are still increasing ?"

2. Object of Present Inquiry.—The present inquiry is undertaken with the object of finding, if possible, and setting forth some of the elements or factors that come into evidence in the search for a solution of the apparent medical paradox. In carrying it out the author has, as regards the disease, no proposition to prove, no thesis to propound or support, no elenchus to bring forward or argue, no cause to plead, no method of diagnosis to recommend, no line of treatment to urge, nothing novel to suggest. All that is attempted is a review of the facts and methods that must be considered in dealing with this dangerous disease. The contribution may be regarded as a study in the logic of medicine as applied to the problems of diphtheria, although, within the limits of space prescribed, an exhaustive examination of all the literature published on the various aspects of the subject is naturally out of the question.

3. Desiderata in Investigations.—Perhaps it is not sufficiently recognised that any investigations into the origin, character, treatment, and control of a disease of this nature entail two distinct tasks—firstly, the collecting of accurate and uniform statistics, and secondly, the drawing of logical inferences from them. The first should be essentially the work of medical men; the second is the business of expert statisticians. The most cursory examination of the published statistical data will show that a large proportion thereof is obviously untrustworthy. It would be unwise, however, in an investigation of this sort to pass by any statistics or class of statistics without careful examination and evaluation. In fact everything connected with the diagnosis, treatment, and control of diphtheria should be scrutinized in order to determine what is the real position of this disease at the present moment. For the purpose of this investigation the most likely sources of information have been explored and utilized.

4. Definition of "Diphtheria."—Probably no one would find much fault with the definition or description of "diphtheria" as an acute infectious disease accompanied by a membranous exudation on a mucous surface. In its typically recognized form it is so; but it must not therefore be inferred that the disease is as much differentiated from other diseases as an animal, plant, or metal is from other organisms or substances.

Forms of disease, corresponding very closely in character to diphtheria as defined or described, have been recognized and reported in medical literature for the past seventeen hundred years. These forms, however, were included in a general class of which neither the bounds nor the subdivisions were clearly defined. Down to the middle of the last century they were generally spoken of as croup, and were described under that heading. Croup, in the Encyclopædia Britannica, 1910, Vol. 7, p. 511, is said to be "a name formerly given to diseases characterized by distress in breathing accompanied by a metallic cough and some hoarseness of speech. It is now known that these symptoms are often associated with diphtheria (q.v.), spasmodic laryngitis (q.v.), and a third disease, spasmodic croup, to which the term is now alone applied."

The year 1858 might be selected as marking a new departure in the study of diphtheria, or even as a time of new manifestations of the spread, if not of the character, of the

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disease itself. In 1821 Bretonneau submitted to the French Academy of Medicine a treatise on this disease to which he had given the distinctive name of Le Diphthérite. This was one result of a general order issued by Napoleon regarding the investigation of the disease known by the name of croup. In the United Kingdom, the name diphtheria, was not adopted for a considerable time. Dr. Cheyne (1833) does not mention it; nor Marshall Hall (1837); nor Graves (1848); nor Thomas (ed. by Frampton, 1853); nor Copland (1858). Copland, however, in a comprehensive bibliography, mentions Bretonneau's name and contributions by him in the archives of medicine.

In January and February, 1859, "The Lancet Sanitary Commission Report on Diphtheria" was published in "The Lancet." Reference to the chief features of the disease, and the problems that had arisen in connexion with it is made in the first volume of the New Sydenham Society's "Annual Compendium of Scientific and Practical Medicine, 1860. Cyclopædias like Ziemssen's (1876) and Nothnagel's (1902) give good lists of literature on the subject; while Systems of Medicine, like Reynolds' (1866), with its article by William Squire, furnish instructive views on the subject at the dates of their publication. These, with clinical lectures, text-books of medicine, and contributions to medical magazines, supply the principal facts regarding the knowledge of the origin, symptoms, treatment and control of the disease down to the discovery of the bacillus, or the beginning of the Antitoxin Period.

It is generally recognized that certain requirements should be fulfilled if statistics are to yield trustworthy inferences. Among these are the following: (1) that reporters should be dealing with the same disease; (2) that medical practitioners should be reporting cases uniformly; (3) that registrars should be following the same method of recording primary and secondary causes of death; (4) that statisticians should be using the same methods in dealing with the notifications of cases and deaths.

Certain historical facts have to be noted, since the value for comparison of any series of statistics will depend largely on the period to which it relates. For example, it was not till 1855 that diphtheria was separated in English statistics from scarlet fever. The confusion of diphtheria with croup down to 1858 still influences statistics collected at the present time through inexactness in diagnosis and lack of uniformity in recording.

Is there an accepted definition or description of the disease called diphtheria? Does the word call up the same clinical or pathological picture to the minds of all physicians and pathologists and statisticians who employ it or who hear it?

Newsholme writing in 1889 on the use of statistics says: "There appears to be a fashion even in the names of diseases. In one doctor's practice nearly all the deaths from respiratory diseases will be returned as bronchitis, in another, perhaps as pneumonia." He then speaks of the effect of this in interpreting "national statistics," the errors tending to balance each other. With respect to the present subject he says :—" Perhaps there is no other case in which variations of nomenclature are so unfortunate as in diphtheria. A large proportion of the deaths due to this disease are doubtless returned as ulcerated throat, quinsy, laryngitis, membranous laryngitis, and especially croup. I have known cases certified as membranous laryngitis which were not entered in the Registrar-General's weekly reports as diphtheria, although they were acknowledged to be this by the practitioner in attendance, when inquiry was made by the local sanitary officials."

A perusal of the multifarious literature on the subject shows that in Europe, America, and Australia there is no stated accepted or recognized uniformity between the clinical and the statistical nomenclature of diphtheria.

A quotation has been given from Newsholme (1889) respecting difficulties arising from variations in nomenclature. But even where the same system of nomenclature is in use, there is room for fallacy on account of inexactness of notification.

Such inexactness, it may be noted, is not necessarily due to carelessness. It arises mainly from necessary limitations of clinical evidence even when all available means have been taken to ensure accuracy.

It might be thought that new methods of diagnosis would tend to increase the accuracy of statistics. Even if they should do so clinically in respect to a disease, there is still a statistical element to be considered. In the case of diphtheria there is a special source of error that may affect the case mortality and the general death rate. This arises from the practice, in some places, of notifying "non-clinical carriers" as sufferers from the disease, and including them in the statistics as "cases."

5. Incidence of the Disease.—(i) General. "The Lancet Sanitary Commission Report on Diphtheria," as abstracted in The Year Book of Medicine and Surgery for 1859, contained some facts showing that the disease is not solely dependent on the unhealthiness of the localities where it prevails; that wherever it has existed, among many varieties of its seat and symptoms, it has always preserved its distinctive characteristics and required the same kind of treatment; that so far no influence or condition has been detected to which the production of diphtheria can be ascribed; that it has prevailed at all seasons, and in all weathers, but that excessive alternations of temperature, or of the density of the air appeared to favour its development, and that its spread was believed to be occasioned in great measure by contagion.

In the same Year Book it is stated that the following conclusions are deducible from the table of cases published in the "British Medical Journal": Sex does not appear to influence the liability; age is positively influential, childhood and early youth being far more often attacked than more advanced age; hygienic conditions, occupation, food, and clothing, purity or impurity of air have not been shown to have much effect, the disease having occurred in many instances where the surrounding circumstances were favourable; our knowledge regarding meteorology extends no further than that the disease may be communicated by contagion sometimes, that is not the usual mode by which it spreads.

These statements, formulated by the editors, Dr. Harley, Dr. Handfield Jones, Mr. Hulke, Dr. Graily Hewitt, and Dr. Odling, may be accepted as setting forth trustworthy observations regarding the characteristics of diphtheria at that date.

(ii) Locality. Both the reports mentioned above agree as to the general features of the epidemic as it occurred in various localities at that time. Locality did not appear to have much effect on its manifestations. The subject of locality has, however, acquired a new significance in view of the changes, geographical and social, that have occurred since then, and that alter the whole aspect of the incidence and spread of the disease.

In the Encyclopædia Medica (1916) Dr. Goodall writes: "Before the appearance of Newsholme's work, it has been shown that for England and Wales one of the most striking features with respect to the prevalence of diphtheria was that, whereas up to 1880 the disease was incident upon the rural to a greater extent than upon the urban population, since that date the reverse has been the case; there has been an increase both in rural and urban diphtheria, but the urban incidence has risen to a much higher degree than the rural. London has especially suffered. Newsholme's observations show that this increase in urban diphtheria is not confined to England and Wales, but has also occurred in countries so widely separated as the United States, Japan, and South Australia. It is reasonable to suppose that the wonderful improvements effected during recent years in our means of transit have had no small share in contributing to this increase."

Squire, in Reynold's System of Medicine (1866), writes : "It is somewhat remarkable that though diphtheria existed both in India and California, we have no history of any outbreak of it in Australia until 1859, when Mr. James Moore (Australian Medical Journal, July, 1859) records nine deaths from this cause, and the occurrence of 275 cases at the same time in New Norfolk, Tasmania. This part of the world is perhaps more exclusively in communication with England than any other. The appearance of the disease there is not until after it had attained in this country to its full epidemic development." In the same year cases elsewhere in Australia are reported in the local newspapers.

In more recent times Cormack (Quain's Dictionary of Medicine, 1890) remarks: "In cold damp weather the mortality is greatest;" and he adds, "The medical constitution of the season, and the character of an epidemic greatly influence prognosis."

(iii) Cyclical Changes. Newsholme (Vital Statistics, p. 119) says: "The fact that certain diseases, especially those of an infectious character, recur after an interval of years, shows that, apart from the influence of the season of the year, there are periods of change which require for their completion a series of years. Mr. Netten Radcliffe has drawn attention to the fact that the law of periodicity of epidemic and pandemic diseases is not yet determined. Two factors appear to be at work: (1) the influence of an accumulation of susceptible persons in the intervals between two epidemics of the same disease: and (2) certain extraneous conditions which appear to be operative in determining the periodicity, but about which little or nothing is known." He refers to Radcliffe's inclusion of "the great development of diphtheria within the last thirty years" under the second factor.

(iv) Hygienic Conditions. Chapin gives a comparative study on this subject. He states (Sources and Modes of Infection) that "during the decade 1890-1899, Boston had the best sanitary administration of any of the large cities, though New York stood high. The death rate from diphtheria in both cities was 84 per 100,000 living, from scarlet fever -25 for Boston, and 33 for New York. Certainly neither Chicago nor Cincinnati enforced such rigorous measures, yet the rates in these two cities were 72 and 71 for diphtheria and 17 and 7 for scarlet fever. Among the smaller Massachusetts cities Fall River has usually had a rather inefficient health service, and little hospitalization, yet the death rate from diphtheria was 21 and from scarlet fever 15 per 100,000 living, while in Worcester the figures were 48 and 8, and this notwithstanding the fact that in Fall River the proportion of children is much greater than in most American cities, and that the population is exceptionally ignorant as measured by illiteracy. Worcester has had a contagious-diseases hospital since 1897, and has removed to it in some years as high as 63 per cent. of its diphtheria cases. In general, Worcester secures an excellent registration of cases and consequent isolation. Nevertheless Worcester has recently had, notwithstanding its increasing hospitalization and good home isolation, a severe outbreak of the disease. It seems a fair assumption that some factor much more important than the recognized causes of the disease has been at work in Worcester. If it were not so, the reported cases of the disease should not have risen from 132 in 1905 to 1,178 in 1907."

(v) Social Conditions. According to the Year Book, 1859, Lancet Report, "The fatality of epidemic sore throat and diphtheria appears to have been half as great again in the middle as in the lower ranks of society when a comparison is made with the mortality arising out of diseases of all kinds." In the same year, the British Medical Journal, speaking of Dr. T. H. Smith's experiences, says: "His remarks are in the main confirmatory of those of other observers. He testifies to the remarkable exemption of the pauper class of patients, to the distinctness of the disease from scarlatina, and to the absence of any peculiar localization of the disease in the haunts of fever and cholera." In Germany it was shown that the years of increase down to 1912 were partially times of crises and high prices, and the scarcity of habitations, a specially important factor, was on the increase, chiefly as regards small dwellings.

(vi) Age and Sex. The following table, from Allbutt's System of Medicine, is compiled from the County of London Records of Diphtheria for ten years ending 1903. It shows the age and sex incidence.

Å ges		Cases Notified.		Dea	ths.	Case F 1,000	tate per Living.	Percentage Fatality.	
	Males.	Females.	Males.	Females.	Males.	Fcmales.	Males.	Females	
All Ages		53,671	63,890	9,059	9,592	2.5	2.8	16.9	15.0
Under 1 year		1,477	1,128	630	528	2.8	2.2	42.7	46.8
1-2 years		4,044	3,561	1,571	1,445	8.4	7.4	38.8	40.6
2-3,		5,219	4,777	1,537	1,488	11.3	10.4	29.5	31.2
3-4 "	• •	6,264	6,144	1,481	1,469	13.9	13.7	23.6	23.9
4-5 ,,		6,180	6,473	1,188	1,326	14.0	14.7	19.2	20.5
510 ,,		16,854	20,328	2,110	2,692	8.1	9.7	12.5	13.2
10–15 "		5,865	7,753	309	341	2.9	3.8	5.3	4.4
15-20 ,,		2,766	3,812	73	81	1.4	1.7	2.6	2.1
20-25 ,,		1,802	3,193	43	39	0.8	1.2	2.4	1.2
25-35 ,,	••	2,099	4,287	43	77	0.6	1.0	2.0	1.8
35-45 ,,		739	1,587	32	43	0.3	0.5	4.3	2.7
45-55 ,,		235	603	24	23	0.1	0.3	10.2	3.8
Above 55,,	••	127	244	18	40	0.1	0.1	14.2	16.4

AGE	AND	SEX	INCIDENCE	OF D) IPH'	THERIA	-COUNTY	0F	LONDON,
			DECE	ENNIL	JM E	NDING	1903.		•

DIPHTHERIA.

Dr. Tatham says, "This table indicates that, according to London experience, which extends to 117,561 cases within a period of ten years, the incidence of diphtheria is mainly limited to the period of childhood, the ages from two years to five being those most liable to attack. Comparatively few cases occur in the first year of life, but the fatality among infants attacked at that age is excessively high. In proportion to population, the notified cases are comparatively few in number after the tenth year of life, and the case fatality is below the mean except among women above the age of 55 years."

(vii) Susceptibility. The subject of susceptibility in races apparently has not been intensively studied, but it would appear on a cursory review of statistics of mortality that the negro in America is less susceptible than the white. The effect of previous diseases, as giving immunity or predisposition, does not appear to have been the subject of close inquiry. In the Year Book, 1859, mention is made of 47 cases, 12 of which had suffered previously from scarlet fever.

(viii) *Prevalence*. The testimony to the increased prevalence of diphtheria in almost all countries is universal. It is the most urgent problem of the present day as regards the disease.

6. Type and Epidemic Constitution.—(i) General. In 1918, when influenza was reported in various parts of the world, there was not a little speculation as to whether it was a new disease, requiring a new name and new methods of treatment and control, or whether it was one of the several protean forms that had been studied in time past, and was to be regarded as influenza showing a particular type or epidemic constitution that had been observed in former outbreaks. Some consider the question still debatable.

(ii) Changes in Type. An epidemic of a communicable or infectious disease in one place may show, for example, an alteration in age-incidence when compared with an epidemic of the same disease at a former time. Again, there may be a difference in its extent, its prevalence, or its virulence, these last two characters not being necessarily concomitant.

The term "epidemic constitution" is defined and illustrated by Latham at considerable length. The name, he says, "indicated nothing of the nature of the thing itself; but it acknowledged a reality and a power." In the course of his exposition he says: "Behold, for a season mankind in various places and circumstances require a treatment for their diseases contradictory to the experience of former times. Then wait for a season, and behold, mankind, in the same places, and in the same external circumstances, will require a treatment for the same diseases contradictory to the experience of the present times. But neither now, nor formerly, nor hereafter, will there be found in the vital being of men themselves, in their places or circumstances, anything to reconcile the contradictions or at all explain them." Again he says: "Let present indications be justly chosen, and fulfilled according to a fit measure, and then the treatment which they suggest, while it is variable at different times, will be at all times uniform in its success."

Sydenham, who devoted a large amount of study to this subject, pointed out that acute diseases showed a long period of evolution, with a rise, a decline and a fall, extending over centuries and, at the same time, seasonal variations with waves measured in months so that their character and reaction to treatment varied at intervals.

In recent times the general subject of type has been discussed by Sir Humphry Rolleston under the heading "The Change of Type of Disease." He says : "At the present time no one doubts that certain diseases have shown changes of type; scarlet fever is universally recognized to have become much milder." Brownlee finds that though there is not any evidence that the amount of scarlet fever (or the infectivity of the causal agent) is less now than in the latter half of the last century, the mortality (or the virulence of the organism) has greatly fallen. Pneumonia is another example of a disease in which the virulence, as shown by the mortality, has increased, and the type of the disease has, since the reappearance of influenza in 1889–1890, undergone some change, the disseminated form being common and the frank lobar pneumonia less frequent. The seasonal variation of type was shown in a well-marked degree by the two waves of influenza in the spring and autumn of 1918, the high rate of thoracic complications and of mortality in the second wave being associated with streplococcus hemolylicus and the pneumococcus.
"In the Royal Navy the spring wave of influenza was accompanied by 0.4 per cent. of complications and 0.03 per cent. mortality, whereas in the autumn wave the incidence of complications was 6.8 per cent. and of deaths 2.8 per cent."

The subject of epidemic constitution came into prominence at the time when diphtheria was recognized in England as a distinct disease. In the Sydenham Society's Year Book, 1859, a summary is given of an article by Henry Kennedy. He states it "as a patent fact, that both animal and vegetable life is subject at times to epidemic influences, which at one period raise, and at another period depress, the standard of health. These determine the so-called "constitutio anni." These were carefully noted by the older writers, and their practice shaped accordingly." He also strongly insists on the need for a discriminating therapeutism, affirming that no single plan can possibly meet the ever-varying shades of disease, some inflammations requiring wine (alone), some mercury, some bleeding, general or local, or both." The view of Dr. Adolf Gottstein on this subject is that the waves of diphtheria prevalence are attributable to rhythmical variations in power of resistance of successive generations, the weeding out of the less resistant being accomplished to different extents at different times.

Since 1859 much has been written on the subject of change of type or epidemic constitution of diphtheria, and not a little speculation has been hazarded, and investigation made as to the causes of such changes.

(iii) Bacteriological Causes. Bacteriological causes have been suggested for change of type. It is said that bacteria may vary in pathogenicity from internal causes, and that these may give rise to such cyclical recurrences of disease as have been observed in measles and influenza. Again, it is suggested that change of type may be due to external causes, such as food, alcohol, climatic conditions, overcowding, overwork, changes in resistance of the patients. These have been discussed at some length by Rolleston and others. In this connexion the difference between prevalence and virulence has to be noted. It has been suggested that fluctuations in prevalence may illustrate changes in the life-history of the disease organism, while mortality may express the accident of its manifestation in surroundings unfavourable to the person attacked.

(iv) Influence of Urban and Rural Distribution of Population. In the case of diphtheria it would appear that the variation in relative proportions in the urban and rural populations may have had a pronounced effect on the incidence, if not also on the virulence, of the disease in recent times. Formerly it was essentially a rural disease, now it is becoming a characteristically urban disease throughout many, if not most, parts of the world.

(v) Necessity for Separate Individual Diagnosis. It has been said that although cases may be regarded as belonging to types, each case requires its special study, speaks its proper language. The laity have considered this in connexion with treatment. Amiel says: "Why do doctors so often make mistakes? Because they are not sufficiently individual in their diagnoses or their treatment. They class a sick man under some given department of their nosology, whereas every invalid is really a special case, a unique example. How is it possible that so coarse a method of sifting should produce judicious therapeutics? Every illness is a factor simple or complex, which is multiplied by a second factor, invariably complex—the individual, that is to say, who is suffering from it so that the result is a special problem, demanding a special solution, the more so the greater the remoteness of the patient from childhood or from country life."

(vi) Quantitative and Qualitative Observation. If there be such types, or epidemic constitutions, in time and place, then in proportion as an investigator takes account of them, he will make his observations and frame his experiments quantitatively and qualitatively so as to yield trustworthy results, and thus to give indications for further research and treatment.

7. Diagnosis.—Correct diagnosis of any disease is obviously of paramount importance as affecting the validity of inferences drawn from statistics of cases or deaths connected therewith. Before considering diphtheria, it may be well to examine the subject of diagnosis in general, in view of the circumstance that it is not studied to the extent it deserves by writers on public health. The following is extracted from "Vital Statistics, a Discussion of What They Are and Their Uses in Public Health Administration," by

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John W. Trask, Assistant Surveyor-General, United States Public Health Service, Washington: "Perhaps the most common error entering into death registration, and therefore into mortality statistics, is in connexion with the statement of cause of death. Aside from the fact that in the instances in which it has been impossible for the attending physician to feel reasonably certain as to the nature of the terminal illness, a cause of death is nevertheless usually stated in the certificate, and also the fact that at times the physician knowing the nature of the illness may, in the belief that he is shielding the family from odium, or because of their whim, intentionally state an erroneous cause of death, there still remain the many unavoidable errors of mistaken diagnosis. Just how great a factor this last may be it is difficult to estimate. However, the findings of Dr. Richard C. Cabot give at least a hint of its possible importance, and the extent to which it may affect that part of mortality statistics relating to causes of death. [In a study of 3,000 autopsies with regard to the relation of the actual cause of death as found post-mortem to the clinical diagnosis, Cabot found that the percentage of correct diagnoses in various diseases ranged from as 16 in acute nephritis to 95 in diabetes mellitus.]

The cases studied were hospital cases under conditions assumed to be favourable to correct diagnosis. It is quite safe to assume that in medical practice at large the percentages of correct diagnosis would be found lower than those found by Cabot."

Diphtheria did not come within the scope of Dr. Cabot's inquiry. It is difficult to estimate what the percentage would have been in respect to this in pre-Klebs-Löffler bacillary days. And yet all statistics of diphtheria of those days have to be considered in the light of accuracy of diagnosis when employed for the purposes of comparison.

When the antitoxin period is reached the question becomes still more important. In an article by Dr. Armand Ruffer, in The Medical Annual for 1895, the following occurs: "Before we come to the results which have been obtained by this method, it is necessary to point out one cause of error which affects all statistics of diphtheria. One finds that a great many cases which are certified as diphtheria and admitted into hospitals, are, as a matter of fact, not diphtheria at all, as the specific bacillus cannot be found in them. Such cases nearly always recover, and if one were to include them in the statistics of diphtheria cases treated by serum, the mortality would appear to be far too low. It is necessary, therefore, before the value of treatment can be established, to examine each case so treated for the diphtheria bacillus. This should be systematically carried out when the antitoxin treatment is being tried."

8. Treatment.—(i) General. Too much stress cannot be laid on the necessity for early identification and treatment of the disease. It has been noted that diphtheria differs in certain respects from other diseases like scarlet fever, measles, and mumps, which run a fairly normal course and tend to recovery of the patient. With diphtheria, in addition to the general or constitutional symptoms, there is often a local condition of the throat that makes feeding and breathing extremely difficult, besides acting as a factory for the making and supplying of poisons to the system. It is this local lesion that is regarded as the crux in various forms of treatment, and that may form one of the most important factors in the spread of the disease. In the use of stimulants in this disease Jacobi's observations are worthy of note. He says: "A mild invasion does not assure a mild course. Never has a 'possible superfluous' tonic or stimulant done harm in diphtheria, but many a case has a sad termination because of a sudden change in the character of the disease putting the bright hopes of the physician to shame."

The literature on the subject of local applications in past times is very considerable. It was recognized that measures that could destroy the presumed infective material locally without harmful results were of the greatest use. Modern measures, it has been said, are not intended to remove the diphtheritic membranes but only to destroy the bacillus and to prevent the production of toxins. If they help to do this they are worthy of consideration, much more so if they do it effectively. A good deal of study has been devoted to the technique of local applications. It is difficult to obtain a substance that is effective in the short time allowed for its application, while the difficulty of applying in the case of young children is sometimes very great, and the patients become agitated and exhausted in their struggles to resist. Among the approved substances are potassium permanganate, boric acid, corrosive sublimate alone or combined with ichthyol, sozodol with milk of sulphur. Löffler used a solution of menthol, toluol, creoline, metacresol, or perchloride of iron, and recorded 96 cases treated without a death. Trousseau (1867) tells of his inquiries into a remarkable stopping of an epidemic that was characterized by a frightful mortality. He found through the parish priest that the cessation was due to an old woman's treatment. Trousseau witnessed and verified the results, and found that the change was brought about by the use of a gargle of alum and vinegar in water. The mode of treatment was thereupon printed, published, and sent to the different communes. Bretonneau adopted it, and it was used by all physicians in the treatment of diphtheria. Many other substances have been used, from the time of Aretaeus downwards; and it would appear that a large part of their efficacy depended on the manner of application and the skill of the attendant.

(ii) Antitoxin. (a) Mouth Administration. Hewlett, in 1902, recorded experiments showing that administration by the mouth or rectum was valueless. His conclusions were founded on the fact that such administration to rabbits and guinea-pigs did not prevent these animals from succumbing within a short time to lethal doses of toxins administered subcutaneously, whereas the subcutaneous injection of antitoxin acted as a preventive or antidote. This, it must be noted, assumed that absorption from the alimentary tract would be the same in human beings as in rodents. Pilcher and Paton had great confidence in the oral administration of antitoxin. King and McLintock immunized animals with diphtheria toxins orally administered, by taking precautionary measures against the action of the gastric juice. In respect to clinical evidence, it is stated that at the East London Hospital for Children all serums were given by the mouth, except in cases of very urgent laryngeal diphtheria, when it was given subcutaneously. In "Osler and McCrae's Modern Medicine" it is stated : "Oral administration is too slow and its effects too uncertain for practical use."

(b) Efficacy of Serum. From the first introduction of antitoxin, there has been much testimony both in favour of and against its use, and a relatively less amount of critical examination of the arguments adduced in support of conclusions.

Behring, the inventor, was severely criticized by Hansemann, but it has been stated that the dispute in Germany was much influenced by personal animosities. Dr. Rupp criticized the statistics of Monte and Kretz, and concluded that they did not satisfactorily prove the efficacy of antitoxin. In London, Lennox Browne treated two series of 100 cases each, the one with, the other without, antitoxin, and although the series treated with antitoxin showed an apparent reduction in mortality as compared with the other, from a careful analysis he believed that this was apparent and not real, and that grave complications, such as anuria, nephritis, and cardiac failure were increased by the use of the serum. Gayton, of the North-Western Fever Hospital, considered that although the mortality in his cases was somewhat lowered, this was due to a less virulent form of the disease rather than to the treatment. He summed up his view thus: "Those cases that under the old treatment would probably have died were still fatal under the new, those which might get better recovered in about the same proportion, whilst the mild cases improved no more rapidly—indeed, rather the contrary."

Behring himself was modest in his claims for the efficacy of antitoxin. He said: "I am now definitely of opinion that under suitable treatment with my remedy, the mortality from diphtheria may be reduced to under 5 per cent. if the serum be used in good time—that is, before the third day of illness."

At the present time, the use of antitoxin is widespread and strongly recommended, statistics being used as conclusive arguments for its employment in practically all known or suspected cases of diphtheria.

(c) Dosage. Practice has been extremely varied both in regard to the amount of the dose, and the length of the intervals between the doses. The dose has varied from less than 600 units to 9,000 units. In one recorded case a child of 3 years received 225,000 units. Some physicians gave 1,000 units for an average dose. D'Agnanno ascribes the different percentages given by various observers to: (1) The period of the disease at which the injection is practised; (2) The quantity of the serum used; (3) Local treatment; (4) The varying proportion of faucial and laryngeal cases. Commenting on this the

recorder in "The Medical Annual for 1898" said: "But he omits a very important point, that of numbers, for to get a percentage which will be practically correct, we need at least thirty-three thousand cases." In one administration area the Health Department distributed 27,000 units for each case reported. So far, there does not appear to be any recognized dosage table for age, sex, general condition, type of disease, or complications.

(d) Time of Administration. All practitioners who use antitoxin urge that it should be administered at the earliest indications of the presence of the disease; many employ it if there is reason to suspect that the disease may possibly be present.

(e) Sequelæ. Sequelæ of antitoxin treatment are varied and frequent. In some statistical records abscesses were noted at the seat of puncture in 1.2 per cent. of cases; joint pains in 6.5 per cent.; pyrexia with or without rash or pain in 19.8 per cent.; urticarial, erythematous, or scarlatinal rashes in 35.2 per cent.; albuminuria in from 53 to 24 per cent.; nephritis in from 1.2 to 0.5 per cent.; lobular pneumonia in from 2.5 to 1.6 per cent.; and various paralyses in from 2.3 to 13.2 per cent. Other statistics would suggest that complications are rare. In the case of albuminuria and nephritis it would not be possible, without a large number of control cases, to say what effects might be due to the disease and what to the treatment. In the Chicago Hospital Statistics it is recorded that cervical adenitis was noted in 62 per cent.; paralysis, usually of the muscles of deglutition, in 9 per cent., not including those in which the heart was involved; and 5 per cent. suffered from otitis media. Of 834 deaths, 137 were due to bronchopneumonia, and 78 to myocarditis.

(f) Anaphylaxis. On this subject of serum treatment a general statement by Dr. Rendle Short demands consideration. In his book, The New Physiology in Surgical and General Practice (1922), he writes: "It is well known that when certain proteins are injected into an animal's blood stream, so far from antibodies being formed, there may be an increased sensitiveness developed, so that a second injection months or years afterwards may produce severe or even fatal symptoms. A few cases are on record in which second injections of horse-serum containing diphtheria or other antitoxin have caused most alarming illness or death. Now that so many men who were wounded in the war and given a dose of antitetanic serum are about in the community, it is possible that there may be trouble one day when one of them is given diphtheria antitoxin or some other preparation of horse-serum protein. It is also well known that if the second dose is given within a week, this sensitization (anaphylaxis) does not occur."

9. Results of Treatment.—(i) General. Reference has been made above to the results when the treatment is begun at an early stage of the disease. Statistics dealing with this will be considered later. Other circumstances influencing results will now be considered.

(ii) Ballard's Researches. Ballard in 1858-9 studied the conditions pertaining to eighty fatal cases in the parish of Islington. He classified them in respect to their truly diphtheritic character: "Class I., cases in which he obtained satisfactory evidence of the presence of the true diphtheritic exudation upon the throat, or in which he saw it himself during life. Class II., cases which were certified as deaths from diphtheria by the medical attendant, but in which he obtained no particulars of the appearance of the throat. Class III., cases in which he was assured by the medical attendant that the exudation was absent. Class I. consists of 31 males, 25 females-total 56. Class II. of 4 males, 9 females-total 13. Class III. of 6 males, 5 females-total 11. General totals-41 males, 39 females. As to age, 5 deaths occurred under 1 year; 12 from 1 to 2; 11 from 2 to 3; 13 from 3 to 4; 7 from 4 to 5; 19 from 5 to 10; 7 from 10 to 20; 6 at 20 and upwards. As to the duration of the disease, in four infants under one year, the main duration was four days; at each of the other ages, it was from nine to eleven days. As to the modes of death, and the period at which they prevailed, it appears from Dr. Ballard's tables that ' the danger from which a fatal result is mainly to be apprehended in the course of the first week of the disease is extension of the disease to the upper part of the air passages, with consequent asphyxia The sudden deaths in this week are probably due to the same cause, giving rise to spasmodic closure of the glottis. As the malady advances into the second week, the chances of death from this

cause are only equal to those from the general prostration of the vital powers. In the third and fourth weeks, the latter is the condition mostly to be dreaded; the sudden deaths at this time being probably due to syncope." As to the social position of the patients, it appears that "the fatality of epidemic sore-throat and diphtheria appears to have been half again as great in the middle as in the lower ranks of society, when a comparison is made with the mortality arising out of diseases of all kinds'."

The number dealt with is relatively small, and the total number of patients is not stated, but the results are interesting as showing that the ratio of the first five to the second five years' deaths was 48 to 19 at that time—that 60 per cent. were under 5, and 23.75 per cent. between 5 and 10.

(iii) London Returns, 1892 to 1912. The London notifications of cases show that for 1892 to 1912, about one-third of the cases are under the age of 5 years, and about another third between the ages of 5 and 10; also that age has a marked influence on case mortality.

(iv) Returns for Scotland, 1860 to 1911. The mortality rates for the population of Scotland per 10,000 for various triennial periods since 1860 are shown in the following table :—

Ages.	1860-2.	1870-2.	1880-2.	1890- 2 .	1900–2.	1909-11.
Under 5 years Under 10 years Under 15 years 15 years and over	$33.3 \\ 7.9 \\ 1.8 \\ .4$	$31.5 \\ 7.5 \\ 1.1 \\ .3$	25.76.61.2.2	$\begin{array}{c} 22.3 \\ 6.4 \\ 1.0 \\ .2 \end{array}$	12.2 3.3 .7 .1	$11.9 \\ 4.5 \\ .8 \\ .1$
All Ages	5.9	5.5	4.6	3.8	2.0	2.0

DIPHTHERIA AND CROUP.—MORTALITY RATES PER 10,000 LIVING, SCOTLAND, 1860 to 1911.

It will be observed that the decrease for "all ages" in the first four periods was becoming more marked, that from the fourth to the fifth it was strongly marked, but that from the fifth to the sixth there was no decrease. The compiler notes that a third element has to be considered, viz., a change in the age-distribution of attacks which has accompanied the increased prevalence which he has been considering. He shows that with the increasing prevalence there has been a relatively greater invasion of the age-period 5 to 15. This is an age of relatively fewer deaths.

The significance of this table may be better appreciated when one considers that notification of diphtheria was not universal until 1899. Then, under radically changed circumstances, an active health propaganda made its effects evident in urban and rural communities alike. It is obvious that no accurate estimate is possible regarding the case mortality in diphtheria previous to the adoption of universal and uniform notification of the disease.

To control infectious diseases effectively, it is necessary (a) to detect every case in the earliest stage at the earliest possible moment; (b) to isolate the sick from the well and to keep them isolated; (c) to isolate, under observation, persons who may be contacts of the sick. Isolation consists in establishing a "biological barrier," which need not be geographical or physical. The prime requisite in all procedure, for control, is notification to the administrative authorities. Such notification was optional on the part of local authorities in Great Britain (with a certain provision for compulsory

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notification in Scotland) from 1889 to 1899, when it was made compulsory and universal. "Hospitalization" of infectious diseases is of recent date in the United Kingdom and most other countries. Its specific adjuncts are speedy and accurate bacteriological diagnosis; safe and ready transport, admission to hospital at all hours and constant supervision by trained attendants; district or hospital nurses for visiting "out-door" cases; inspectors trained and certificated in disinfection and other sanitary administration. Except in a few favoured localities, these means were not available for the treatment or control of infectious diseases before antitoxin times. The Isolation Hospitals Acts in England date from 1893 and 1901.

(v) The Co-efficient of Expectancy. Sir Malcolm Morris in "The Practitioner" in 1895 said : "The results so far achieved by the antitoxin treatment of diphtheria appear to me to give solid ground for the hope that at last a real antidote to this bane of child life has been discovered. Of course, in estimating the value of any new remedy which excites the enthusiasm of the profession, it is always well to leave what dressmakers, I believe, call a 'margin for shrinkage.' The weak point in the new treatment, to my mind, is that it is too successful; its effects are painted in colours too brilliant not to fade a little by and by. One of the lessons which the philosophy of medical history teaches is that a new remedy always cures."

Some years ago a writer in "Le Monde Médical" said : "Every new method of treating chronic pulmonary tuberculosis, provided it be harmless, always yields satisfactory results. This is an axiom which is absolutely true, one which I should like to see inscribed in large letters on the first page of every new work on phthisotherapy because, if it be not borne in mind, it renders it impossible to gauge the value of any new mode of dealing with this disease." The co-efficient of expectancy can in some cases be estimated in respect to its effects on physician, patient, friends and nurses.

In other cases it may be difficult to gauge the immediate and the remote effects of expectation and confidence on the treatment of patients and the control of disease unless experimental investigation is made on an extensive scale and according to the canons of the logic of medicine.

(vi) Results on Convalescence. The general statement has been made by Dr. C. H. Roger that statistics clearly establish that, under the antitoxin medication, the period of convalescence has been considerably reduced. There seems, however, to be a lack, if not a complete absence, of statistics bearing on this subject.

10. Interpretation of Results.—(i) General. Much of the "advance" of modern times, many of the recent errors in general medicine, abandoned or still in vogue, have resulted from inferences drawn from some assumed scientific principle or solitary fact and applied to modes of treatment.

In 1864 Dr. Barclay delivered the Lumleian Lectures to the College of Physicians on "Medical Errors: Fallacies Connected with the Application of the Inductive Method of Reasoning to the Science of Medicine." Referring to what may be called the variable causes influencing the results of an attack of disease he says: "First, before the attack: the sex, age, and social position of the individual; his previous state of health, including early constitution, acquired habit, and the effect of the relative amount and purity of food and air; his actual condition, whether suffering from any minor ailment (to say nothing of major complications, which may be excluded), from actual privation or cold, or from any recent excess. Secondly, as regards the seizure itself : its immediate cause ; its intensity ; the rapidity of its development and progress; and the extent to which the special organ attacked is affected by it. Thirdly, the circumstances external to the patient influencing the progress of the disorder : such as his home ; the means at his command ; the friends that surround him, ignorant or well-informed; his nurse and his food, including stimulants, as well as other nourishment; the skill of his medical attendant; and the judgment with which other subsidiary remedies are employed ; if necessary, the influence which the conditions

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calling for their employment exercise over the disease, no less than the remedies themselves; and, perhaps more than anything else, the discretion with which the amount of stimulants is strictly limited to the exigencies of the particular case. Lastly : the wonderful and inexplicable influence of mind over body, the condition of hope or fear, of quiet confidence or restless anxiety. This list is far within the limits of all possible circumstances affecting the result, because it is intended to be general, and to include those only which are undoubtedly of sufficient power to lead to a fatal result, or a lingering convalescence. I need not, therefore, go into a detailed examination of them individually. The list is a long one, and each circumstance mentioned presents several varieties; so that if it be required to neutralize their influence completely, the number of cases selected must be such as shall fairly represent all possible conditions in these respects, and afford a true comparison between the two series. For whatever the number needed, it must be borne in mind that it is essentially a comparison, and that a series of hundreds of cases which seemed to do well under a particular mode of treatment is valueless, because perchance a similar series in which the remedy was not administered might have done better." Elsewhere he says: "The statistics of our large hospitals collected under ever-varying circumstances as to the antecedents of the patient, the nature of the attack, and the pet prejudices and customs of the physician by whom he is treated, amounting as they soon would do to a large number, would afford a basis of calculation on such points of very considerable value, because the chances of error would, from the nature of the inquiry, be comparatively small."

Sir Henry Holland says: "Through medical statistics lies the most secure path in the philosophy of medicine." As an illustration of the practical application of statistics he says: "A question may be started whether it is possible to reach any sound conclusion without including in the average those cases where there has been no treatment at all. If the tables show a mortality of 75 per cent. under one method of treatment, and only 60 per cent. under another, this does not logically prove the latter to be beneficial, but merely gives evidence that the former is injurious."

It may be well to illustrate the present subject by applying some of the recognized tests of medical logic to the statistics accepted as more or less authoritative in order to see how far the statements of facts, *i.e.*, the figures, and the inferences drawn from them, *i.e.*, the conclusions, conform with the canons of logic—that is, to find out what information the statistics are capable of supplying.

When Balfour found that Skoda's patients in Vienna were left to sink or swim without phlebotomy, while others at the same time, and in the same city, and under similar conditions, were being treated *secundum artem* by profuse blood-letting, he was witnessing an investigation according to the logical "Method of Difference." When patients in Edinburgh were being treated, one set by profuse bleedings and another in similar conditions at the same time by varying degrees of small bleedings, the investigation was being made by the "Method of Concomitant Variations."

According to Jacobi, the doctors in Vermont in 1862 made a complete and wholesale reversal of the treatment during an epidemic of diphtheria, and the death rate fell from 90 per cent. to 10 per cent. This was an application of the "Method of Difference"— provided that, in the meantime, no unrecorded or unnoticed seasonal change had occurred, or other varying element had complicated the problem. As a rule, few investigations can be made under such favourable conditions, *i.e.*, conditions so definite as to yield accurate comparisons and trustworthy results.

From what has been said and quoted above, it will be seen that the problem of diphtheria is a very complex one, involving many factors, and demanding for its investigation extensive series of accurate medical observations coupled with expert statistical analysis in order to reach even a fair amount of probability in respect to the influence of any given or supposed single factor.

(ii) Influence of Diagnosis. In dealing with questions of the incidence, treatment, and case mortality of any disease, the prime essential is a certainty that all the facts and figures that are being studied refer to the subject of investigation, in other words, the first requisite is exact definition, which means diagnosis. On this Dr. C. V. Chapin, in 1910, stated the position in respect to diphtheria very clearly. He said : "Many had long recognized that the diagnosis of diphtheria was difficult. It was suspected that many cases, because of this difficulty, escaped isolation entirely. When the culture method of diagnosis was devised, I became enthusiastic and hopeful. We adopted it in Providence in January, 1895, and soon after required a negative culture before the patient was released from isolation. Hill has shown that without cultures the chance of error in the diagnosis of diphtheria is 50 per cent., which corresponds entirely with my frequently expressed opinion before the advent of the culture method. It is evident, then, that the general use of cultures ought to bring to light great numbers of cases of diphtheria which were formerly unrecognized, and this it certainly does. If such an improvement in diagnosis, and consequently in isolation, is brought about by the use of cultures, and if by the same means isolation can be maintained until the patient is certainly free from infection, there ought to follow a marked reduction in this disease. But it was quite otherwise. The deaths in Providence, which in 1894 had numbered 45, rose to 79 in 1895 and 125 in 1896, nearly twice as many in proportion to the population as there were in 1883, when there was no isolation, no disinfection and no antitoxin. The cases rose from 166 in 1894 to 386 in 1895 and 890 in 1896. The apparent reduction in the fatality rate from 27.71 to 14.07 indicates very plainly that the culture method of diagnosis had discovered a very large number of mild cases that would have previously been unrecognized, for antitoxin was only a minor factor in reducing the fatality, as it had been used in only a little over one-third of the cases."

Other investigators have written in similar terms, and it must be recognized that accuracy of diagnosis has given rise to a false impression as to the effect of any system of treatment on the case mortality of present-day diphtheria when compared with the figures for the period from 1859 to the discovery of the bacillus of the disease. The question naturally arises whether any other factors have had a similar influence on the study of the problem.

Reference may be made to other diseases with which diphtheria is closely allied, viz., typhoid fever, measles, scarlet fever and whooping cough.

An Official Report of the State of Massachusetts deals with the results locally of the progress of preventive medicine. It gives the median and average number of deaths and death rates for the more prominent communicable diseases for the three ten-year periods 1890–99, 1900–09, and 1910–19. It says: "The statistics for the single year 1919 are given also to show that the deaths and death rates are still on the downward trend despite the increase in population. The common factors in the reduction of all diseases have been isolation of cases and quarantine of contacts.

The special factor in diphtheria which assisted in the lowering of the death rate is diphtheria antitoxin, introduced in 1894, and within a few years universally used. Prior to 1894, from 20 to 30 died out of every 100 ill with diphtheria, but in 1919 only 7 children died out of each 100 cases of diphtheria.

A remarkable fact in diphtheria fatality has been demonstrated in Paris and reported by Roux in the Office International d'Hygiène Publique, 1919, XI., No. 11. In the Children's Hospital in Paris there were 15,271 cases of diphtheria for the five years 1914–19. Of this number only 378 died, giving a fatality rate of 2.64 per cent. This indicates that the fatality rate of 7.2 per cent. for Massachusetts is still capable of being reduced."

Statistics relating to Massachusetts are given in the appended series of tables :--

. .	Yea	r.	<u>-</u>	Population.	.l Year,	Population.
1890 1900	••	••	•••	2,238,943 2,805,346	1910 1919	3,380,151 4,033,826

POPULATION OF MASSACHUSETTS.

				Dea	iths.	Death-rate (per 100,000).
	Peri	iod.		Median.	Average.	Median.	Average
189099				737	727	29.4	29.5
1900-09				518	501	16.6	16.7
1910–19				258	239	7.0	6.6
1919 (a)	••						

TYPHOID FEVER.

(a) Deaths, 102 : death-rate, 2.6.

WHOOPING COUGH.

				Dea	aths.	Death-rate ((per 100,000)
	Perio	od.	.=	. Median.	Average.	Median.	Average
	-						
1890-99	• •			278	294	11.2	11.9
1900–09				269	303	8.3	10.1
191019				263	307	7.2	8.2
1919 (a)				••		• • •	

(a) Deaths, 319: death-rate, 7.6.

MEASLES.

D · J		Dea	aths.	Death-rate (per 100,000).			
	Per	iod.	1	Median.	A verage.	Median.	Average.
1890–99				127	155	5.2	6.3
1900-09	••			192	228	6.4	7.6
1910-19	••			263	278	7.6	7.4
1919 (a)						• ••	

(a) Deaths, 183 : death-rate, 4.6.

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				Dea	aths.	Death-rate (per 100,000).
	Peri	od.	-	Median.	Average.	Median.	Average
1890-99	••			338	412	11.5	15.8
1900-09	••	••		299	284	10.0	9.9
910-19				156	173	4.1	4.8
1919 (a)	••	• • •		••	•••	••	

SCARLET FEVER.

			Dea	ths.		Death-rate (per 100,000).			
	Perio	ođ.		Median.	Average.		Median.	Average.	
1890-99				1.440	1.413	,	60.3	57.6	
190009		• •	• •	749	867	•	23.9	29.0	
1910-19				627	638		17.1	17.3	
1919 (a)		••	••	••			••	•••	

DIPHTHERIA.

(a) Deaths, 591 : death-rate, 14.8.

From these tables it will be seen that in typhoid fever, whooping cough. scarlet fever, and diphtheria there has been a gradual reduction during the three ten-year periods. The case of measles is exceptional, and this has to be correlated with the fact that usually this disease is communicable by a sufferer to a healthy person for two or three days before any clinical symptoms are manifest (unless routine examination is made of the buccal cavity), whereas, in typhoid fever, whooping cough, and scarlet fever, a sufferer is usually obviously ill before being in a condition to infect another person. In the case of diphtheria, a reduction in the death-rate is manifest during the periods, but the reduction in scarlet fever is about the same in amount, and in typhoid fever is much greater. Had the diphtheria rate decreased as did that of typhoid fever, the average death-rate instead of . being 17.3 would have been 12.8 only. The recorder states that "The factors common in the reduction of all diseases have been isolation of cases and guarantine of contacts," and then he says: "The special factor in diphtheria which assisted in the lowering of the deathrate is diphtheria antitoxin, introduced in 1894, and within a few years universally used." The death-rates from typhoid fever have fallen from 29.5 to 6.6 and from diphtheria from 57.6 to 17.3; and from the figures as stated there is nothing to show that any form of treatment was a special factor in the reduction that occurred, or was a factor in preventing the further reduction that might have been expected from the general common factors, viz., "isolation of cases and quarantine of contacts." In all investigations there is a danger of attaching too much importance to one factor to the exclusion of another, or of several.

In 1843 Sir Thomas Watson, in his lectures on "The Principles and Practice of Physic," wrote: "The exceeding value of statistical returns in determining the *causes* of disease has been admirably set forth by Dr. Alison; but, for directing the treatment of individual cases, it is far more profitable (as some one has well expressed it) to *watch* than to *count*. To use or to withhold a given remedy simply because it is found, by numerical calculation, that in cases nominally the came, recoveries have been more frequent when that remedy was employed on the one hand or omitted on the other, would be to sacrifice the plain and perhaps pressing indications of a particular case, to the statistical averages of diseases having merely a common denomination. To repeat what I have said elsewhere—we do not necessarily take the same symptoms as indications of treatment, which we trust to as signs of disease. We treat, indeed, not the so-called disease, but its accidents; the vital manifestations which proclaim its character and intensity, foreshow its tendencies, and illustrate its course."

It is an axiom in medicine that one cannot prescribe according to statistics. In any system of treatment, new or old, the manner of action of any agent or remedy demands most careful and critical study. No one can forecast what will prove to be essential and what accidental in its use, or what its effect will be in any particular direction. Examination, experiment, and logical induction alone can give trustworthy information.

In old times, wounds were healed through the introduction of the "Sympathetic Powder." Forty years ago the "carbolic spray" on the wound was regarded by many as the one essential in the new antiseptic system. Later on, neglect of antiseptic lavage of the post-partum uterus was characterised as almost a criminal proceeding.

A recent contribution will show the relative places of the essential and the accidental in producing results. Colonel Edward Munson, of the United States Army, writing in June, 1917, regarding an outbreak of measles among soldiers in a camp under his medical care, points out that, while his belief is that for measles any other disinfection than by sun and air is unnecessary, he found that he was obliged to issue orders for the soldiers' clothing and equipment to be wetted by a chemical solution, in order to compel the men to spread the articles out in the sun and dry them before they were fit for use. Colonel Munson's experience was that neither officers nor men could be entrusted to carry out orders regarding simple disinfection by air and sun. There was a psychological necessity for the chemical solution.

On the subject of "professional statistics" Baginsky says: "The value of statistics in ascertaining the actual permanence of the processes and circumstances in things and in man is beyond all doubt and incontestable, and the less complicated the relations, the more certain and likely will be the results which may be determined from such a compilation, grouping, and addition. On the other hand, the scientific and conscientious statistician knows that on account of the complicating circumstances and relations attending figures, the difficulty of their proper estimation grows, and the results may be far from the actual truth. What can be more complicated than the course of morbid processes in which certain positive factors as to age, weight, social position, the number of affections, etc., are taken into account, but where innumerable other conditions that cannot be mentioned, even unknown circumstances, such as the constitution of the patient, the nature and virulence of the pathogenic agent, the favourable influence of remedies and of physician, as well as faulty observation and reports, and errors in treatment, may also affect the individual case. This renders professional statistics untrustworthy, and in so far as the most simple relations of figures are not taken into calculation, they are faulty, without value, and harmful." He adds: "Only after a very large, almost enormous number of results which include the omissions and errors of individual numbers are observed, is a result attained which approximates the truth. This, above all, renders general statistical reports regarding therapeutic results valueless, and so much inferior to the experience of the faithful observer who notes the minutest details. Hence the useless and detrimental controversy with statistically produced small figures regarding the curative properties of serum therapy. Are the conditions of a single region similar to those of another, or is even one case exactly like another, and even in the same places, under the same physicians, persons, conditions, are the morbid processes exactly similar? Do we not even see in this hospital how the severity of the individual case varies, the children coming to us having entirely different constitutions, their disease and a thousand other conditions varying greatly? But just for this reason the observation of an impartial well-trained physician who watches with open eyes is more valuable than all statistical reports. From this viewpoint, the judgment of serum therapy arising from careful clinical observations of the special case, with all the variations and surrounding conditions, is the only proper one, and the one that comes nearest the truth. This is the reason why we do not turn to the right nor to the left, but singly and alone, holding to our own base of observation, we arrive at our conclusions regarding the curative value of serum therapy, and shall even attain better results."

When the problem comes to be considered in detail one finds that various factors influence the incidence and the death-rate, such as the fallacies arising from inaccurate diagnosis and the inclusion of non-clinical cases of "carriers," and in this connexion one must remember that without cultures-which was the position before Behring's discovery-the chance of error in the diagnosis was said to be 50 per cent. This is a disturbing factor in all statistics before 1883 and for some time after, and it affects all comparisons made between the present and the past in respect to incidence and casemortality. That it does so, is undoubted. Dr. Herringham, in Allbutt's System of Medicine, says that "since the diagnosis has been supplemented by the bacteriological test there is no question that if every patient is said to have diphtheria in whose throat the bacillus diphtheriæ is found, the average severity of the cases will diminish, since many such are, and remain, perfectly well, and would not have been so diagnosed in former times. In comparing statistics, therefore, it is necessary to be certain that the diagnosis rests upon the same grounds in all." So far, when making comparisons, it does not appear that any co-efficient of correction has been worked out, or even any allowance made for errors in the diagnoses previous to Behring's discovery.

(iii) Influence of Age. It has often been noted that age has a remarkable effect on the incidence and virulence of diphtheria; but the importance of this in statistics, especially in comparative statistics, has been but little noted.

In the Year-Book for 1859 figures are given from Ballard's investigations. His percentages show the number of deaths per hundred, not of cases but of fatalities.

DIPHTHERIA.—DEATHS IN AGE GROUPS, BALLARD'	'S	S IN	INVES	ГIG	iA	T	10)[N	Ľ	Ş	j,	•
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Age Group.	Deaths.	Per cent.	
Years Under 1 $1-2$ $2-3$ $3-4$ $4-5$ $5-10$ $10-20$	5 12 11 13 7 19 7	$\begin{array}{c} 6.25 \\ 15.00 \\ 13.75 \\ 16.25 \\ 8.75 \\ 23.75 \\ 8.75 \\ 8.75 \end{array}$	

Summarizing the neures given above vields the following r	Summarizing	e figures	given	above	vields	the	following	result :
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Age Group	p.		Deaths.	Per cent.	
Year 0-4 5- At	s—- 5 10 pove 10	··· ;	- 48 19 13	60.00 23.75 16.25	

The numbers involved here are as small as they are in most other similar compilations, but they all point to a distinct difference of fatality in respect to age. The "age periods" that are of most importance for comparison are from 1-5 years, from 5-10, and above 10. For a long time after 1859 it was noted that the 1 to 5 years period showed the largest number of deaths.

It is interesting to consider the causes of death in these cases recorded in 1859. They are set forth thus :---

	Under 5	Under 10	10 Years	Period of	luring which	ch death o	ccurred.
Cause.	Years.	Years.	upwards.	1 Week.	2 Weeks.	3 Weeks.	4 Weeks.
Laryngeal Affection Exhaustion	17 13	7 5	3 ' 4	18 7	8 8	1 3	·. 4

DIPHTHERIA.-CAUSES OF DEATH, BALLARD'S INVESTIGATIONS.

Commenting on this matter Dr. Squire says in "Reynolds' System of Medicine": "In diphtheria both local and general means of treatment are required; the cure of particular cases may sometimes be attributable to the one and sometimes to the other, but in no case can either be safely disregarded. The general therapeutical indications are of primary importance throughout; they consist neither in attempts to nullify a poison by specifics, nor to expel it by elimination, but in withstanding the encroachment of the disease, and in sustaining the vital powers."

Many series of statistics are now available, and they show that the increased tendency in many, if not most places, is for cases to be transferred from the first or more fatal group to the second or less fatal. The effect of such transference on the conclusions to be drawn from mortality statistics should be evident.

The following table shows the numbers of deaths from diphtheria in South Australia from 1888 to 1920, and their distribution in two groups—under 5 years and 5 years and over. The "transference" of deaths from the first to the second group commenced in 1897–1898, and it is remarkable as regards quantity. During the ten years in the first period, the percentages of the groups were 54.7 and 45.3; during the twenty-three years in the second period, the percentages were 45.8 and 54.2. It would be well if the incidence of the disease, *i.e.*, the number of cases notified in the various years were obtainable from

large series of statistics. These would furnish by far the most accurate and valuable information on the subject of the influence of the age periods.

	Ye	ar.		Total Deaths.	Under 5 Years.	5 Years and Over.
1888		•		139	76	63
1889				109	63	46
1890				174	91	£0 83
1891				173	94	79
1892				106	52	54
1893				100	50	50
1894				97	58	39
1895				37	21	16
1896				21	14	7
1897				$\overline{22}$	16	6
1898				38	17	21
1899				40	19	21
1900				32	16	16
1901				19	9	10
1902				27	11	16
1903				21	8	13
1904				18	6	12
1905				7	2	5
1906				12	7	5
1907				13	9	4
1908				8	4	4
1909				14	4	10
1910				40	21	19
1911				65	30	35
1912				58	28	30
1913				78	46	32
1914				57	18	39
1915		••		72	29	43
1916				144	62	82
1917				.87	42	45
1918		••		86	44	42
1919	••			82	33	49
1920	••	••	•••	87	41	46
			1			

DIPHTHERIA.-DEATHS IN AGE GROUPS. SOUTH AUSTRALIA, 1888 TO 1920.

The following table gives a summary with percentages of the two age-groups for the periods 1888-97 and 1898-1920, and shows a remarkable reversal of the incidence figures :---

DIPHTHERIA.—DEATHS IN AGE GROUPS, SOUTH AUSTRALIA, SUMMARY 1888 TO 1920.

	Total	Under	5 Years.	5 Years and Over.			
Period.		Deaths.	Total.	Per cent.	Total.	Per cent.	
1888–1897 (10 years) 1898–1920 (23 years)	 	978 1,105	535 506	$54.7\\45.8$	443 599	$\begin{array}{c} 45.3\\54.2\end{array}$	

(iv) Susceptibility.—The "susceptibility" of individuals at various ages, and the relation of this to the mortality and fatality are extremely important factors. This is shown in the following table by Brownlee. He points out that the factors of infectivity and virulence are capable of existing in very different degrees of association. In this connexion the subject of exposure may become a very potent factor in the increase or decrease of mortality.

The accompanying table gives the figures for diphtheria taken from the returns of Manchester. Brownlee says these are chosen as they are the only returns where the actually notified cases and corresponding deaths are distributed in age periods.

	Age P	eriod. •	r	Susceptibility.	Mortality.	Fatality.
Years-			· · ·			Per cent.
0-1			•• •	' 89	62	69.6
1-2				271	160	59.0
2-3				293	152	51.9
3-4				392	161	41.7
4-5				356	129	36.2
5-6				325	100	30.8
6-7				199	56	28.1
7-8				187	44	23.5
8-9				152	34	22.4
9-10				124	14	11.3
10-15				74	5	6.8
15 - 20			•••	46	2.1	4.6
20 - 25				37	1.1	3.0
25 - 35				29	2.5	8.6
35-45			i	16	.6	3.8
45 55				0	4	4 4

DIPHTHERIA.—SUSCEPTIBILITY, MORTALITY, AND FATALITY, MANCHESTER, 1893 TO 1903.

New aspects of susceptibility and immunity have been presented within the past few years. Various factors may contribute to immunity. Immunity would appear to be inherent in some races or persons. The immunity that a person acquires by an attack of the disease may be called a pathological immunity.

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55 - 65

Digby, in "Immunity in Health, 1919," says: "It is an arresting fact in medicine that some degree of immunity may be acquired by mere contact with cases of an infectious disease without an obvious attack. This may be called healthily-acquired immunity." Sir James Paget had noted this in 1871 when recording his personal experience of immunity from *post-mortem* infection and the result of his lapse from this acquired insusceptibility. Many surgeons have noted how well town-bred youths bear surgical operations, and how fast they improve during convalescence compared with country-bred subjects in the same wards; and this is observed also in "medical cases."

Colonel Vaughan and Captain Palmer, of the United States Army, undertook an investigation for the purpose of ascertaining why the seasoned soldier is more resistant even to newly-imported infections than the recent recruit, why the men from crowded cities resist these infections transmitted from and to the respiratory tract more successfully than their comrades from sparsely settled areas, and why the rurals fall more ready victims to pneumonia than the urbans. After a critical review of clinical, bacteriological, and epidemic investigations, they said in "The Military Surgeon, 1920," "that the man who has been long accustomed to crowd life, and who has consequently frequently inhaled particulate proteins (bacteria), whether they be pathogenic or non-pathogenic, acquires a non-specific immunity, which helps him in withstanding infection." They point out that this conforms with some of the findings of the Typhoid Commission in 1898, contrary to the beliefs of the members when they began their investigations.

Another important factor must also be considered. Bodley Scott, in "Endocrine Therapeutics, 1922," writes: "It has been proved in human and in animal life that milk is capable of conveying antitoxin substances to the offspring after these have been injected into the mother; this is transmitted immunity, but what is far more important is inherited immunity. Probably all infectious diseases in a civilized people eventually lead to a condition of partial and increasing immunity. This takes place partly *in ulero*, but largely through the mother's milk during the first year of the child's life. In

. .

artificially-fed babies this latter immunity-giving power is, of course, absent, and such are far more vulnerable to outside attack."

It may be that age-insusceptibility is co-related with maternal feeding from birth, with exposure to infectious diseases without acquiring them, and with complete recovery from some one or more of such diseases, but statistics on the subject are not available. An examination of susceptibility tables would seem to support the suggestion.

It is of interest in this connexion to note that the London notifications for 1892 to 1912 showed that one-third of the cases of diphtheria were under five years of age, about another third between five and ten, and for each succeeding quinquennium much smaller. The case-mortality was highest in infants under one year. This contrasts strikingly with Ballard's statement in 1859, that "the disease was comparatively rarely fatal to infants in their first year." This was at a time when breast-feeding was the rule.

The reference to food suggests another line of study and investigation. Rendle Short (1922), in a search for a cause in the increase of appendicitis, made a physiological, pathological, and food economic investigation, and found most support for the theory that the increase was due to the use of imported food-stuffs leading to a reduction in the relative quantity of cellulose consumed in the diet. He says, amongst other evidence: "The time-factor is correct. It was between 1895 and 1905 that the foreigner began to feed us, and that we imported appendicitis with his food. Since then, there has been little change in either." In the light of the physiological and pathological facts largely applicable to both diseases, and if the time-factor is correct for diphtheria as for appendicitis, one might find support for the suggestion that a liability to disease arising from diminished powers of resistance on account of lack of proper food elements was at least a possible factor in the increased susceptibility to diphtheria.

The term subepithelial lymphatics has been applied to certain glands in the body, viz., the faucial, lingual. and nasopharyngeal tonsils; the solitary lymphatic nodules of the intestinal tfact; Peyer's patches; and the vermiform appendix. In their anatomy, physiology, and pathology, they are closely allied. Digby (1919) says their time of greatest activity corresponds with the period during which the individual is securing immunity against the exanthemata and other infections, and apparently one imust correlate these two phenomena—the acquirement of immunity, and the activity of the glands. This activity is exhibited in the attack of scarlet fever, typhoid fever, appendicitis, and diphtheria. In diphtheria, the faucial tonsils are the special defensive organs, the biological barriers against invasion, and they become the portals of entrance of the specific poison when their protective powers fail. The vulnerability of an individual to infective disease is increased by the quality of the food, by functional impairment of the tonsils. Tonsillotomy, it may be noted, began to be a common if not a fashionable operation about 1890.

(v) Scx. A table giving age and sex incidence of diphtheria for the County of London during the decennium ending 1903 has been given on an earlier page of this article. The figures in that table may be thus summarized:—

DIPHTHERIA.-DEATHS IN AGE-GROUPS, COUNTY OF LONDON, 1894 TO 1903.

Ages.		Cases 1	Notified.	Dea	ths.	Percentage Fatality.		
		Males.	Females.	Males.	Females.	Males.	Females.	
Years	— ·							
0-5		23,184	22,083	6,407	6,256	27.6	28.3	
5-10		16,854	20,328	2,110	2,692	12.5	13.2	
10-15		5,865	7,753	309	341	5.3	4.4	
Above 15		7,768	13,726	233	303	3.0	2.2	

SUMMARY I.

Ages.		Cases Notified.	Deaths.	Percentage Fatality.	
				-	
Years-			15 0/15	10.000	25.05
0-5		!	45,267	12,663	27.97
5 - 10		!	37,182	4,802	12.91
10-15			13,618	650	4.77
Above 15		••	21,494	536	2.49

SUMMARY II.--COMBINED SEXES.

The abstracts made show the percentage case mortality in the two groups referred to, and would point to the same conclusion as one would draw from Ballard's statistics, though the two sets are not compiled in uniform fashion. Many series of statistics are now available; and they show that the increased tendency in many, if not most, places is for cases to be transferred from the first or more severe group to the second or milder group. Since the recoveries in this second group are more numerous, the effect of this on the conclusions to be drawn will be evident. Herringham, in "Allbutt's System of Medicine, 1905," when dealing with statistics, points out that the treatment elsewhere is not so uniformly successful as it is in London, and says : "It is not to be expected that it should be. Not only are the Board Hospitals magnificently equipped and maintained, but also, as it seems, both the public and the practitioners of London co-operate more promptly with the sanitary authorities than is the case in many towns. This is shown by the early date at which in London the cases are admitted to hospital; " and he draws a contrast between this and the defective administration in Manchester. It does not appear that this recently-introduced extensive and effective organization is estimated by any one as a factor influencing the diphtheria mortality when comparing present and recent statistics with figures of 30 years ago. It may be of interest, however, to note that the existence of legal powers and the commencement of administrative health activity in the control of the various infectious diseases, and the provision for what is universally recognized as the prime and specific necessity for saving life in diphtheria, viz., early treatment, coincided with the introduction and use of antitoxin.

(vi) Urban and Rural Incidence. Allbutt's "System of Medicine" states :--- "The following table which relates to the quinquennium ended with 1903, shows the varying incidence of mortality from diphtheria and croup in town and country. The figures represent averag annual rates per thousand children living under five years, at which age diphtheria is more fatal than at other stages of life.

DIPHTHERIA AND	CROUPDEAT	H RATES PER 1,0	00 CHILDREN LIVING,
AGE GROUP	UNDER FIVE Y	EARS-ENGLAND	, 1899 TO 19 03 .

. Se x.	 1	Urban Counties.	Rural Counties.	
Boys	 	1.86 •	0.96	
Girls	 	1.79	0.92	
Both Sexes	 	1.83	0.94	

These figures indicate that in recent years the mortality from diphtheria has been much greater in the town than in the country—a distribution which is the opposite of that obtaining in the earlier years of civil registration, when diphtheria was commonly considered to be mainly a disease of the country. It is more than likely that the present excessive fatality of this disease—as well as of most other infectious diseases—in the urban areas is caused by the closer aggregation therein of school children as compared with rural areas. This rural to urban influx is a factor which deserves most careful study. It occurs in many countries. In Australia especially has it to be reckoned with, the massing of population in and around the capitals being proportionately greater than in any other part of the world. The facilities for the transference of infective material by carriers are enormously increased, not only on account of travelling, crowding and over-crowding in conveyances, of aggregations in schools and places of amusement, but of "improvements" in sanitation in such matters as the providing of toilet requisities which, though good in theory, fail in practice because their insufficiency makes them adjuvants of infection instead of preventives.

(vii) Influence of Antitoxin. At the beginning of the antitoxin treatment a committee of the Paris Academy of Medicine reported : "We are now in possession of a specific treatment of diphtheria as powerful as it is harmless." If this meant that complications from the use of antitoxin did not occur, the statement has been belied on every hand. If it meant that it "cured" in every case, experience of the fatality rate is outstanding proof to the contrary. Unfortunately the statement gave rise to a belief that all failures or untoward results were to be explained away or concealed by imperfect and misleading statistics. The test of the comparative efficacy or relative utility of antitoxin must be its effect in every case or every class of case in which it is administered, as compared with other methods under similar conditions; while its absolute utility must be judged by the part it plays in the incidence and mortality of the disease in the general community-a subject which has received little or no attention. It is imperative, then, that in estimating its place and power one should carefully examine the statistics from which inferences have been drawn. In 1895 Sir Malcolm Morris, in "The Practitioner," after referring to the enthusiasm and contradiction that were being exhibited, and warning against statistical fallacies, wrote : "Let us, however, be quite clear as to what antitoxin can, and what it cannot, do. It is essentially an antidote to a specific poison; that is to say, it can neutralize the action of the poison, but it has no effect on the organic changes and functional disturbances caused by the poison. If used in time, antitoxin may, with tolerable confidence, be expected to prevent the occurrence of such changes and . . Nor must it be imagined that the disturbances, but it cannot cure them antitoxin is an unfailing specific."

In an article in Allbutt's "System of Medicine" the following occurs: "It might be thought that there would be little difficulty in determining whether the antitoxin treatment is successful or not, for it means a simple matter by comparing records to decide whether the fatality of diphtheria is lower when antitoxin is given than when it is not. But it soon becomes clear that for various reasons and in various ways this simple test may prove fallacious. In the first place, since the use of antitoxin has now become universal in hospitals, it is seldom possible to compare two large series of cases treated at the same place at the same time, the one with antitoxin, the other without. There are, however, a few instances in which such a comparison can be made."

The writer, in the course of the article, says: "At the Blegdam Hospital in Copenhagen, Fibiger, under Sorensen's direction, divided cases merely according to the day of admission, treating with serum those admitted on alternate days, while those admitted on the intermediate days were treated without it. The experiment lasted from 13th May, 1896, to 13th May, 1897, and was carried out as arranged, except that toward its close the physicians, who were already driven to the conclusion that the serum had a powerful effect, used it on a few severe cases out of their proper turn. Excluding cases admitted moribund, which died within 24 hours, 483 cases in all were treated, as follows :--

238 with serum, of which 7 died, or 2.94 per cent.

245 without serum, of which 30 died, or 12.2 per cent.

Total 483.

Of the 238 cases treated with serum-

203 were pharyngeal, of which 4 died, or 2 per cent. 35 were laryngeal, of which 3 died, or 8.57 per cent.

Of the 245 cases treated without serum-

200 were pharyngeal, of which 14 died, or 7 per cent. 45 were laryngeal, of which 16 died, or 36 per cent.

Of the 238 cases treated with serum-

- 72 had albuminuria.
- 37 had paralysis.
- Of the 245 cases treated without serum-
 - 75 had albuminuria.
 - 36 had paralysis.

It would hardly be possible to find two sets of cases more strictly parallel than these. The total death-rates are small as compared with those of other hospitals because they are calculated without the 'moribund cases,' which always form a large proportion of the total deaths. In both Baginsky's and Fibiger's cases the clinical diagnosis was confirmed by bacteriological investigation."

Besides the smallness of the total death-rates as compared with those of other hospitals, and the exclusion of moribund cases, there are serious defects—the writer omits all reference to the age-incidence, the time at which the various cases came under treatment, and other circumstances which have been proved to be of paramount importance in testing the efficacy of any remedy employed in treatment. One gathers no idea of what "treated without serum" implies. The record he quotes is obviously an example of what Dr. Baginsky has characterized as "professional statistics."

In many cases, the records appear to have their value enhanced by the statement that in all "the diagnosis was controlled by the bacteriological examination"—the writers apparently overlooking the fact that the effect of such diagnosis has been to swell the number by admitting cases that would not have been included in records with which comparison is made.

In the early days of antitoxin, when Katz reported on the treatment in Baginsky's wards, he stated that "the ordinary treatment by sprays, insufflations, etc., was carried on as formerly, and tracheotomy and intubation done when indicated. The cases were grouped into four classes: (a) slight, where the constitutional symptoms are absent or slight, and the membrane is restricted; (b) moderately severe, in which the throat is extensively covered and the glands affected; (c) very severe, when the nose and other parts are involved, and the general symptoms grave; and (d) cases to which septic processes are superadded. Of the first class, there were 47 cases, which all recovered; of 35 of the second, 1 died; the third class had 42, of which 31 recovered and 11 died; while the 4 septic cases all died."

This method of study is much more likely to give indications of the therapeutic value and place of any remedy than the wholesale or indiscriminate use of it without any means of discovering and setting forth accurate information. An examination of all the convalescents with a view to discover the number of carriers relatively to other series without local treatment might have yielded interesting results.

It has been said that the first axiom in the treatment of diphtheria is that there is no specific, that in no other disease are the individualizing powers of the physician tested more severely. Such individualizing powers have been shown in the experiments made by Lennox Browne in a series of cases, and his logical conclusions are noteworthy; but such records are conspicuous by their rarity.

In some records, embracing varied numbers of cases, one finds attempts at classifying the cases and estimating values of methods of treatment by accurate observation and judicious inference; but few recognize that the prime requisite for accurate evaluation is a true control series.

Herringham, in "Allbutt's System" says: "It is unsafe to compare strictly the hospitals of one town with those of another. There may be in their circumstances a difference sufficient to account for a difference in their death-rate. And even in comparing the past with the present rate of one hospital or group of hospitals, it is essential to be certain that there has been no great change in buildings, nursing, or medical attendance during the years included."

A report dealing with Massachusetts about 1919, states: "Sudden death occurred in 5.2 per cent. of the cases. In many instances lack of nursing care was the responsible factor. Another factor in the sudden death group appeared to be the repeated attempts at intubation where, for some reason, the tube was either not properly introduced or else expelled."

In the Medical Annual for 1897 it is recorded : "In connexion with the anti-toxin of diphtheria an important report was published at the beginning of the year—the joint production of the medical superintendents of the various hospitals of the Metropolitan Asylums Board—dealing with the diphtheria cases treated with antitoxin during 1895, and compared with those of 1894—the two years being comparable as to diphtheria (severity, etc.)." A...owing for the "personal equation" of the various superintendents, the following results may be tabulated as proved from this Report :---

(1) Great reduction in the mortality of cases brought under treatment on the first or second day of illness, such reduction being specially marked in the laryngeal cases.

(2) Improvement in the results of tracheotomy.

(3) The clinical course of the disease slightly improved, as shown by the statistics, *i.e.*, in 1894, 3,042 cases and 902 deaths; 29.6 per cent. mortality; in 1895, 2,182 cases and 615 deaths, 28.1 per cent. mortality (46.4 per cent. of the cases treated being under five years of age).

(4) The earlier the treatment with antitoxin, the better are the results, e.g. :--

ANTITOXIN.-RESULTS OF TREATMENT, 1894 AND 1895.

Treatment.					1895	(Antitoxin).		1894 (All Cases).
Treatment	commenced	on	1st day	i	11.7%	death rate		22.5%
,,	,,	,,	2nd ,,	•• !	12.5%	,,	••	27.0%
,,	,,	,,	3rd ,,	'	22.0%	,.	•• ,	29.4%
,,	,,	,,	4th ,,		25.1%	**		31.6%
**	,,	,,	5th "	•• :	27.1%	,,	••	30.8%
-				· · · · · · · · · · · · · · · · · · ·				

It is noticeable that here a comparison is made between different years; that one set of death-rates refers to antitoxin cases alone, the other not to non-antitoxin cases alone, but to all cases, a method which is obviously defective. It would appear that the earlier treatment with antitoxin is credited with the improvements in the results, despite the fact that from 1859 onwards early treatment, apart from any particular method, was recognized as the great factor making for recovery.

In the Medical Annual for 1898 there is an article which follows up the above and adds the figures for 1896. The writer says: "The importance, however, of the antitoxin treatment is shown in a valuable (second) Report signed by eight (out of nine) medical superintendents of the various hospitals of the Metropolitan Asylums Board, and published during the year, giving an account of the use of antitoxin serum in the treatment of diphtheria during 1896 (vide also Medical Annual, 1897, p. 624). Of the total cases, 71.3 per cent. have been treated with antitoxin with the following results—to which are added, for comparison, the cases treated in 1895 (also partly with antitoxin), and those in 1894 (without antitoxin) :—"

		1	Mo	rtality per ce	ent.	
Day of Disease on which Trea	tment	18	96.	18	1894.	
was commenced.		All Cases.	Antitoxin Cases.	All Cases.	Antitoxin Cases.	All Cases, No Antitoxin.
First Day Second Day Third Day Fourth Day Fifth Day and after Total	 	$ \begin{array}{r} 4.7 \\ 12.8 \\ 17.7 \\ 22.5 \\ 24.6 \\ - \\ 20.8 \\ \end{array} $	5.2 15.0 21.9 27.8 31.7 25.9	$ \begin{array}{c} 11.7 \\ 12.5 \\ 22.0 \\ 25.1 \\ 27.1 \\ \hline 22.5 \\ \end{array} $	4.6 14.8 26.2 33.1 35.7 28.1	22.5 27.0 29.4 31.6 30.8 29.6
Tracheotomy Cases Laryngeal Cases Post-Scarlatinal Diphtheria		$\begin{array}{c} 41.0\\ 29.6\\ 5.0\end{array}$	40.6 28.8 5.9	 	••	70.4 62.0

ANTITOXIN.--RESULTS OF TREATMENT, 1894 TO 1896.

The same logical fallacies are evident here as in the former report.

Some examples may be given of statistics recorded in generally accepted authoritative works on the subject of diphtheria. The following is extracted from an article by Dr. Goodall in the second edition of the Encyclopædia Medica : "Before we proceed to discuss the question of the usage of the serum in the human subject we must draw attention to one very important point in the experimental evidence. It has been found that if an interval be allowed to elapse between the injection of the toxin, and subsequently the antitoxin, into a susceptible animal, then the longer the interval the less effectual will be the action of the antitoxin, and, finally, there comes an occasion when the interval has been made too long, and the antitoxin is injected too late to prevent the lethal effects of the toxin." Hence, it was predicted by Behring that the success of the treatment would be found to depend very largely upon the earliness of its application. Clinical evidence has amply borne out this prediction. The following figures, illustrative of this point, are taken from the Statistical Reports of the Metropolitan Asylums Board :—

Day of disease upo mitted (1894) or treatment (1895-	n which brough -97).(a)	n patient v t under ar	vas ad- ititoxin	1st.	2nd.	3rd.	4th.	5th and later.
Non-antitoxin cas	ses, 189	4; all th	e hos-					
Cases				133	539	652	566	1159
Deaths	•••	••		30	146	192	179	355
Mortality	•••	••		22.5	27.0	29.4	31.6	30.8
Antitoxin cases, a 96); with Bro pitals only for 1	ll the h ock and 1897—	iospitals (l Eastern	1895- Hos-					
Cases	•			209	1126	1313	1332	2436
Deaths '				8.	137	275	376	780
Mortality	••		•••	3.8	$12 \cdot 1$	20 · 9	28.2	32.0

ANTITOXIN AND NON-ANTITOXIN TREATMENT, 1894 TO 1897.

(a) No further statistics illustrative of this point and relating to all the hospitals were published by the Asylums Board till the year 1911. It was found that for that year the mortality for each day was as follows:—1st, 2.6; 2nd, 3.4; 3rd, 8.9; 4th, 12.5; 5th and later, 13.4. These figures related to 3,864 cases.

The 1894 figures refer to the day of the disease on which the patient was admitted, and to all the hospitals, and to non-antitoxin cases. The figures for 1895–96 refer to the day on which the patient was brought under antitoxin treatment, and to all hospitals, with Brook and Eastern Hospitals only for 1897. In view of the number of conditions which must be considered in estimating the place and power of any factor in treatment, these statistics are not such as to furnish accurate conclusions to the statistician. And yet these statistics of the Metropolitan Asylums Board are received and quoted as the most trustworthy on the subject.

(viii) Summary of Present Position.—In the Medical Annual for 1901 reference is made to a statistical study (locality not mentioned) by Dr. J. E. Herman, in these terms : "In view of the fact that in late years there has been a decline in the death rate of other infectious diseases than diphtheria, against which no new remedy has been directed, he announces the failure of antitoxin in the treatment of diphtheria."

The article then states that Dr. William P. Munn reaches a different conclusion, founded on statistics of antitoxin treatment in Denver, Col., during five years 1895–1899, in which Denver had almost half as many cases of diphtheria as during six preceding years, but with one-sixth as many deaths from the disease.

The following occurs in the U.S. Public Health Reports, Vol. 34, No. 20 : "In their weekly Bulletin of March 15, the New York authorities call attention to the fact that, although there had been a continuous reduction in the death rate from diphtheria, 'the mortality from this disease is still much higher than it should be, when we consider the armamentarium at hand for preventive and curative work.' In New York City, despite

the excellent results of antitoxin treatment, diphtheria still causes over 1,000 deaths annually, approximately 20 per 100,000 population. Rates only a little less than this prevail in Rhode Island, Pennsylvania, Kentucky, North Carolina, Massachusetts, and Michigan." It is pointed out that during the period 1891 to 1900 there were 17,845 deaths from diphtheria in the city of New York among persons under fifteen years of age, and 81.5 per cent. of these were under five, and that efforts to effect further reduction in diphtheria mortality should manifestly, therefore, be mainly centred on the latter age group. There is a recognition here that other factors than antitoxin are concerned in the reduction of mortality rates.

In 1907, Rubner called attention to the increasing incidence and malignity of diphtheria, his knowledge being gained by inquiry among German Medical Officers of Health. He says: "The result was that in our province, in the Empire, and also in the majority of the large towns and districts the disease is neither diminishing nor even stationary, but that an obvious and, in some districts, alarming increase is apparent; and the disease continued to show a manifest inclination to such an increase among us also, even as late as May, 1912. Nor can local causes for a spontaneous decline of diphtheria be discovered."

In Chicago, from 1912 to 1916 inclusive, 6,817 patients were admitted to the State Hospital. Of these 834 died—case mortality was approximately 12 per cent. The number of patients under treatment in 1916 was about 200 greater than in 1912, which indicates a marked increase in the prevalence of diphtheria in Chicago at that time. The recorder notes that few cases occurred in the coloured race, the negro being relatively immune to diphtheria.

Carey states in the Boston "Medical and Surgical Journal," 1919, that "with an average of 6,500 or more cases being reported yearly, with approximately a 10 per cent. fatality, we cannot in truth say that we are progressing with endemic diphtheria".

These are examples that set forth the conditions that obtain generally throughout the world regarding the increase in incidence of diphtheria and the loss of life in various communities, a loss which is not decreasing, and which presents one of the most difficult problems in present-day medicine.

11. Carriers.—(i) General. The subject of the diphtheria carrier does not belong exclusively to the present day, nor does it date only from yesterday. It was recognized more than half a century ago. It is referred to by Dr. Squire in Reynolds' System of Medicine, 1866.

An individual may show the presence of diphtheria bacilli in his throat, and soon after may suffer from the disease. He is termed an "incubationary carrier." Another, who has recently recovered from the disease, may exhibit bacilli either constantly or intermittently. He is termed a "convalescent carrier." Persons who have been exposed to infection may show the constant or intermittent presence of bacilli without contracting the disease. Such are termed "contact carriers." The condition is explained by the supposition that the bodily state is such that it can resist the effects of the toxic material manufactured by the germs locally in the throat; and such resistance may continue temporarily or indefinitely. Without discussing the subject of the virulence or non-virulence of the bacilli in carriers, one may assume for administrative purposes that all persons with such "localized" bacilli are possible disseminators of disease. The healthiest looking carriers may spread germs of the most virulent sort. The question of what is to be done to prevent dissemination is perhaps the most pressing and the most difficult problem of the day connected with the control of diphtheria. Antitoxin, no matter how administered during or after recovery from the disease, has no effect on such bacilli.

The discovery of carriers is not difficult. Susceptible individuals may easily be discovered and presumably protected; and it might be thought that control would be easy. Henry J. Nichols, in "Carriers in Infectious Diseases, 1922," says, however, that practically the programme usually breaks down because it is too big; and he gives cogent reasons in support of his statement.

(ii) Convalescent Carriers. With convalescence, the bacilli begin gradually to disappear, and, by the end of a month, 85 per cent. of convalescents are bacteriological recoveries. By the end of a second month, 98 per cent. are free. The remainder pass into the most dangerous class of more or less chronic carriers.

(iii) Contact Carriers. Pure contact carriers occur among attendants, families, and contacts of cases, and carriers in from 10 to 20 per cent. of instances. The organisms are virulent in 80 per cent. of instances, and the carriers are dangerous, but the condition is temporary unless there is some predisposing deformity of a chronic focus. These carriers are immune or "Schick negative."

(iv) Proportion of Carriers to Population. In the general population, true carriers of virulent organisms are less than 1 in 1,000. Among children, however, 2 per cent. are true carriers. Only 10 per cent. of non-contact or non-convalescent carriers show virulent organisms. [The statements in (ii), (iii), and (iv) are made on the authority of Nichols.]

The following table by Chapin sets forth the results of an examination of all the wage earners in the families at the time the cases were reported, and of all the members of the family for release, that is, to determine the end of isolation. Chapin also gives statistics of a large number of examinations in schools in America, Great Britain, and the Continent of Europe.

DIPHTHERIA.—NUMBER AND PERCENTAGE OF CARRIERS, PROVIDENCE, U.S.A., 1897 TO 1901.

		Ages.		Persons Examined.	Number of Carriers.	Percentage of Carriers.
Under 1	year			119	17	14.2
l year	•			112	15	13.3
2 years				97	23	23.7
3				112	25	22.3
4				116	31	· 26.7
5				120	17	14.1
6 "				137	42	30.6
7				130	30	23.1
8				119	25	21.0
9 "				• 113	23	20.3
10 "				139 .	. 26	18.7
11				79 ·	11	13.9
12				127	28	22.0
13			•	86	15	17.4
14 "	• •		·	88	13	14.7
15				. 70	5	7.1
16				64	9	14.0
17				57	9	15 7
18				57	6	10.5
19				45	4	8.8
20				34	4	11 7
Adults	••		••	2,505	. 277	11.0
т	otals			4,526	655	14.4

At the Fifteenth International Congress at Washington in 1912, Dr. W. Lorenzo Moss stated that the problems urgently demanding solution were: "1. May avirulent diphtheria bacilli become virulent, and under what conditions? 2. Under what conditions may virulent diphtheria bacilli cause clinical diphtheria? 3. How may the sterilization of diphtheria-bacillus carriers be accomplished?" He says that "until these problems have been solved, or, at least, until the solution of the third one has been accomplished, we are scarcely in a position to deal with the healthy diphtheria-bacillus carrier. This, of course, does not mean that the rigorous measures usually adopted against cases of clinical diphtheria should be relaxed."

(v) Treatment of Carriers. The isolation of "carriers" is allowed to be impracticable. The part they play in the spread of the disease, directly and indirectly, is becoming more and more recognized; and they are being regarded as a most important means of

conveying infection. The significance of this is obvious when one considers that in the social conditions of to-day a person may be more likely to spread infection to another country or continent than half a century ago he would have been liable to infect a person in the next parish.

There has been a good deal of investigation into the carrier question both generally and experimentally by Shick-testing and immunizing with antitoxin, toxin-antitoxin, avirulent bacilli and other substances; but, although there has been much discussion, there is no consensus of opinion as to what administrative measures would be justifiable, practicable, or efficient in dealing with "carriers" in a general community.

(vi) Place of Schools in the Control of Diphtheria.--For a time the part played by schools in the dissemination of diphtheria was doubtful. It had been noted that the greatest number of deaths occurred among children under school age; but the question was raised whether these received the infection from school, or whether they were the source of the school infection. It was held that among older children the school played a large part in the spread of the disease. The facilities that a school gives for the spread or the check of an epidemic will depend largely on the amount of attention of a sufficiently skilled nature that can be given to the children both in school and at home, on the facilities for detection and isolation of sufferers, on the discovery and exclusion of carriers, and on prompt and effective measures of disinfection. Cities should be more favourably situated in respect to these matters than country places, but if precautions are neglected, the facilities for spread will, on the other hand, be so much the more multiplied. There have been so many opportunities of estimating the effects of varied experience in various classes of circumstances that there is not much difficulty in deciding what method will promise the best results in any given case-provided always that all the circumstances are known, and that all the measures recommended for control are promptly taken and minutely carried out.

(vii) The Diphtheritic Membrane. On a review of the clinical observations on the action of antitoxin, and statistical evidence on the subject, it would appear that the diphtheritic membrane may be the crux of the problem. The presence of the membrane has a twofold effect on the patient: (a) it makes the acts of breathing and swallowing difficult, and so interferes with respiration and nutrition; and (b) it exhausts the patient by the efforts made to resist the local applications for relief. Antitoxin, on the other hand, not only improves the general condition of the sufferer, but makes local applications unnecessary, or less necessary, and so conserves the patient's strength and at the same time allows the free administration of nourishment and stimulants. But, as contrasted with this, it has no effect on the presence of the bacilli in the throat during or after convalescence, and so allows the patient to remain in a condition to mingle freely with others, and to be a possible or actual cause of the spread of the disease. In the light of recent findings it would appear that local treatment of the membrane by destroying the bacilli had a double effect: it checked the supply of the toxin to the patient's system, and it prevented the spread of infection by the bacilli from the patient to others during and after the attack.

12. The Problem of Eradication .- About five years ago the Massachusetts State Department of Health made a statistical study of 1,000 deaths due to diphtheria in order to find the causes and, if possible, to remedy them, being "deeply concerned by the apparent apathy of physicians and organized health agencies towards the failure of the morbidity to decline, while the mortality rate has been so markedly reduced by the use of antitoxin." The private practitioner has no professional or pecuniary interest in the eradication of communicable disease. He is not a philanthropist. The officer of health and his employers as a corporate body may have such an interest if the expenses of control or eradication fall on them. But the interests of the family physician and the officer of health are not as yet identical or even similar. It is sometimes said that they are diverse or antithetical. Even commercial considerations of sorts are not entirely foreign to the diphtheria problem. If these things are so, it would not be an unwarranted inference that while antitoxin reduces the case mortality, it may be a powerful factor in the increased incidence of the disease. It should not be impossible. or even difficult, to conduct a series of test experiments that would furnish trustworthy information on this crucial question.