DEPARTMENT OF CENSUS AND STATISTICS, CEYLON

SINHALESE POPULATION GROWTH
1911-1946

(With special reference to corrections for the Under-Registration of Births and Deaths, etc.)

by

R. RAJA INDRA, B.A. (HONS.) LOND., M.SC. (ECON.) LOND.

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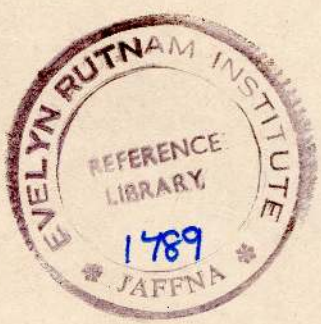

DIRECTOR'S NOTE

THIS thesis, submitted by Mr. R. Raja Indra after his course at the London School of Economics in 1952, was accepted by the University of London for the M.Sc. (Econ.) examination in Demographic Statistics. It is the first occasion on which research conducted on a major aspect of Ceylon demography has led to a post-graduate degree in any University.

The thesis discusses the overall demographic position of Ceylon and makes particular reference to Sinhalese Population Growth during the period 1911–1946. It considers, in some detail, under-enumeration at the various population censuses and under-registration of births and deaths during this 35-year period, and also suggests correction factors to be applied to the different years.

Mr. Raja Indra is a Statistician of this Department and is at present attached to the Registrar-General's Office.

H. E. PERIES,
Director of Census and Statistics.

Department of Census and Statistics,
Colombo, September 16, 1955.

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PREFACE

THE original thesis " Sinhalese Population Growth, 1911–1946 " is reproduced here with very little revision.

In the light of information now available relating to the post—1946 period, the author would have liked to revise and bring up-to-date some of its sections. But as this would have affected the unity of the thesis and required other revisions it was decided to leave the study substantially in the form in which it was originally submitted.

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I am greatly indebted to Mr. E. Grebenik, formerly Reader in Demography at the London School of Economics and now Professor of Social Studies at the University of Leeds, for his many criticisms and suggestions which were invaluable to me in the preparation of my thesis.

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I wish also to express my sincere thanks to the staff of the British Library of Political and Economic Science, where most of my research was done, for their ready co-operation at all times.

R. RAJA INDRA.

Registrar-General's Office,
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CHAPTER I

THE BACKGROUND

1—INTRODUCTION

SOME knowledge of Ceylon's history and geography may be necessary for an understanding of the population features of the Island.

Ceylon is separated from the Indian mainland by only 22 miles of water—by the Gulf of Mannar and the Palk Strait. Its extreme length from north to south is 270 miles, and its greatest breadth is 140 miles. In area it is about 25,232 square miles—i.e., about half the size of England and Wales.

The Central part of Ceylon is hilly, the highest peak (Pedrutalagala) being 8,296 feet high. On the hillslopes are the tea and rubber plantations, on which so much of Ceylon's prosperity depends.

Not much is known of the earliest inhabitants of the Island but it is generally believed that their descendants are the Veddhas who number only a few thousands[1] to-day.

The earliest known invaders and settlers would appear to have been of Aryan or Aryo-Dravidian stock, and to have come from North India, probably from the Bengal area, about 500 B. C.[2] According to legend, they subdued the " aboriginals " and avoiding inter-marriage with them obtained Tamil brides from South India. Subsequent South Indian invasions and settlements by the Tamils (and other related Dravidian races) must have contributed to the development of the Sinhalese race which is therefore largely a blend of Aryan and Dravidian strains.[3]

The Sinhalse, occupying the fertile parts of Ceylon, developed a distinctive civilisation of their own. But the course of their history was continually interrupted by the Tamil invasions from South India. Quite often the invaders succeeded in establishing their rule over the Sinhalese for some years, sometimes for even some generations. In turn, the invader would be overthrown or repulsed, and Sinhalese kings would then rule over the whole, or a large part of the Island for quite long periods.

The Tamil invasions ended about 1505 A. D. with the arrival of the Portuguese who subjugated the Sinhalese maritime provinces as well as the Tamil Kingdom in the North of the Island, leaving the Sinhalese independent only in the highlands.[4] During the first half of the 17th century, the Dutch displaced the Portuguese in the maritime provinces, but by the begining of the 19th century the British, in turn, had taken these over from the Dutch.

By 1815, the British had captured the Kandyan (hill) provinces, which had remained independent throughout the Portuguese and Dutch periods, and so brought the whole of Ceylon under their rule. The Kandyan Sinhalese, who were the last to come under European domination and influence, are still somewhat different from their brothers and sisters in the lowlands, who are known as the Low-Country Sinhalese.

The present day descendants of the Dutch and the Portuguese have an appreciable amount of Sinhalese blood in their veins and are known as " Burghers ". They are mostly found in the Western Province, particularly in the city of Colombo and the suburbs.

After the British occupation some of the Europeans, in particular the " planters " on the tea and rubber estates, married or consorted with Ceylonese or Indian women, and their children and descendants are geneally referred to as

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[1] 2,361 at the 1946 Census.

[2] Vide G. C. Mendis, The Early History of Ceylon, page 8.

[3] India seems to have been occupied in pre-historic times by races similar to the early Veddhas of Ceylon, and their descendants may still be found among the hill and jungle tribes of India. About 4000 or 5000 B. C. a civilization, probably Dravidian, related to those of ancient Egypt and Sumeria seems to have developed in India, ruins of which have been discovered in Mohenjadaro and Harappa (in North India and Pakistan). Subsequently the Aryans invaded India. To-day the Aryans occupy much of Northern India, and the Dravidians the South. The principal Dravidian races are the Tamils, the Telugus and the Malayalees (to be distinguished from the Malays).

[4] G. C. Mendis, *The Early History of Ceylon*, pages 132, 141, &c. Also W. I. Jennings' Article, *Ceylon History* in Chamber's Encyclopaedia, 1950 edition, vol. 3, p. 250.

" Eurasians ". In that sense, they differ from the Burghers, but generally both Census Superintendents and Registrars-General have grouped them together as " Burghers and Eurasians ".[1] Socially too, these two groups people have tended to mingle more with each other than with the rest of the population.

In the latter part of the last century, coffee was planted on the central uplands. This was a great success, but the great coffee pest of the 1880's caused a switch-over to tea plantation, and this, with rubber on the midlands has been the chief export product of Ceylon ever since. Cheap labour for these hill plantations was recruited from South India, largely of Tamils, generally referred to in Ceylon (as well as in official Reports) as " Indian Tamils ", to distinguish them from the Ceylon Tamils.

2—DISTRIBUTION OF THE POPULATION

The historical element has largely determined the present geographical distribution of the major races of the Island.

Thus the Sinhalese occupy most of the Island excepting the Northern and Eastern parts which are occupied by the Ceylon Tamils.

The Indian Tamils are mostly on the tea and rubber estates which are on the central uplands. The Burghers who were on the whole favoured by the British for civil service and professional posts are mostly in the Western Province, particularly in the city of Colombo and its suburbs. The Veddhas are still in the less developed areas near the jungle—e.g., in the eastern provinces. But they are rapidly decreasing in numbers, which is partly due to assimilation by the Sinhalese population.

For some centuries before the Portuguese era, Arab traders had settled on the coast of Ceylon, and later married Tamils and Sinhalese, particularly the former. Their descendants, rather erroneously, are now known as the " Ceylon Moors ". They are mostly traders still, like their cousins, the Indian Moors who appeared in Ceylon after the British occupation. The Moors, both Indian and Ceylon, are mainly scattered over the whole Island, though there are very large concentrations of Ceylon Moor population in certain areas as in the Eastern province.

In the Dutch period (and even earlier) " Malay " troops (mainly from Java) had been brought over to Ceylon. Their descendants are the Ceylon Malays of to-day, most of whom are in the city of Colombo.

3—GENERAL FEATURES OF THE DIFFERENT RACES

In Table 1 below are tabulated some features about each of the major races of the Island. They represent wide generalisations, but still may give the reader some idea of the facts underlying the population picture of Ceylon, and indicate also the relative extent of the difficulties those patient compilers of vital and population statistics, the various Registrars-General and Census Superintendents would have had to overcome in doing their work. For where people are fairly well educated, it is not so difficult to get accurate statistics concerning them than if they were uneducated. As the level of education, as well as the customs, manners, language and economic condition of each of the various races in Ceylon often differs quite markedly from those of the others, so do the degree of accuracy and reliability of the statistics compiled for each race differ from those of the others.

During the last 75 years Ceylon has changed very much indeed not only in its total population, but educationally, socially and politically.

In 1875 it was an obscure colony of Britain's. The indigenous people did not have a single elected representative of their own blood in the Legislative Council. Only in 1911 was *one* seat open to an " educated Ceylonese " elected to the Legislative Council. In 1931, the State Council came into being, with 7 Ceylonese and 3 Government (British) Ministers all responsible directly to the Governor. In 1948 Ceylon attained Dominion Status. It has now its own Prime Minister and its own Houses of Parliament like Canda or Australia. In nearly all internal affairs Ceylon is quite independent to-day.

This political progress is only a parallel to Ceylon's social, educational and economic progress during this period.

Whatever caste and social barriers existed then have been melting away rapidly. The number of English and vernacular schools has gone up by leaps and bounds. Ceylonese before 1921 had gone to Indian or British Universities for their higher education. But in 1921 the Ceylon University College was founded in Colombo and affiliated to the London University. In 1939, this College gave place to the University of Ceylon, an independent educational institution.

[1] They formed only 0·63 of one per cent. of the total population of Ceylon at the 1946 Census.

Table I—Ceylon's Racial Background

Race	*Population (in '000's) Total*	*Population as % of Total*	*Where Mainly Resident*	*Main Occupation*	*General Educational Standard (Relative)*	*Reliability of Vital Statistics, &c.*	*Religion*	*Home Language*	*Historical Background*	*Indigenous Race (= I) or not (= N)*	*Other Remarks*
Low-country Sinhalese	2,903	44	Rural	Agricultural	Fair	Fair	Buddhists*	Sinhalese	Original invaders and settlers from about 2,500 years ago	I	Sinhalese migrate very little out of Ceylon (Kandyans least)
Kandyan Sinhalese	1,718	26	Rural (hills)	do.	Poor	Poor	Buddhists*	Sinhalese		I	
Ceylon Tamils	734	11	Rural	do.	Fair	Fair	Hindus*	Tamil	Later invaders and settlers from about 2,000 years ago	I	So too the Burghers Malays and Veddahs
Indian Tamils	781	12	Estate (hills)	Estate labourers	Poor	Fair	Hindus	Tamil	Immigrants within last 100 years for employment	N	Ceylon Tamils emigrate a little for middle-class employment to the Federated Malay State
Ceylon Moors	374	5½	Towns	Small traders	Poor	Poor	Muslims	Tamil	Descendants (mixed) of early Arab traders	I	Sinhalese Ceylon was frequently invaded by the Tamils (and other South Indian races) between 300 B. C. and 1500 A. D.
Indian Moors	36	½	Towns	Small traders	Fair	Poor	Muslims	Tamil	Immigrants (traders) within last 100 years	N	
Burghers and Eurasians	42	½	Colombo and towns	"White collar" jobs	Good	Good	Christians	English	Descendants (mixed) of Portuguese, Dutch and British invaders	I	Portuguese conquered and ruled the maritime (but not the Kandyan hill) provinces for about 200 years from about 1500 A. D. Then the Dutch displaced the Portuguese and ruled for about 150 years. Then the British ruled the whole of Ceylon from 1815 till 1946, when Ceylon attained Dominion Status
Ceylon Malays	23	⅓	Colombo and towns	Small traders	Fair	Fair	Muslims	Sinhalese	Descendants of troops from Malaya brought in by Dutch and British	I	
Veddhas	2	—	Villages and jungle	Agriculture and hunting	Very poor	Very poor	Buddhists and animists	Sinhalese	Earliest settlers (aboriginals)	I	
Europeans	5	—	Cities and estates	Administrative and professional	Very good	Very good	Christians	English	Mostly British Civil Servants, Planters, Businessmen and Missionaries	N	
Others	41	½	Towns	Shopkeepers, domestics	Fair	Poor	Hindus	Indian Languages	Late immigrants (last 100 years)	N	

* Up to about 10% of the Sinhalese and Ceylon Tamils are Christians.

4—TWO MEASURES OF PROGRESS

The extent of general progress may perhaps be roughly gathered from the following tables referring to (1) advance in literacy and (2) reduction in mortality rates.

Row 8 of Table 2 shows that literacy among males had easily more than doubled from about 25 per cent. to 62 per cent. of the population during the 65-year period 1881–1946. Though the level of female literacy in Ceylon has always been markedly lower than male literacy, it too had risen from about $2\frac{1}{2}$ per cent. to 38 per cent. during this period. The difference in the literacy ratio between the two sexes indicates a not unusual feature in most countries of the world, particularly eastern countries—viz., neglect of female education, partly as a result of a conservative and unfavourable attitude to the general social progress of women.

Table 2—Progress of Literacy in Ceylon

(Figures in Rows 2–7 in thousands)

Row		Census Year					
		1881	*1891*	*1901*	*1911*	*1921*	*1946*
2[1]	*Literates*—						
	Males	361·7	475·8	657·6	878·8	1,156·1	2,170·7
3[1]	Females	32·6	61·6	115·6	204·1	381·5	1,182·0
4[1]	*Illiterates*—						
	Males	1,106·3	1,175·5	1,237·2	1,296·3	1,225·7	1,361·5
5[1]	Females	1,256·2	1,352·8	1,553·1	1,727·3	1,735·3	1,943·1
	Total—						
	Literate and Illiterate—						
6	Males	1,468·0	1,593·3	1,894·8	2,175·1	2,381·8	3,532·2
7	Females	1,288·8	1,414·4	1,668·7	1,931·4	2,116·8	3,125·1
	Literate to Total : Ratio—						
8	Males (Row 2 ÷ Row 6)	24·6%	29·9%	34·7%	40·4%	48·5%	61·5%
9	Females (Row 3 ÷ Row 7)	2·5%	4·4%	6·9%	10·6%	18·0%	37·8%
10	*Male to Female literates*	9·8	6·8	5·0	3·8	2·7	1·6

[1] From Table 17 : "Literacy of Ceylon by Sex" in the *Statistical Abstract of Ceylon, 1950*. (Government Publications Bureau, Colombo).

Note.—The Term "literacy" is not defined in the original publication. As absolute measures the figures should be used with caution. As comparative indices, however, they are instructive.

But as Row 10 clearly shows, the ratio of male to female literacy, which was as high as 9·8 in 1881, had declined steadily to 1·6 by 1946. This is perhaps a rough measure of the steady and rapid decline in the general social prejudice to female emancipation.

The decline in mortality is as striking and as significant. The rates given in Table 3 below are approximate, being calculated from the uncorrected official figures. They are intended to show the marked decline in mortality during the period 1910–1947 and illustrate the point well, since as there was much under-registration of deaths in the earlier part of this period, the actual decline in mortality must have been even greater.

Table 3—Decline in Mortality

Period	*Crude Death Rate (per 1,000 of population)*	*Infant Mortality Rate (per 1,000 live births)*
1910–12	38·2	203
1920–22	29·5	187
1930–32	22·7	165
1940–42	19·3	133
1945–47	18·9	127

The spread of education, the improvement in health, the rise in the general standard of living, the lessening of social prejudices based on caste, race and sex, the increase of transport facilities and the growth of administrative organisations have all taken place concurrently at a very high tempo in Ceylon during the last 75 years and more. Under such conditions, one might expect the vital statistics and census enumerations of population to grow more and more accurate and reliable with the passage of time.

5—DEMOGRAPHIC DATA

Much of the statistical material used in this thesis has been taken from (i) the various Reports of the Registrars-General on the Vital Statistics of Ceylon and (ii) the Reports of the Census Superintendents during the last 75 years.

The main concern of the present work has been to examine the reliability of the available official statistics relating to the registration of Sinhalese births and deaths every year and to the enumeration of the Sinhalese population at the different Censuses during the present century ; to devise a system of correction of these statistics ; and to estimate the actual number of births and deaths among the Sinhalese for each year between 1911 and 1946 and the average expectation of life for Sinhalese males and females about the periods of the 1911 and 1946 Censuses.

CHAPTER II

THE VITAL STATISTICS OF CEYLON

1—THE BIRTH-RATE

IT was in 1867 that civil registration of births, deaths and marriages was instituted in the Island[1]. Registration however, was virtually left to the will of the parent or guardian and it is not surprising that a large number of births and deaths were not registered and the annual lament of the Registrars-General in their Administration Reports to the effect that some legislation was needed to compel parents or guardians to register births and deaths[2] went unheeded till 1887 when it was decided to institute prosecutions against people who did not register the births of their children. This had a good effect and the registration of births and deaths showed a marked improvement[3]. But provision had yet to be made to prevent the same birth from being registered by 2 or 3 Registrars at the same time.

Ordinance No. 1 of 1895 which came into force on July 1, 1897 abolished concurrent jurisdiction of Registrars of Births and Deaths, and one officer was made responsible for the registration work of his division. . . . . [4].

After this again we find a marked increase in the number of births registered : there is a jump from 104 thousands in 1896 to 125 thousands in 1897, representing a " 20 per cent. increase ". This again indicates the glaring inadequacy of the system of registration in earlier years.

An examination of the number of births in the form of the crude birth rate confirms this view. The crude birth rate is well below 30 in most of the years before 1887, but during that year it shot up to 33·3 from 27·4 for the

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[1] Vide the Ceylon Registrar-General's Administration Report on Vital Statistics (1925)—Preface (on page L. 3).

[2] Vide Registrar-General's Report on Vital Statistics (1877) :

" With the law in its present state, many births are unregistered. The Ordinance requires that births shall be registered within a certain time, but there is no penalty attached to the non-observance of the law ; and it is generaly supposed that the registration of births is not compulsory . . . . " Again, in the 1880 Report : " I do not claim complete accuracy for the statistics of births and deaths herewith forwarded ".

[3] Cf. Registrar-General's Report (1889), page 6, III :

" The rise (in births) was due to the improvement in the registration of births, a duty much neglected till I directed prosecutions under the Penal Code ". Also, 1891 Report : " The registration of births was very imperfect in the early years of civil registration. But as each year advanced registration became more and more accurate ; and though the amount of birth statistics gradually diminished, it was not appreciably affected until 1887 when prosecutions were directed under the Penal Code for ommissions to register births ".

[4] Vide Appendix D (Summarising the 1897 and other Ordinances).

previous year. Again, in 1897, the next critical year, the crude birth rate went up to 36·7 from 31·5 in the previous year. A comparison of the average crude birth rates for various periods of five years from 1871 to 1948 given below is instructive :—

Table 4—Changes in the Official Birth-rate

Period	*Average crude birth-rate* for period of five years*
1876–80	26·2
1887–91	31·4
1897–1901	37·7
1902–06	38·5
1913–17	39·0
1920–24	38·9
1940–44	37·3
1944–48	38·4

The rate immediately after 1887 is markedly higher than for 1876–80, and the figures for the 5-year periods after 1897 are still higher.

This clearly shows that before the Ordinance came into force in 1897 the registration of births and deaths was extremely defective. It does not of course follow from this that subsequent registration has been perfect, or even nearly perfect.

2—THE SEX-RATIO AT BIRTH

A comparison of the number of registered male births with the female births during successive periods drives home those points even more effectively. More than 114 male births were registered for every 100 female births in 1867, but there has been a steady decline in this ratio which is well illustrated by the figures below :

Table 5 —Changes in the Registered Birth Sex-Ratio

Period	*Birth Sex-Ratios (No. of males to 100 females)*	
	Ceylon—All Races	*Sinhalese*
1867	114·8	—
1868	110·8	—
1869	112·4	—
1867–76	109·2	—
1877–86	110·3	—
1887–96	108·4	—
1897–99	108·9	—
1900–04	105·71	105·31
1905–09	104·68	104·71
1910–14	104·29	104·29
1915–19	104·48	104·24
1920–24	103·95	103·70
1925–29	104·05	104·18
1930–34	104·08	104·32
1935–39	103·76	103·96
1940–44	103·30	103·31
1945–49	103·60	103·48

For the decade ending 1876, the ratio was 109·2, and for the next decade it was a little higher, viz., 110·3. Then came the 1887 Ordinance, and the ratio drops to 108·4. Then the 1897 Ordinance and there is a vary marked drop to 105·9 in the three years 1897–99. During the last half-century the ratio has declined relatively little.

* Average annual number of registered births to average of population for each year.

The reason for this declining birth-sex-ratio is, of course, not any change in the actual ratio as such, but the fuller registration of female births[1] with the passage of the years following general social and educational progress during the last 75 years ; the rather sharp drops after 1887 obviously followed the coming into force of the Ordinances in those years, which not only reduced the under-registration of female births relative to males (as is evidenced by the decline in the birth-sex-ratio) but also in absolute terms reduced the under-registration of male births themselves[2].

Apart from these considerations, the (actual) sex-ratio at birth varies with different communities, though the sex-ratio at conception may be presumed to be the same for all human races[3]. The defference seems to be due to the pre-natal casualties, in which the male to female ratio is higher than at conception. Hence the ratio at birth is reduced. In those communities in which pre-natal care is highly developed, relatively more males survive birth, and the male to female ratio will be accordingly higher than in the case of less developed communities. Thus, among American whites the ratio is nearly 106 (to 100), while among the " Coloureds " it is markedly less[4], sometimes going down to about 100.

It is not easy to decide exactly what the true ratio is for Ceylon (all races) or for the Sinhalese. We have seen how the official ratio has deen going down fairly steadily due to changing conditions and the lessening of parental indifference to the registration of female births. If we examine the figures in Table 5, we find that the lowest birth sex-ratio for Ceylon (all races) during any quinquennial period is 103·30 (to 100) during 1940–44. The Sinhalese quinquennial ratio is also the lowest ever during this period, being 103·31. On our hypothesis, this would therefore appear to be the period of " least indifference to female birth registration " in Ceylon.

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[1] In Eastern countries, where only now the female is coming into her own in the social and other fields, it is not surprising that this social neglect or indifference should result in the neglect on the part of the parent to register the birth of a daughter. Also—up till very recently at least— girls did not aspire to jobs in the public and other services, for which the production of a birth certificate is often necessary. The schools also for many years now have called for birth certificates. As the law too has insisted more and more stringently and impartially on the registration of both male and female births, the relative under-registration of female births has gradually diminished.

Cf. *Census of India*, 1931, Vol. I, Part 1, Chapter V, pages 195 et seq. (the references are of course to India). " Sons are every where desired . . . . It is admitted that the Vital Statistics are incomplete and that there is a definite tendency to omit to report the birth of females in a greater degree than that of the similar omission with regard to males . . . . ".

The social attitude may result in the reverse also happening, as in parts of Africa, where the fear of the male child attracting the attention of evil spirits often induced the parent not to report its birth, which however, he may do readily in the case of the female child ; while in other parts, where a matriarchal society is concerned (as among the Bakongo) in which girls are more sought after than boys, the natality records showed less male births than female births during 1932, 1933 and 1934—vide P. Granville Edge's *Vital Statistics in the Tropics* (Bailliere, Trindall and Cox, London), pages 81–83. Indeed Victorian Britain herself would seem to have been subject to this attitude which was duly reflected in the registered birth-sex-ratio which declined from 105·2 during 1841–45 to 103·8 during 1876–80. Professor Glass, in his article, *A Note on the under-registration of Births in Britain in the 19th century* in *Population Studies*, Vol., V, No. 1 (July 1951 issue) says : " . . . . . The finding of the calculations in this note, that there was a slightly greater deficiency of registration for female than for male births, is not inherently improbable in a society which placed considerably greater emphasis on males than on females ".

[2] For, if we take any of these periods before 1897 and increase the female births so that the male to female birth sex ratio is as, low as for any subsequent period, and then calculate the crude birth-rate (using the registered male births plus the corrected female births), we shall find it still appreciably lower than for subsequent periods ; this suggests very strongly that male births themselves were appreciably under-registered ; e.g., during the decade before the Ordinance came into effect in 1897, there were 498,930 male births and 460,314 female births (ratio = $\frac{108 \cdot 4}{100}$). Even if we " correct " the latter to equal male births (which hardly ever holds in actual fact), the crude birth-rate would still be only $\frac{2 \times 498,930}{3,047,858} = 32 \cdot 7$ per 1,000 of the population, which is much lower than for any subsequent period (vide Table 4).

[3] Vide Article by Sanford Winston : " *The influence of social factors upon the sex-ratio at birth* " in the American Journal of Sociology (Vol. XXXVII, Number 1, July 1931) (page 9 et seq.). The writer sums up (page 20) : " The sex-ratio of man at birth is a resultant of the sex-ratio at conception, such sex-ratio constantly being reduced by a pre-natal mortality which bears more heavily upon the male than upon the female fetus. This mortality is importantly affected by social factors which operate indirectly through affecting the mother's ability to provide the necessary optimum conditions for survival ".

[4] Approximately 103, according to T. Lynn Smith : *Population Analysis* (Mc Graw Hill Co.), page 124.

Vide Encyclopaedia Britannica (1945 edition), Article *Sex*, section " Sex-ratio " by F. A. E. Crew. The writer gives the following ratios for " whites " and " coloureds " living in the same region :

Locality	*Authority*	*Ratio for " Whites "*	*Ratio for " Coloureds "*
U. S. A. ..	.. Jastryebaski ..	105·7 ..	100·0
Columbia ..	.. do. ..	105·0 ..	100·0
New Orleans ..	.. do. ..	102·0 ..	98·2
Columbia ..	.. Nichols (1907) ..	106·2 ..	103·0

It would appear that the birth-sex-ratios could vary from about 106 (when pre-natal conditions are very good) to about 100 (or even lower ?) when conditions are unfavourable,

A consideration of the social and economic conditions prevalent at the time in Ceylon tends to confirm this. For this was the period of the war, and ration books had come into force during this time. Registration of the birth of the infant, male or female, ensured the almost immediate issue of the vital rations. It may also be noted that during the subsequent quinquennial period, 1945-49, the ratio had gone up slightly, for the war was over and the ration book was no longer indispensable as many, though not all, of the vital foodstuffs had gone off the ration.

For this reason, we feel that 103·30 should be very close to the true birth-sex-ratio for Ceylon and the Sinhalese, and we shall hereafter treat that as the correct ratio for both Ceylon and the Sinhalese. This ratio is appreciably below the Western European or American whites[1] ratio but is well above some of the low ratios obtaining among less developed communities.

(If we examine the *annual* birth-sex-ratios[1] for both the Sinhalese and Ceylon for the last half-century, we find that it was lower than even 103·30 for a few years, viz., for 1911, 1920, 1943 and 1944 when the Sinhalese ratios were 103·05, 103·22, 103·06 and 102·60 respectively. But we are not taking any of these single year's ratios as the correct one, not only because a longer period than a year seems desirable, but also because it is possible than when the registration system gets " tightened up " for some reason for a year (or two), parents who had earlier neglected to register their daughter's births might do so in the year concerned, and so lower that year's ratio with the previous year's unregistered female births. Hence a single year's ratio might be misleading).

To return to our consideration of the registration of total births :

Our comparison of the (official) crude birth rate figures as well as of the birth-sex-ratios for the period prior to 1897 with the corresponding figures for the years after 1897 would lead us to reject the pre-1897 figures as quite unreliable. As we shall try to show, the registration of births and deaths during even the next half-century was incomplete.

CHAPTER III

THE CENSUSES

1—EARLY CENSUSES

WE are concerned in this thesis mainly with Sinhalese population growth during the period 1911–1946. We shall not therefore go into the Censuses taken before this period at any length.

The first Official Census was taken in 1871. Censuses were subsequently taken in 1881, 1891, 1901, 1911, 1921, 1931 (a partial Census) and 1946.

In view of the incompleteness of the registration records relating to births and deaths, it is not possible to check the completeness of the early censuses by comparing any two of them. It would indeed be unusual if those early censuses were quite complete, as they were really pioneer attempts at Census taking in Ceylon[2].

2—THE 1901 CENSUS

The usual mis-classification of ages occurs in the 1901 Census but there is a peculiarity in the error in that the number of infants would appear to have been " over-enumerated " rather than under-enumerated as is usual in most censuses. For the number of infants given by the Census Superintendent cannot be reasonably reconciled with other statistics, like the population of the whole Island or the number of married women in Ceylon in 1901.

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[1] Vide Table 36, page 36.

[2] In fact, regarding the 1871 Census, the Registrar-General himself in an annexure to the Report dated July 26, 1871, admits that the enumerators' books were entered in native characters even to the figures—" great mistakes in addition were obviously the result ". In the 1881 Census Report, it is stated that portions of villages were omitted altogether from the Census of 1871 (vide page XI, para. 18) ; and there are indications that no counter-checking was possible in the 1871 schedules (vide page XIV, paras. 2 et seq.).

In the 1881 Census age classification was unsatisfactory. According to the Superintendent of the Census himself : " I cannot claim greater accuracy for the figures which I am able to present than in Indian reports which always lament the difficulty of obtaining accurate information as to age ". He thought ages 25 to 60 would be most inaccurate, and ages up to 25 fairly accurate. (Vide 1881 Census Report, Chapter VIII, paras. 3 and 4).

The Superintendent of the 1911 Census of Ceylon has in fact very clearly brought out these points[1], and I cannot do better than quote from his Report. The passages within inverted commas below are his ; I however add my own comments where I think he may have over-stated or under-stated his case :

" The following Table D gives the figures for the age periods 0–5 by annual periods and 5–10 at the Censuses 1891, 1901 and 1911. . . . .

TABLE D (IN PART)—CHILDREN UNDER 10 YEARS OF AGE AT THE 1891, 1901 AND 1911 CENSUSES

Age Period	Males			Females		
	1891	1901	1911	1891	1901	1911
0–1	40,200	98,938	61,620	37,777	93,986	59,359
1–2	90,000	61,172	52,973	85,488	88,326	50,734
2–3		61,951	67,536		58,862	64,629
3–4	146,277	55,697	67,589	135,961	51,756	63,692
4–5		50,936	62,152		47,152	57,691
Total 0–5	276,477	328,694	311,870	259,226	310,082	296,105
5–10	247,099	263,878	289,025	217,609	240,142	275,450

(I give below a similar table for the above figures for males and females together) :

TABLE D—(COMPOUNDED)

Age Period	1891	1901	1911
0–1	77,977	192,924	120,979
1–2	175,488	119,498	103,707
2–3		120,813	132,165
3–4	282,238	107,453	131,281
4–5		98,088	119,843
Total 0–5	535,703	638,776	607,975
5–10	464,708	504,020	564,475

" We find from these figures that the difference is chiefly in the first period both for males and females, viz.: amongst infants under 1 year, where there are the large decreases of 38 and 37 per cent. in males and females repectively. The number of infants under 1 year in 1901 was 2½ times the number in 1891, and half as large again as the figure for 1911. . . . .".

" The total number of infants under 1 year at the Census of 1901 was 192,924. The number of registered births in 1900 was 136,051 or a rate of 38·6 births to 1,000 persons living a sufficiently high birth rate to make it unlikely that any large number of births escaped registration ; while the number of deaths of infants under 1 year in 1900 was 24,152 the births in January and February, 1901, which would be included in the total for children under 1 year at the Census are counterbalanced by the inclusion of births in January and February, 1900 and though the deaths of infants under 1 year in 1900 include children born in 1899, the deaths in January and February 1901 are omitted and the heaviest mortality amongst infants is at birth and under 3 months. From these figures it would appear that the number of infants under 1 year at the Census of 1901 might have been expected to be approximately 113,000 instead of nearly double this figure ".

(If we deduct deaths of children " under 1 " in 1900 (= 24,152) from births in 1900 (= 136,051), we have 111,899 or approximately 112,000. If deaths in January and February 1900 are allowed to counterbalance deaths in January and February 1901, still about 20 per cent. of deaths would be of infants who would have been *over a year old* at the end of the 12-month period considered. Allowing for this, we should deduct not 24,152 but 80 per cent. of this figure, viz., 19,322. We would then expect about 116,729 children under 1 at the 1901 Census, and not 112,000. Of course this does not seriously affect the validity of the writer's argument).

" Further, at the 1901 Census there were 562,432 married women, between 10 and 50 to 192,924 infants under 1 year, or 1 infant to every 3 married women, then is to say, one in every 3 married women between 10 and 50 may be assumed to have given birth to a child who survived between the end of February 1900 and March 1, 1901—a supposition which appears incredible ".

[1] *Ceylon at the Census of 1911* by E. B. Denham, page 360 et seq.

(I regard this as a rather telling argument, as the " self-contradicting " sets of figures are both taken from the 1901 Census Report itself.)

" Comparing the Ceylon figures for 1901 and 1911 with the Indian figures for 1901, we find the following age distribution of 10,000 of each sex in the yearly periods.

TABLE E—PROPORTION OF CHILDREN FOR AGES UNDER 10 YEARS TO 10,000 OF THE POPULATION OF EACH SEX IN CEYLON AND INDIA

Age Period	*India*		*Ceylon*			
	1901		*1901*		*1911*	
	Males	*Females*	*Males*	*Females*	*Males*	*Females*
0–1	266	276	521·8	562·9	283·3	307·3
1–2	163	175	322·6	349·3	243·6	262·7
2–3	274	297	326·7	352·5	310·5	334·6
3–4	276	303	293·7	310·0	310·7	329·8
4–5	275	288	268·6	282·4	285·8	298·7
Total 0–5	1,254	1,339	1,733·4	1,857·1	1,433·9	1,533·1
5–10	1,394	1,382	1,391·6	1,438·2	1,328·8	1,426·2

" The Ceylon figures for 1911 admit of comparison with the Indian figures and show a slightly higher percentage of children in Ceylon in each year up to 5 years, as might be expected, the earlier marriages in India are counterbalanced by healthier conditions in Ceylon ; but the 1901 figures show *twice* as high a proportion of infants under 1 year and under 2 years in Ceylon as in India.

" From the statistics it is difficult to believe that the figures for infants under one year according to the Census of 1901 can be correct. If correct, we have to assume that some 80,000 births in 1900 were not registered, and that the number of infants under one year rose from 80,000 in 1891 to 190,000 in 1901, and dropped again to 120,000 in 1911 without any reported heavy infantile mortality or change in the birth-rate ".

(The latter part of the argument could, I think, be challenged—theoretically at least—by (say) the 1901 Census Superintendent, who could conceivably contend that the earlier and later Vital Statistics registration and Census enumeration were deficient unlike the 1901 Census. This charge would not be entirely without foundation. However, the cumulative effect of the 1911 Census Superintendent's comparisons (above) with India (1901) and Ceylon (1891 and 1911) is very suggestive).

" It is clear that some further explanation is required. It appears to be the case that in the tabulation of ages at the Census of 1901, in each group of ages the lower limit was excluded and the upper limit included ; that is to say, the group 5–10 did not include 5 but included *10, and 0–1 included 1 and under*, so that the figures in 1901 for 0–1 include not only those children who at this Census were entered as infants, but also those children who were in their 2nd year or had passed the age of 1, and against whom 1 was entered in the column for age in the Census schedule. The consequence is that the figures for 0–1 in 1901 must be compared with the figures for 0–2 at the 1911 Census, and 1–2 with 2–3, and so on . . . "

It is difficult not to agree substantially with what the writer says as to the error in the 1901 Census classification but I do not think that we could entirely agree with him when he implies that at the 1901 Census, age (say) " 0–5 " was taken (by the Census staff or by the public or by both parties) to include *all* " 5+ ". In Ceylon, people often count a person's age not by the years he has completed (as is done in the West) but by the year of age he is completing. Thus, a boy who is 12 years and 7 months old would be described as a 12-year old in England but might be described as being " in his 13th year " in many parts of Ceylon. I am therefore inclined to think that this 1901 Census peculiarity is due not so much to the Census authorities consciously deciding that they should adopt this mode of age-classification but to their failing to make the public quite aware of what they meant by the year of age ; or, what amounts to the same thing, their misunderstanding the statements of age as given by many members of the public. *All* the people, however, would not have given their age in the same manner, and not *all* the Census enumerators would have unquestioningly accepted the answers given to their questions regarding age ; many of them would have got the facts straight. This is rather unfortunate ; from our point of view it would have been better if all had erred consistently in one direction, as it were ; for then it would be relatively simple to make allowances for that and to find the true age distribution. But as it is, it is only reasonable to suppose that some would have erred, and some would not have ; and we should regard the statement of age as, e.g., " 0–5 " as not excluding " 5+ ", as the 1911 Census Superintendent would have us believe ; but as including a part, perhaps the major part, but not the wohle, of " 5+ ".

An examination of the figures in Table D above (from the 1911 Census Superintendent's Report) would seem to confirm this. The numbers of males between 0 and 5 years at the 1891, 1901 and 1911 Censuses are (approximately) 276, 329 and 312 thousands respectively. If the 1901 total included the " 5+ " group—that is, " 4–5 years " having been taken to mean " 5–6 years ", then if the figure for the " 4–5 years " group (viz., 51 thousand) be deducted, we would have figures corresponding to the same age division " 0–4+" for the three Census years, viz., 276, 278 and 312 thousands. Clearly, this too looks unreliable. The 1901 figure now seems too close to the 1891 figure.

An examination of the figures for females reveals the same thing. The figures for 1891, 1901 and 1911 are approximately 259, 310 and 296 thousands respectively. On deduction of the 1901 " 4 to 5 years" figure, we have 259, 263 and 296 thousands for the three Census years.

Clearly, then, we cannot accept the 1911 Census Superintendent's interpretation fully, and literally—that the 1901 figures for " 0 to 5 " include the " 5+ " figures. These figures include *only a part* of the " 5+ " figures.

It follows that the " 5–10 " figures do not represent the full " 5+ to 10 +" group as the 1911 Census Superintendent suggests but that it includes only a part of " 5+ " and a part of " 10+ " and the whole of the intervening " 6+ to 9+ " group. This, however, makes it approximately a 5-year group, and so permits a superficial comparison to be made with the 5-year groups " 5–10 " (meaning really " 5+ to 9+ " for 1891 and 1911). Thus the figures (vide Table D) 247, 264 and 289 thousands for males and 218, 240 and 275 thousands for females in the " 5–10 " groups for 1891, 1901 and 1911 respectively do not appear incongruous.

Briefly, then, an examination of 1901 Census figures relating to the younger ages reveals the fact that the age-divisions are not as water-tight as they should be, but " adjacent years " over-lap considerably.

The 1911 Census Superintendent points out another instance where age-classification appears grossly to be in error, though this would appear to be due not to misunderstanding or ignorance on anyone's part but to wilful misrepresentation of their ages by many members of the public who were in certain age-groups.

As poll-tax had to be paid by all males between 18 and 55, there appears to have been under-statement of age at 18 and over-statement at 55. Understatement does not matter as an 18–or 19–year old falls into the same group 15–20, as 16–and 15–year olds. But overstatement weights the 55 to 60 groups; thus, at the 1901 Census[1] there were 41·9 thousand males in the 50–55 age-group, and 61·0 in the 55–60 group. This is very suggestive because we would expect a smaller number in the higher age-group, not a number nearly 1½ times as big as the number in the lower group. Obviously, many thousands classed in the 55–60 group really belonged to the 50–55 group.

This suspicion is confirmed when we find at the 1911 Census 45·6 thousands in the 60–65 group ; this corresponds to the 41·9 in the 50–55 group at the previous Census ; even if no-one in this group had died in the intervening decade, there could not be 45·6 thousands in 1911. There was, it is true, an excess of immigration over emigration during this period, but when we consider that very few in the old age groups immigrate but a comparatively large number emigrate, the discrepancy in the figures referred to above seems to be convincing evidence that a large number of people in the 50–55 group had over-stated their age at the 1901 Census either hoping to evade payment of poll-tax or fearing detection of such evasion *if* they had not paid poll-tax for some time earlier.

The table below brings out these points clearly ; the critical figure is 41·9 under 50–55 years and against 1901.

Table 6—Mis-statement of age by " 50–55 " year-olds at the 1901 Census

Year of Census	*40–45 Years*	*45–50 Years*	*50–55 Years*	*55–60 Years*	*60–65 Years*	*65–70 Years*
1891	55·3	—	—	—	—	—
1901	68·0	—	41·9	61·0	—	—
1911	—	—	65·0	51·7	45·6	20·3

It is clear from these that the age classification at the 1901 Census is not reliable.

We have discussed these features of the 1901 Census to give an idea of the kind of mistakes that could creep into the statistics of a Ceylon Census about this period.

It is on the subsequent Censuses that we have tried to study Sinhalese population growth in recent years.

[1] Vide Table 6 below.

3—THE 1911 CENSUS

The Census of 1911 was held on the 10th of March. Already some comparisons have been made between the 1911 and 1901 Census figures, and certain observations of the 1911 Census Superintendent regarding the 1901 Census have been quoted. It is perhaps not surprising that the 1911 Census should have been, at least relatively, free from the more glaring errors of the earlier Census.

During the 12-month period ending March 10, 1911 (Census Day) approximately 56,902 births[1] and 10,037 deaths[2] were registered (on a proportionate basis) among Sinhalese males. Assuming the registration figures to be correct, we would have about 56,902—0·7 × 10,037 male children under one year on Census Day—i.e., 49,886 infants. According to the Census there were only 45,462 infants. This alone suggests under-enumeration of infants, for the difference is appreciably large being nearly 10 per cent. of our estimated figure. But the estimate itself is on the assumption that birth and death-registration were perfect. If they have to be increased[3], the difference would be still greater.

But under-enumeration of children, particularly of infants, is of course not unusual even in countries which have had much more experience of Census taking than Ceylon had in 1911.

The correctness of the age classification at the 1911 Census is also open to suspicion. Unfortunately, the Report does not give the population by each year of age, as then the eccentricities of age-estimation—as, e.g., partiality for numbers ending in certain digits like, 0, 5, 8, &c.—would be clearer.

Table 7—1911 Census Age classification for selected race groups

Age-group	*Low-country Sinhalese Males*	*Kandyan Sinhalese Females*	*Low-country Sinhalese Females*
0–5	140·4	79·8	129·3
5–10	131·0	73·0	124·6
10–15	114·1	59·7	100·9
15–20	64·1	38·3	68·3
20–25	72·7	46·0	76·4
25–30	75·9	44·5	73·5
30–35	62·9	34·6	57·0
35–40	55·8	24·5	40·9
40–45	41·1	20·3	38·7
45–50	34·7	14·5	25·3
50–55	27·9	17·2	34·4
55–60	24·4	6·9	15·0
60–65	22·0	8·4	18·1

We would expect the figures in each column to decline steadily as the age-groups advance, since they represent aggregates for periods of 5 years each and the effects of an exceptionally high or low birth rate[4]. in any particular year would tend to be eclipsed by the grouping into quinquennial periods and by the accumulating deaths[5]. But as may be easily seen, the decline of the figures in each cloumn is broken abruptly and inexplicably by the figures in circles. That these incongruities in the figures above do not represent *actual* peaks in the age structure of the different races is also evidenced by the fact that when we compare them with their corresponding age groups in the 1901 and 1921 Censuses still further incongruities are brought to light.

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[1] The average seasonal distribution of births for the period 1921–31 as a whole was used (vide page L 13 of the Ceylon Registrar-General's Vital Statistics Report, 1931), 21·398% of births in 1911 (for January 1 to March 10, 1911) + 78·602% of births in 1910 (for March 11 to December 31, 1910).

[2] 80·7% of deaths in 1910 (for period March 11 to December 31, 1910) + 20·1% of deaths in 1911 (for period January to March 10, 1911), vide relevant Reports of Registrar-General.

[3] As we shall see later, we have to increase births and deaths registered for this period by an appreciable amount, indicating considerable under-enumeration of infants.

[4] It should be remembered that the Sinhalese (crude) birth-rate does not fluctuate so markedly as to those of some Western countries.

[5] Cf. Mortara : " In a country where either the annual number of births or the probabilities of death in each year of age remain constant over the period, the number of persons enumerated by the Census decreases gradually in proportion as the age increases. This decrease will be even more rapid in a country like Brazil where it is very likely that the actual number of births was tending to increase and the probability of deaths in the early years of life was tending to diminish in the ten years immediately prior to the 1920 Census "—from page 14 : *Methods of Using Census Statistics (with applications to the population of Brazil)*—United Nations Publication, November 1949. What the writer says of Brazil is essentially true of Ceylon, except perhaps for a slight decline in the birth-rate in Ceylon in contrast to the increasing birth-rate in Brazil, as mentioned by the writer.

Thus the 46·0 thousands in the " 20–25 " Kandyan Sinhalese female group in 1911 were apparently only 37·5 thousands ten years *earlier* (" 10–15 " group, 1901)! And ironically enough where they make a " peak " in 1911, they' make a " hollow " in 1901. And the " 50–55 " group in 1911 bears an exactly similar relationship to the " 40–45 " group in 1901. So do these ladies' Low Country Sinhalese sisters in the same age groups at the 1911 Census to the correspondingly lower age groups at the 1901 Census. It is as if the Nemesis of Demography had seen to it that those who were grossly under-enumerated at the 1901 Census should be correspondingly over-enumerated at the succeeding Census.

As in the case of the Sinhalese, the other two major indigenous races of Ceylon, the Ceylon Tamils and the Ceylon Moors, display abnormal age structures, similar to that of the Sinhalese but not to the same extent.

As over 90 per cent. of the rest of the population are foreigners (most of whom are Indian Tamils) and immigrants, they may be expected to have a relatively abnormal age structure. Hence it is difficult when studying the figures for Indian Tamils to determine what is their real contribution to the abnormal age structure and what is due to the errors of Census enumeration.

As it is, the faulty age classification of the indigenous races of the Island who constitute over 85 per cent. of the total population of the Island makes it necessary to reject the age classification for each race as well as for the nation as a whole. The data available is, of course, not entirely useless, since after graduation (and certain other corrections) it should provide us with a fairly good idea of the age-structure for each of the major races, as well as for the Island as a whole.

Now we may only note that at the 1911 Census (i) there was under-enumeration of infants ; and (ii) the Census tables giving the age structure of the population are of doubtful reliability[1].

This does not mean that the Census enumeration of the *total* population (of each race as well as of the whole Island) is substantially in error. It is quite possible that even if the Census enumerators enumerate all, or nearly all, the population, that incorrect statements of their ages on the part of the public through ignorance and carelessness may lead to the abnormal age-structures that we have been considering. Hence we cannot conclude that there was under-enumeration at the 1911 Census (except in the case of infants) just because the ages given in the Census Report are apparently wrong. We have to judge by other tests if the total population as enumerated at the Census is equal to, or approximately equal to, what it really was on Census Day.

Perhaps the best way of setting about this is to compare the Census figures for 1911 with the corresponding figures from 1901 and 1921 Censuses, taking into account the number of births and deaths and the amount of immigration and emigration that took place in the intervening decades. In doing this of course, we have to consider the accuracy and comprehensiveness of the relevant vital and migration statistics.

4—THE 1921 CENSUS

The Census of 1921 was taken on the 18th of March and we may subject some of the figures relating to age-classification to a critical comparison with other related figures.

The table below gives the 1921 Census figures relating to infants of all the major races of the Island, and also gives very approximate estimates for each race based on the relevant Vital Statistics figures.

Table 8—Census and relevant Vital Statistics figures relating to Infants at the 1921 Census

Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*
Race	*Sex*	*Estimated Births*	*Estimated Deaths*	*Estimated Infant Survivors*	*Infants at 1921 Census*
		During 12-month period ending Census Day, 1921			
		(20% of 1921 births) + (80% of 1920 births)	*(20% of 1921 deaths) + (80% of 1920 deaths)*	*Column 3 minus 0·7 × Column 4*	*Official Census figure*
Sinhalese	M	56,746	9,393	50,171	42,307
	F	54,955	9,925	48,008	40,659
Non-Sinhalese (including immigrants)	M	28,801	6,903	23,969	18,542
	F	27,253	4,677	23,979	18,828

The above figures are merely intended to give a very rough idea of the discrepancy between the official census figures and the estimates based on the official vital statistics, since no allowance is made for seasonal or yearly variations except that 20 per cent. of births and deaths are supposed to have taken place before March 18 of each of the

[1] The 1911 Census Superintendent describes how villagers account for their ages by referring to trees (their " tambis " or younger brothers) planted soon after their own births. (Vide 1911 Census Report, page 356). This indicates the degree of reliability (or unreliability) that may be attached to age-statements at this Census.

years 1920 and 1921. But the Census figures are appreciably lower than the estimates in each case, and since we have reason to believe, as we shall show later[1], that there was appreciable under-registration of births and deaths, particularly of the former, the estimate should be still higher, and therefore the suggested under-enumeration of infants at the 1921 Census still greater. As it is, therefore, we may suspect the 1921 infant enumeration.

When we examine the age-structure for certain of the races at the 1921 Census, we note inconsistencies as in the 1911 age-tables (vide Table 9 below).

As explained earlier[2], one might expect the numbers in the Sinhalese (male and female) and Ceylon Tamil (female) quinquennial age groups to decline in numbers as the " ages " concerned advance, since these " race divisions " migrate very little[3]. We may not expect this to apply to the Indian Tamils who are immigrants and who may be expected to be more thickly grouped at the " middle ages " than the other races ; their distribution is given in the last column merely for the sake of comparison.

As in the case of the 1911 Census we find unexpected and inexplicable peaks and hollows in the otherwise steadily declining lines of figures for the different indigenous races, e.g., for the " 20–25 " group for the Low Country Sinhalese males and females and Kandyan Sinhalese females. This would seem to indicate that, as in the earlier Census, there have been gross errors in the statement of ages. This may be partly due to some people giving the wrong ages deliberately as, e.g., to evade poll-tax or through ignorance and misleading turns of speech—as, e.g., the Tamils giving the age of a child of " 1 + " or " 3 + " as " about two " — " two " (" tendu ") being a favourite number used in almost a figurative sense—or " eight " or " twelve " or any of the round numbers or other multiples of five ; and even amongst these there may be favourites as " 20 " to denote early manhood, " 50 " to denote advancing years . . . . the terms and peculiarities of expression will also vary according to the race, the language and the locality concerned. This probably accounts for most of the warped age-grouping we have for Ceylon.

Table 9—1921 : Age-Structure

Age	*Low-country*		*Sinhalese*		*Kandyan Sinhalese*		*Ceylon Tamils*		*Indian Tamils*	
	M		*F*		*M*		*F*		*M*	
0–1	26·7		25·5		15·2		5·6		7·8	
1–2	24·2		22·6		14·8		5·7		5·6	
2–3	30·8		29·1		18·9		7·2		7·8	
3–4	31·8		29·8		19·8		7·0		8·6	
4–5	31·0		28·7		17·1		6·4		7·1	
Total										
0–5	144·6		135·7		85·7		32·1		36·9	
5–10	133·8		126·2		74·2		30·5		27·1	
10–15	128·8		112·5		65·3		31·6		32·4	
15–20	88·0		87·3		48·7		24·8		31·1	
20–25	91·7		94·0		54·2		24·7		36·3	
25–30	81·4		79·9		45·3		22·9		44·9	
30–35	66·4		62·0		31·4		18·1		35·6	
35–40	66·9		50·9		27·4		16·5		34·1	
40–45	46·8		44·0		22·3		13·7		19·4	
45–50	42·7		32·1		17·0		11·2		14·5	
50–55	31·0		36·2		17·4		9·7		8·7	
55–60	27·2		17·2		7·6		5·7		5·4	
60–65	23·9		19·4		8·3		5·9		4·0	
65–70	12·4		8·1		2·9		2·8		1·7	

Thus, as far as we can see at this stage, the 1921 Census seems to suffer from the same defects as its immediate predecessor, viz. :—(i) from under-enumeration of infants and (ii) wrong classification—due presumably to mis-statements of ages[4].

These defects seem to be shared by all the major races indigenous to the Island, viz., the Kandyan and Low Country Sinhalese, the Ceylon Tamils, the Ceylon Moors, and even the smaller " urban " races, the Burghers and Eurasians, and the Malays—though to different degrees and in slightly different ways.

It does not necessarily follow from this that the total population of each race and of Ceylon as a whole has been under-enumerated (provided that we make allowances for the under-enumeration of the children in the lowest age groups).

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[1] Vide § 4 of Chapter V et. seq.

[2] Pp. 12 and 13.

[3] The Ceylon Tamils (males) division is subject to some migration (to the Federated Malay States for " white collar " jobs)—vide Appendix C : " Ceylon and Sinhalese Migration ".

[4] Vide Appendix A : " Mis-statement of Ages at the 1921 and 1946 Censuses : Favoured Digits '.

5—THE 1931 CENSUS

After the 1921 Census, a partial Census was taken in 1931. This Census did not enumerate the population either by race or by age, which are serious omissions and which for our present purpose make the chief finding of this Census, viz., the total population of Ceylon in 1931—of relatively little value to us, since we do not know what part of the increase in population after 1921 is due to the excess of births over deaths and what is due to the excess of immigrants over emigrants. If the different race populations had been given at the 1931 Census, we could have separated the Indian Tamils and other non-Ceylonese from the pure Ceylonese, and then studied the growth of the latter with respect to the 1921 and 1946 Census data. Except therefore for passing references to the 1931 Census, we shall not make much use of its findings, as infact there is relatively little in those findings of value to us in our present study.

6—THE 1946 CENSUS

In 1941 no Census was taken due to the War. In 1946 a full Census was taken.

The fact that it was held 25 years after the previous full Census (the 1921 Census) makes it impracticable to compare specific age groups in the 1946 Census with related age-groups (25 years "younger") in the 1921 Census as we did earlier when we compared 1911 age groups with related 1901 and 1921 age-groups (vide pp. 13 et. seq.)

We could still, however, compare the 1946 age-groups among themselves and come to certain tentative conclusions. Table 10[1] below gives the Sinhalese population by sex and "sub-race" in quinquennial groups[2] at the 1946 Census. These are all non-migrating indigenous race groups and we find that though numerically the quinquennial group population tends to decline, there are "peaks" (italicized in Table 10) which suggest that there was considerably mis-statement of age as at the earlier Censuses.

Examination of the distribution of digits of age-endings—Vide Appendix A—confirms our suspicion. However it shows that mis-statements were not so bad as at the 1921 Census.

There would also appear to have been considerable under-enumeration of infants :

From the Registrar-General's figures we would estimate the Sinhalese male and female births for the 12 months period ending on March 19, 1946 (Census day) to be 86,283 and 83,255 respectively ; and Sinhalese male and female infant deaths to be 13,360 and 12,129 respectively.[3]

This would give us approximately (86,283– $0{\cdot}7 \times 13{,}360 =$) 76,931 male and (83,255– $0{\cdot}7 \times 12{,}129 =$) 74,765 female infants on Census day. The corresponding official figures are, however, only 56,257 and 54,467 showing considerable under-enumeration of infants, if we assume that there was no appreciable under-registration of births and deaths.

Table 10—1946 Census Population Sinhalese in Age-groups

Age-group	*Males*		*Females*	
	Low-country Sinhalese	*Kandyan Sinhalese*	*Low-country Sinhalese*	*Kandyan Sinhalese*
0–5	184,286	123,685	176,623	119,879
5–10	171,719	121,122	163,925	118,012
10–15	*183,264*	117,684	*170,773*	111,379
15–20	160,872	100,764	140,632	84,586
20–25	137,977	77,788	*143,801*	80,850
25–30	127,575	71,820	119,292	67,805
30–35	104,367	55,064	91,942	47,448
35–40	*105,827*	*61,546*	*92,153*	*50,836*
40–45	76,300	40,843	63,586	31,210
45–50	*76,777*	*43,196*	61,941	31,694
50–55	45,355	21,832	43,912	19,676
55–60	41,648	*23,078*	33,367	14,737
60–65	33,977	16,193	29,278	12,260
65–70	26,655	12,100	21,649	8,823
70–75	17,499	8,109	15,301	6,195
75–80	10,340	4,487	9,900	3,161
80–85	6,297	3,255	5,629	2,381
85–90	2,453	1,509	2,326	1,061
90–95	899	638	1,193	565
95–100	454	322	571	257

[1] The table has been prepared from data in Table 6 (pp. 146 and 147) in Vol. II of the *Census of Ceylon, 1946*.

[2] Ages over 100 have not been taken.

[3] Vide pp. § 3 of Chapter V et. seq. and Tables 32–34 for explanation of sources and methods of calculation of corrected figures.

Briefly, then, the last three full Censuses taken in Ceylon, viz., the 1911, 1921 and 1946 Censuses—all seem to share two defects to a fairly marked extent :—

(i) under-enumeration of infants, and possibly of other children in the lowest age groups ;
(ii) general misclassification of ages.

It does not follow from this that there was no under-enumeration of the total population of any of the major race groups at these three Censuses (excepting in the lowest age groups), and we therefore look into this very important question before proceeding further.

CHAPTER IV

INTER-CENSAL POPULATION GROWTH

1.—IMMIGRANT AND INDIGENOUS RACES

IF the Census enumerations, the registration of births and deaths and the migration statistics for any race were comprehensive and accurate, the population at any census should be equal to the population at any previous census plus the excess of births over deaths plus the excess of immigrants over emigrants during the inter-censal period.

But as we shall find, the relevant statistics for Ceylon for the period 1911–46 is not complete and accurate.

Perhaps the greatest deficiencies appear in the migration statistics. The data available as regards migration is quite inadequate and unreliable, and has so far been collected with considerable indifference. This is partly due to the large number of Indian immigrants who pour into Ceylon annually to work on the tea and rubber plantations and trickle back to their homeland by different ways and means, so that even when approximate figures have been available as regards immigration, very unreliable figures have been given as representing emigration[1].

The inter-censal checking cannot therefore be satisfactorily done with the immigrant population.

The major indigenous races of the Island are the Sinhalese, the Ceylon Tamils and the Ceylon Moors. Unfortunately the vital statistics relating to the Ceylon Tamils and Ceylon Moors have been " mixed up " with the Indian Tamils and Indian Moors till very recently[2], in the Registrar-General's Administration Reports under the heading " Tamils " and " Moors " respectively.

The inter-censal checking can therefore be done satisfactorily only with the Sinhalese population who form 70 per cent. of the total Ceylonese population, and nearly 80 per cent. of the total indigenous population of the Island.

It is rather fortunate for our present purpose that Sinhalese migration out of Ceylon is quite negligible. Ceylonese migration during the period we are considering was mostly to the Federated Malay States, mostly for white collar jobs, and by the nature of the case was not in appreciable numbers. And the majority of these migrants were Ceylon Tamils, the Sinhalese who migrated forming a very negligible proportion of the total population[3].

In our examination of Sinhalese population growth between the censuses we shall therefore treat Sinhalese (net) migration as negligible, and consider births and deaths to be the only factors determining Sinhalese population growth between 1911 and 1946.

Few countries possess very reliable statistics on these subjects. Even the United Kingdom and the U. S. A. do not have statistics relating to the births, deaths and migration that have taken place during the last 50 or 75 years as accurate and as full as their demographers would perhaps like to have. Most other European countries have even less reliable statistics, and many Asiatic countries lag still further behind. Ceylon's Census and Vital Statistics may perhaps be said to occupy a place (as regards comprehensiveness and accuracy) somewhere midway between the two extremes, being inferior to those of many Western countries but being superior to those of most Eastern countries. I think the Island is in this respect in a better position than India[4], or China, and much better off than many of the other countries of Asia ; perhaps Japan is the only one among the better known countries of the East whose population statistics may be comparable or superior to those of Ceylon[5].

But in Ceylon itself Vital Statistics registration has still not attained anything like perfection as regards accuracy, and in the past they were even less reliable. However, we may reasonably presume that during the last 50 years the registration of births and deaths has become increasingly more efficient, comprehensive and accurate for the following reasons :—

(i) it has been a period of great progress in the educational, as well as in the social, political and economic fields. The public therefore have not only become more enlightened and more conscious of their duty to attend to official requirements like the registration of births and deaths, but have also become aware of the desirability of doing so.

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[1] Vide Appendix B : " Ceylon's Migration Statistics ".
[2] Till 1940.
[3] Vide Appendix C : " Ceylonese and Sinhalese Migration ".
[4] As we shall see Ceylon's under-registration of births and deaths for the period 1911–46 lies between 3 per cent. and 7 per. cent. (vide Table 27) while for India it is nearer 30 per cent. to 33 per cent. (vide Appendix E).
[5] Cf. P. Granville Edge : *Vital Statistics in the Tropics* (p. 133), where the writer, in illustrating a general point, uses statistics from Ceylon, explaining : " Ceylon was selected because the registration system is unusually well organized ".

(ii) Meanwhile, the Government Administration has also gained in experience and efficiency during a relatively long period of unbroken peace and orderly development in the country. The Public Services are now manned by personnel much better educated and efficient than they were 25 or 50 years ago (as may perhaps be gathered from (i) above).

(iii) One effect of this, fortunately easily measurable, has been the increasingly comprehensive registration of female births relative to the registration of male births. The sex ratio at birth was as high as 114·8 in 1867 according to the registration records, but had declined to 104·7 during 1905–1909 and 103·6 during 1945–1949[1]. It is not unreasonable perhaps to suppose that the social, educational and administrative factors that brought about this marked improvement in the registration of female births relative to male births would have also tended to improve the registration of male births by themselves. There may not be perfect correlation between the two improvements but there is probably some degree of correlation between them.

2—UNDER-ENUMERATION AT THE 1921 CENSUS?

I have prepared tables, based on the Ceylon Registrar-General's Vital Statistics Reports, giving the Natural Increase of the Sinhalese (males and females separately) during each of the inter-censal periods 1901–1911, 1911–1921, and 1921–1946[2]. Similar details for the other major races as welll as for Ceylon as a whole are also given, and the corresponding increases according to the Census enumerations, are given in an adjacent column for the sake of comparison.

Table 11 below summarises the details relating to the Sinhalese for the three inter-censal periods referred to above.

During each of these inter-censal periods, it will be noticed, that the (official) natural increase for both Sinhalese males and females is positive ; that is, registered births have exceeded deaths, as is perhaps to be expected in a country like Ceylon with a high birth-rate.

Table 11—1901–1911—Population Differences

	Natural Increase	*Census Increase*	*Difference: Census Increase minus Natural Increase*
Ceylon—			
Male	185,635	278,818	+ 93,183
Female	172,366	261,578	+ 89,212
Total	358,001	540,396	+ 182,395
Europeans—			
Male	— 107	793	+ 900
Female	+ 469	499	+ 30
Total	+ 362	1,292	+ 930
Burghers—			
Male	1,252	1,660	+ 408
Female	1,014	1,521	+ 507
Total	2,266	3,181	+ 915
Sinhalese—			
Male	186,165	201,548	+ 15,383
Female	161,051	183,065	+ 22,014
Total	347,216	384,613	+ 37,397
Tamils—			
Male	— 8,505	49,640	+ 58,145
Female	+ 420	57,627	+ 57,207
Total	— 8,085	107,267	+ 115,352
Moors—			
Male	7,927	21,588	+ 13,661
Female	9,217	17,003	+ 7,786
Total	17,144	38,591	+ 21,447
Malays—			
Male	268	395	+ 127
Female	137	693	+ 556
Total	405	1,088	+ 683
Others—			
Male	— 1,365	3,194	+ 4,559
Female	+ 58	1,170	+ 1,112
Total	— 1,307	4,364	+ 5,671

[1] Vide p. 6 (Table 5).
[2] Vide Tables 11–14.

Table 12—1911-1921—Population Differences

		Natural Increase	Census Increase	Difference: Census Increase minus Natural Increase
Ceylon—				
Male	.. ..	170,851	206,782	35,931
Female	.. ..	147,615	185,473	37,858
	Total ..	318,466	392,255	73,789
Europeans—				
Male	.. ..	183	— 10	— 193
Female	.. ..	628	536	— 92
	Total ..	811	526	— 285
Burghers—				
Male	.. ..	1,597	1,166	— 431
Female	.. ..	1,528	1,610	+ 82
	Total ..	3,125	2,776	— 349
Sinhalese—				
Male	.. ..	168,652	161,035	— 7,617
Female	.. ..	145,135	139,699	— 5,436
	Total ..	313,787	300,734	— 13,053
Tamils—				
Male	.. ..	— 4,347	27,082	31,429
Female	.. ..	— 7,133	33,970	41,103
	Total ..	— 11,480	61,052	72,532
Moors—				
Male	.. ..	6,024	9,192	3,168
Female	.. ..	6,761	9,147	2,386
	Total ..	12,785	18,339	5,554
Malays—				
Male	.. ..	818	156	— 662
Female	.. ..	557	256	— 301
	Total ..	1,375	412	— 963
Others—				
Male	.. ..	— 2,076	8,161	10,237
Female	.. ..	+ 139	255	116
	Total ..	— 1,937	8,416	10,353

Table 13—1921–1946—Population Differences

	Natural Increase	Census Increase	Difference: Census Increase minus Natural Increase
Ceylon—			
Male	999,276	1,150,406	+ 151,130
Female	949,662	1,008,328	+ 58,666
Total	1,948,938	2,158,734	+ 209,796
Sinhalese			
Male	761,541	839,119	+ 77,578
Female	709,608	765,234	+ 55,626
Total	1,471,149	1,604,353	+ 133,204
Tamils—			
Male	187,181	215,950	+ 28,769
Female	181,475	178,311	— 3,164
Total	368,656	394,261	+ 25,605
Moors—			
Male	40,141	71,146	+ 31,005
Female	42,725	53,073	+ 10,348
Total	82,866	124,219	+ 41,353
Burghers—			
Male	6,354	6,471	+ 117
Female	6,461	6,016	— 445
Total	12,815	12,487	— 328
Malays—			
Male	4,362	4,899	+ 537
Female	4,178	4,207	+ 29
Total	8,540	9,106	+ 566
Europeans—			
Male	298	— 1,618	— 1,916
Female	1,068	— 1,082	— 2,150
Total	1,366	— 2,700	— 4,066
Others—			
Male	— 601	14,439	+ 15,040
Female	4,147	2,569	— 1,578
Total	3,546	17,008	+ 13,462

Table 14—Sinhalese Population Growth

(Figures in thousands)

A—SINHALESE MALES

	1901–11	*1911–21*	*1921–46*
Registered Births	535·0	580·6	1,827·4
Registered Deaths	348·9	411·9	1,065·8
Therefore Natural Increase	186·2	168·7	761·5
Census Increase[1]	201·5	161·0	839·1
Census Increase minus Natural Increase	+ 15·4	— 7·6	+ 77·6

[1] Difference (increase) between Censuses.

B—SINHALESE FEMALES

(before birth-sex-ratio correction)

Registered Births	509·4	557·8	1,758·9
Registered Deaths	348·4	412·7	1,049·3
Therefore Natural Increase	161·1	145·1	709·6
Census Increase[1]	183·1	139·7	765·2
Census Increase minus Natural Increase	+ 22·0	— 5·4	+ 55·6

C—SINHALESE FEMALES

(after birth-sex-ratio correction)

Corrected Births	517·9	562·0	1,769·0
Uncorrected Deaths	348·4	412·7	1,049·3
Natural Increase	169·6	149·4	719·8
Census Increase[1]	183·1	139·7	765·2
Census Increase minus Natural Increase	+ 13·5	— 9·7	+ 45·4

There are, however, discrepancies between the increases shown by the Censuses and the corresponding increases shown by the excess of registered births over deaths. If, as we believe, Sinhalese migration is negligible, these discrepancies are due to under-registration of births and deaths, or under-enumeration at the Censuses[2].

Thus, where the " Census-increase " is greater than that represented by the excess of registered births over deaths, as for the periods 1901–11 and 1921–46, the possible causes could be (i) under-enumeration at the earlier Census and/or (ii) under-registration of births outweighing under-registration of deaths. But where the registered natural increase exceeds the census increase, as it did for the period 1911–21, the causes could be (1) under-enumeration at the later Census, and/or (2) under-registration of deaths outweighing the under-registration of births.

The Table below sums up these possible explanations for the three intercensal discrepancies we are considering :

Table 15—Possible Causes of Discrepencies between Census and Vital Statistics

Period	*1901–11*	*1911–21*	*1921–46*
Comparison of Census with Vital Statistics	*Census Increase exceeds Natural Increase*	*Natural Increase exceeds Census Increase*	*Census Increase exceeds Natural Increase*
Possible explanations for statistical discrepancies	(i) Under-enumeration at 1901 Census, and/or (ii) Under-registration of births outweighing under-registration of deaths	(i) Under-enumeration at 1921 Census, and /or (ii) Under-registration of deaths outweighing under-registration of births	(i) Under-enumeration at1921 Census, and/or (ii) Under-registration of births outweighing under-registration of deaths

1 Difference (increase) between Censuses.

2 Multiple registration of births and deaths or over-enumeration at the Censuses are theoretically possible, but not at all probable, since what little multiple registration of births and deaths was there earlier in Ceylon (before 1897) was more than offset by under-registration of births and deaths during the same period, and in any case would appear to have been effectively dealt with by the Ordinance that came into effect in 1897. (See page 5). Again, over-enumeration at a Census is generally far less likely than under-enumeration (at the previous or following Census) which would explain the same discrepancy, and so we shall not consider that too as a serious possibility.

In countries where there is under-registration of births and deaths, the degree of under-registration is nearly always higher in the case of births than of deaths[1].

And there seems to be no reason why Ceylon should be an exception. Indeed Ceylon's Registrars-General who are perhaps the best judges in the matter have inclined to the view that deaths were better registered than births[2].

Also, the digest of possible causes for the inter-censal discrepancies above suggests that deaths may have been better registered than births during the 1901–11 and the 1921–46 periods, but that, in the intervening period, 1911–21, births may have been better registered than deaths ; unless we accept the other possibility for 1911–21, viz. :—that there was under-enumeration at the 1921 Census. This is suggested by a consideration of the 1911–21 period, and is also consistent with the 1921–46 disceptancy (vide chart).

On the whole it seems reasonable to suppose that births were under-registered to a greater extent than deaths throughout (1901–1946)[3] and that there was under-enumeration at the 1921 Census[4]. (This does not mean that there was no appreciable under-enumeration at the other Censuses ; as we have seen, there very probably was under-enumeration of infants in all the Censuses). But in the circumstances it seems safer not to base any estimates on the assumption that the 1921 Census enumeration (even after allowance is made for the under-enumeration of children) was complete[5].

In studying recent Sinhalese population growth therefore we shall use the 1911 and 1946 Censuses as our main bases.

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[1] Vide Appendix E, dealing with the under-registration of births and deaths. As a matter of fact (and ironically enough) the Ceylon (1921) Census Commissioner himself believed this to be true of Ceylon. In his (1921) Census Report he says (Vol. I, Part 1, Page 11) : " In most countries regarding which any statement is possible, it appears to be assumed that the error in the birth registration is higher than in the case of the records of deaths. Although, in Ceylon, the registration of births is made compulsory by section 12 of Ordinance No. 1 of 1895, and although the advantages of the birth registration are becoming more widely realized, it is probable that the birth-registration under-states the facts. *Omissions in the records of deaths are less likely to occur* owing to the care which is taken by the officers of Justice and police to see that any suspected deaths are inquired into, but it is not impossible that there might be omissions, for example, at the height of a virulent epidemic ". (Italics are mine).

[2] One factor that ensured death registration in the towns, cities and ports and perhaps tended to " train " the people at large in the matter of registering deaths in their families, &c., was the legal requirement according to which : " No dead body can be buried in Colombo or any other port or town in the Island without the death being previously registered, for which purpose the cause of death is ascertained by the registrar, a medical officer, by personal inspection of the body, unless the cause is certified by a qualified medical practitioner who was last in attendance on the deceased. These requirements are enforced under the special clauses 31 to 36 of the Births and Deaths Registration Ordinance, No. 1 of 1895, which are in force in every town in the Island . . . . " Registrar-General of Ceylon in his administration Report on Vital Statistics for 1898 (page F. 7).

[3] In fact, as we shall see later (Tables 27 and 28) when we estimate birth and death under-registration for the period 1911–46 as a whole, by comparing age groups in the 1911 and 1946 Censuses and without making any assumption as to birth registration being better than death registration or vice versa, we find birth registration better than death registration both for Sinhalese males and females for the period 1911–46 as a whole.

[4] There is not much reason to suppose that, because the 1921 Census of Ceylon was the sixth full decennial Census to be taken in the Island, it would probably be fuller and more accurate than its predecessors. Unlike the system for registering births and deaths which is maintained without a break and therefore tends to improve steadily with time, Censuses taken generally at intervals of 10 years or longer, often under high pressure and by men with little or no previous experience in Census taking may depend for their quality, comprehensiveness and accuracy largely on the skill of the Census Superintendent and the funds and staff at his disposal. Cf. Kucyznski, *Colonial Population* (Oxford University Press, 1937), page X. " In point of fact, censuses do not at all improve automatically ". The Ceylon (1921) Census Superintendent himself doubted if Census statistics would be more accurate than Vital Statistics : " It is sometimes stated that as the Census is a specially orgainsed effort, for which extensive and detailed preparations are made, it is to be expected that its accuracy would be greater than that of the routine registration of births and deaths. This view is, however, discounted by the consideration that the Census operations have to be conducted at very high pressure and that, in the rush of work, omissions and other errors are perhaps more likely to occur than in the routine of deaily registration ". *Report on the Census of Ceylon, 1921* by L. J. B Turner, Vol. I, Part I, (Page 11).

As we have remarked earlier, it is not possible to analyse the figures relating to the Ceylon Tamils and the Ceylon Moors (as we have done with the Sinhalese) as, unfortunately, the Vital Statistics relating to these two communities are mixed up with those of the Indian Tamils and Indian Moors respectively till 1939. The other two indigenous communities of any appreciable size are the " Ceylon Malays " and the " Burghers and Eurasians ". The latter, being a mixed community, is not " ethnically stable " and reliable inferences may not perhaps be drawn from the different Censuses' figures relating to it. But the Ceylon Malays form a definite group and we find that a comparative study of their Census and Vital Statistics figures suggests, just as in the case of the Sinhalese, that there was under-enumeration at the 1921 Census. (Vide Tables 11, 12 and 13). The other possible explanation that under-registration of deaths during 1911–21 was greater than under-registration of births is even more improbable in the case of the Malays than in that of the Sinhalese, because most of the Malays are urban dwellers (particularly, in Colombo) and the registration of deaths in towns and cities has been very efficient and comprehensive for many years (vide footnote [2]).

[5] The possibility of some Sinhalese having been enumerated as members of some other race need not be considered seriously as an explanation for their under-enumeration at the 1921 Census since, due to the increasing measure of self-government Ceylon has been getting during the last 40 or 50 years (which spells perhaps more power and political prestige for the Sinhalese, who form the largest community in Ceylon), the inducement if any, would be for some members of the other races to pass off as Sinhalese. But even this would not be easy since the Tamils, the Moors and the Burghers differ markedly from the Sinhalese in language, dress, religion and customs. Also, since the people are socially quite friendly and tolerant towards each other, few, if any, would feel any acute desire to change their racial label.

CHAPTER V

UNDER-REGISTRATION OF DEATHS AND BIRTHS BETWEEN 1911 AND 1946

1—FIRST ESTIMATES OF UNDER-REGISTRATION

COMPARING the official Census figures for the Sinhalese at the 1911 and 1946 Censuses, we have :

Table 16—Inter-censal Population Growth, 1911–46

	Males	*Females*
1946 Census	2,419,715	2,200,792
1911 Census	1,419,561	1,295,859
Increase	1,000,154	904,933

According to the official vital statistics we have :

Table 17—Natural Increase, 1911–46

	Males	*Females*
Registered births, 1911–46[1]	2,407,941	2,316,655
Registered deaths, 1911–46[1]	1,477,748	1,461,912
Natural Increase (official)	930,193	854,743

It will be seen that there is an appreciable difference between the official Natural Increase and the (official) inter-censal increase.

If, as we presume, Sinhalese migration during this period was negligible, it is clear that there was under-registration of births and possibly under-registration of deaths.

Normally, when Censuses are held, it is possible to estimate the degree of under-registration of births and deaths by comparing corresponding age groups in successive Censuses.

Between the two Censuses we are using there is an interval of 35 years. This is rather unfortunate, as usually comparisons are made between decennial Censuses and results obtained from comparing different age groups could be themselves compared with and checked against each other . . . .

As it is, since there would appear to have been appreciable under-enumeration of infants and possibly of even slightly older children, we shall leave out the child population of the 1911 Census and take the whole Sinhalese population over 5 years old (i.e., " 5+ " and over) as one group and compare this number with the survivors in 1946, who would then be " over 40 ".

The table below sums up this analysis :

Table 18—Estimate of Under-registration of Deaths among Sinhalese between 1911 and 1946

	Males	*Females*
" Over 5's " at 1911 Census	1,195,316	1,086,784
" Over 40's " at 1946 Census	514,355	420,856
Total deaths presumed in this group during inter-censal period ..	680,961	665,928
Corresponding registered deaths	645,999	608,685
Therefore number of deaths unregistered	34,962	57,243
Unregistered deaths as percentage of registered death	5·412%	9·404%

The " total deaths presumed " have been obtained by subtracting the " over 40 's " from the " over 5's ". The registered deaths have been estimated from the Registrar-General's annual figures on certain assumptions and by certain approximations, as illustrated below :

(i) In the Registrar-General's Administration Reports, deaths among the " over 5 " population have been classified in the following age groups : 5–10, 10–15, 15–20, 20–25, 25–35, 35–45 and so on in 10-year groups up to 100.

[1] As between the two Census days.

In estimating the deaths over 7, for instance, we have to and the numbers in groups " 7–10 " to the " over 10's " ; the latter is directly found by adding up all the numbers in the age-groups over 10 ; the " 7–10 " group was estimated on a simple proportionate basis, i.e., as three-fifths of the " 5–10 " group. This is not quite correct, as deaths will not be quite evenly spread between different years of age in the various age-groups. (To some extent, however, the errors due to this approximation will tend to adjust themselves, when every year of age from 5 to 40 is considered in turn for the inter-censal period).

(ii) The survivors of the original " over 5 " cohort on March 10, 1911 would be over 6 on March 10, 1912, over 7 on March 10, 1913, and so on, We have to estimate the deaths in this cohort from the Registrar-General's figures which are for calendar years. Hence allowance has to be made for the parts of each year before and after March 10. For convenience of compuation, the percentages of deaths before and after March 10 each year have been taken to be roughly 20 per cent. and 80 per cent. respectively.

(iii) Making these allowances the " over 5's " who died during the 12-month period following March 10, 1911, the " over 6's " who died in the next 12-month period, &c., were estimated from the Registrar-General's records of deaths, and were taken to represent the actual number of deaths corresponding to these age-groups from the original cohort, but this again is not quite correct, since, e.g., some of " 5+'s " who (according to the Registrar-General) died in the first 12-month period need not have belonged to the actual cohort, since they might have been only " 4+ ' on Census day, and might have entered the " 5+ " group and died (say) two or three months later. So with the other " border groups " for other years.

(iv) We are really trying to estimate the under-registration of deaths (all ages) during the whole inter-censal period, when there were more deaths (all ages) during the later half of the period than in the earlier half. The deaths from the 1911 " over 5 " cohort wer are considering should be therefore approximately proportional to the total deaths, year by year, if it is to be representative of the latter. But the actual position is just the reverse, since more deaths (e.g., from the " over 5's " in 1911) enter our sample during the earlier half of the inter-censal period than during the second half which ends in 1946 with only deaths " over 40 ".

Since we assume that registration improved fairly steadily from 1911 to 1946, our sample, over-representing deaths from the earlier half (when under-registration was greater) would tend to give an estimate of under-registration higher than it should.

(v) This will be offset to some extent by the fact that infant deaths (which are generally under-registered to a greater extent than non-infant deaths) have not entered our sample. This tends to make our estimate of under-registration lower than it otherwise would.

In view of these considerations, we are not likely to get quite an accurate estimate of under-registration of deaths from the method adopted above, and we shall therefore not use the results obtained just as they stand. But since the " disturbing factors " affect our estimates of death under-registration in the same way for both males and females, we shall treat the results obtained—viz., 5·412 per cent. for males and 9·404 per cent. for females—as *proportional* to the true correcting factors for death-under-registration for the inter-censal period as a whole ; that is, the actual percentages of under-registration of deaths will be taken to be 5·412 k % and 9·404 k % respectively, where we propose to determine the value of k by using the birth-sex-ratio, described below.

The registered male and female deaths (all ages) for the inter-censal period 1911–46 were 1,477,748 and 1,461,912 respectively. By using our correcting factors, we have the actual number of deaths as :

Males .. .. .. $1{,}477{,}748 + \frac{5.412\,k}{100} \times 1{,}477{,}748$

Females .. .. .. $1{,}461{,}912 + \frac{9.404\,k}{100} \times 1{,}461{,}912$

As we have seen, infants were appreciably under enumerated at both the 1911 and 1946 Censuses. As it is possible that other children too in the lower age-groups were under-enumerated, we shall estimate the child-population[1]. at each of the Censuses from the (corrected) vital statistics figures for the 5-year period preceding each Census.

We are here faced with a slight problem, for the child population correction will, of course, affect the total population and hence the inter-censal population difference, from which in turn we propose to estimate the correction necessary for the registered births and deaths for each year. There is thus a chain-effect the child population correction affecting the inter-censal difference and vice versa. In the circumstances we shall proceed by successive approximations till the final correction necessary becomes negligible.

To begin with, we shall assume that the actual child population on Census day in 1911 and 1946 were as given in Table 19 below, in which the other relevant details are also given.

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[1] By this, we shall hereafter refer to all children (including infants) under 5.

Table 19—The Inter-Censal Difference (1st Estimate)

	Males	Females
1946		
Estimated child population[1]	348,735	336,432
Official child population	307,971	296,502
Difference	40,764	39,930
Official total population	2,419,715	2,200,792
Therefore estimated total population	2,460,479	2,240,722
1911		
Estimated child population[1]	234,195	227,910
Official child population	224,245	209,075
Difference	9,950	18,835
Official total population	1,419,561	1,295,859
Therefore estimated total population	1,429,511	1,314,694
Therefore inter-censal difference	1,030,968	926,028

Now, the inter-censal difference = Births—Deaths, during inter-censal period.

Therefore using our corrected figures for deaths, we have, for *Males :*

$$1{,}030{,}968 = \text{Births}—\frac{(1{,}477{,}748 + 5{\cdot}412\text{K} \times 1{,}477{,}748)}{100}$$

Therefore male births = 2,508,716 + 79,975·721,76K

Similarly, for *females :*

$$926{,}028 = \text{Births}—\frac{(1{,}461{,}912—9{\cdot}404\text{K} \times 1{,}461{,}912)}{100}$$

Therefore Female Births = 2,387,940 + 137,478·204, 48K

According to the birth-sex-ratio, male births : female births = 103·30 : 100

From this we get k = 0·676574

We then have, on substitution, &c.:

Table 20—Correction Factors : First Approximations

	Males	Females
Death correction factors	3·661,618%	6·362,502%
Therefore corrected deaths (total)	1,531,857	1,554,926
Therefore corrected births (total)	2,562,825	2,480,954
Registered births	2,407,941	2,316,655
Therefore birth correcting factors	6·432,217%	7·092,079%

These correcting factors (for births and deaths) are for the intercensal period 1911-1946 *as a whole*. Our problem now is to apportion the unregistered births and deaths which we have estimated for the inter-censal period as a whole to the individual years, by devising correcting factors for each year.

[1] The 1911 and 1946 child populations have been estimated on the assumption that births and deaths were equally under registered between 1911 and 1946. The details of the working leading up to the estimates are not given here, since these estimates are tentative and used as a convenient "start" to get more refined estimates of both the child populations and the inter-censal differences later (page 30).

2.—YEARLY CORRECTIONS

As we have remarked earlier, the registration of births and deaths would appear to have improved in accuracy and comprehensiveness with the years. We shall therefore try to devise a formula by which the degree of under-registration of Sinhalese births and deaths would tend to diminish fairly steadily, but not necessarily year by year (as, due to administrative as well as other causes, there may be occasionally slight lapses from efficiency in registration).

We have pointed out that the sex ratio at birth for each year indicates for that year, the under-registration of females births relative to the male births registered during that year. If we assume that there is some relationship between this measure and the actual degree of under-registration of male births, we could determine the latter for each year since we know the former.

There is, of course, no strictly logical reason to suppose that there is a rigid relationship between these two measures. But in the circumstances, in the absence of other more definitive evidence as to the actual degree of under registration of male births for each year, we adopt this measure which in spite of its limitations, is influenced by some though not all, of the social and administrative factors which influence the other measure.

We propose to estimate the degree of under-registration of male births, in the first place, as follows :

If the birth-sex-ratio for any year (or other period) is $\frac{(103\cdot30 + x)}{100}$, let the number of male births registered during the year be m. Then the number of registered females births $= \frac{100m}{103\cdot30 + x}$. The number that should have been registered in relation to the male births registered $= \frac{100m}{103\cdot30}$; therefore the number of female births unregistered

$$= \frac{100\,m}{103\cdot30} - \frac{100\,m}{103\cdot30 + x} = \frac{100\,mx}{103\cdot30\,(103\cdot30 + x)}$$

This, as a percentage of registered female births $= \frac{100\,x\%}{103\cdot30}$

Hence, since the birth-sex-ratio for the inter-censal period is 103·94, (relatively) under-registered female births from $\frac{64\ \%}{103\cdot30}$ of the registered female births.

For the same period (from Table 20 above) unregistered male births form 6·432,217 per cent. of registered male births.

Our device for finding the c.f. for male births for any year is simply this : that the percentages ($\frac{64\%}{103\cdot30}$ and 6·432,217 per cent.) which apply to the inter-censal period as a whole stand in the same proportion to each other as do the corresponding percentages for any specific year that is considered[1]. That is, if the percentage by which registered male births in any year have to be increased by $y\%$, then :

$$y : \frac{100x}{103\cdot30} = 6\cdot432,217 : \frac{64}{103\cdot30}$$

Therefore $y = 10\cdot050,339\ x\%$

On this basis the under-registration of male births for each year from 1911 to 1946 (inclusive) was estimated[2].

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[1] In other words :

$$\frac{\text{Percentage by which male births for any year have to be increased}}{\text{Corresponding percentage for whole inter-censal period } (= 6\cdot432,217\%)} \text{ is equal}$$

to

$$\frac{\text{Percentage by which female births have to be increased for the same year to satisfy the birth-sex-ratio with respect to registered male births (known)}}{\text{Corresponding percentage for whole inter-censal period } (= \frac{64\%}{103\cdot30})}$$

[2] Instead of using the birth-sex-ratio for the year considered, the mean of the birth-sex-ratio for that year, the previous and the following years (i.e., for 3 years) was used.

Then, after certain necessary adjustments,[1] the correct number of births for each year of the period 1906-1910 was estimated on the same basis[2]. (Figures for this period were necessary for estimating the child populations at the 1911 Census from the Vital statistics figures).

From the male birth figures for the year 1906-1946, the corresponding female birth figures were calculated by simply dividing the male births by 1·033.

The correct male and female death figures were estimated just as the male birth figures were estimated, since (1) the percentage by which the registered deaths (for the period 1911-46 as a whole) have to be increased is known (from Table 20), (2) the percentages by which female births have to be increased relative to registered male births for any year as well as for the whole inter-censal period are also known.

These corrected annual male and female deaths had to be " adjusted " as were male births before, and the method was " extra-polated " for the years 1906-1910.

The corrected figures for births and deaths for males and females for the periods 1906-1911 and 1941-1946 are given below as from these the first estimates of the child populations at the 1911 and 1946 Censuses were made :

Table 21—Corrected Births and Deaths : 1906–1911 and 1941–46

(1st Approximations)

	Births		*Deaths*	
	Males	*Females*	*Males*	*Females*
1906	58,890	57,009	47,779	51,677
1907	54,823	53,072	41,271	42,069
1908	65,730	63,630	40,457	41,994
1909	58,351	56,487	41,405	43,708
1910	61,126	59,173	35,806	36,560
1911	60,862	58,918	48,687	54,194
1941	78,708	76,194	39,521	37,819
1942	79,376	76,840	40,083	36,728
1943[3]	88,719	85,885	45,926	42,599
1944[3]	82,229	79,602	47,829	44,665
1945	85,228	82,505	50,953	49,590
1946	93,373	90,390	48,653	47,851

Table 22 below indicates by what percentage of the corresponding official figures the corrected figures above exceeded them.

Table 22—Percentage Corrections (increases) made with reference to Official Figures for our First Approximations

	Births		*Deaths*	
	Males	*Females*	*Males*	*Females*
1906	16·727	18·662	9·492	16·395
1907	16·526	18·589	9·378	16·197
1908	12·221	13·883	6·925	11·944
1909	12·322	12·791	6·982	12·044
1910	6·415	8·326	3·615	6·208
1911	10·820	10·557	6·126	10·560
1941	3·212	3·825	1·790	3·044
1942	1·520	1·722	0·819	1·362
1943[4]	—	—	—	—
1944[4]	—	—	—	—
1945	0·609	0·778	0·305	0·472
1946	2·311	3·123	1·276	2·153

[1] The male births, corrected for each year from 1911–1945 (inclusive), added up to 2,561,640 when according to the overall c.f there should be 2,551,599 births. Hence the figure for each year was reduced by multiplying it by $\frac{2,551,599}{2,561,640} = 0{\cdot}996,080$.

[2] This was not strictly justifiable, since the principle of our method is applicable only to the inter-censal period. But since 1906–1910 is just " outside " the period 1911–1946 extra-polation was resorted to.

[3] No corrections in births or deaths were made for the years 1943 and 1944 since the birth-sex-ratio for these years were 1·0306 and 1·0261 respectively, and the means used for determining corrections were 1·0306 and 1·0305 respectively, i.e., less than the correct ratio 1·0330.

[4] Vide footnote 3,

3.—FIRST ESTIMATES OF THE CHILD POPULATIONS AT THE CENSUSES

We may now explain how the child populations at the two Censuses were estimated from the (corrected) Vital Statistics figures.

We shall, for this require in the first place the number of births and of deaths (by age-groups under 5) for the last five 12-month-periods before Census day.

As we have figures for only calendar years, we have to first determine what percentage of these apply to the part of the year before March 10[1]. for the pre-1911 Census period, and what percentage to the part of the year after March 10; and so with regard to March 19[2]. for the pre-1946 Census period.

Unfortunately, we do not have monthly figures for the Sinhalese by sex for all the years concerned. Hence we use " substitute figures " when necessary.

As figures for 1911 period are not availabe, the mean figures relating to seasonal variation in the birth-rate for the period 1921 to 1931 (all Ceylon) have been used. Thus the following table taken from the Ceylon Registrar-General's Vital Statistics Report for 1931 (page L.13) gives :

" CEYLON BIRTH RATES BY QUARTERS, 1921 TO 1931

Quarter	*Average Rate*
1st	44·6
2nd	38·2
3rd	37·2
4th	39·8 "

On a proportionate basis therefore, about 21·39 per cent. of births would take place between January 1 and March 10 of the year, and 78·602 per cent. during the rest of the year.

Similarly, for the period 1941-46, data is not available for each month of each of the years concerned, for Sinhalese births. We therefore use the quarterly rates for the whole period 1936-45 (given in the Registrar-General's Administration Report on Vital Statistics). According to this, the crude birth rate for the 1st quarter for this period is 40·6 while for the whole year it was 146·7. On a proportionate basis therefore, approximately 23·986 per centage of the births would take place on the average before March 19 of the year ; and 76·014 per cent. after that day.

These seasonal percentages while indicating changes in the birth-rate from season to season in a year are not likely themselves to change much from year to year in a country like Ceylon where the practice of birth-control is almost unknown[3], and where therefore, the number of births in any season, expressed as a percentage of the births for the whole year, tend to remain the same for successive years[4].

This may not be so in the case of deaths, for not all diseases take their toll in the same season ; hence the seasonal variations in the death-rates one year may not be similar to those of another year. It would be therefore more risky than in the case of births to calculate the separation percentages for the years we are interested in from the separation percentages for other years. But fortunately, we have more details for determining the seasonal variation in deaths than we had in the case of births.

In Table 23 the actual numbers of deaths (for Sinhalese males and females together) during January, February and March of each of the years 1906-1911 are given together with the annual figures. This enables us to calculate the separation percentages for deaths for each year before and after March 10. The separation factors so obtained are applied to Sinhalese males and females separately later.

Similarly for the 1946 period (vide Table 24). Figures were not available for the Sinhalese but for all races (both sexes) together for the years 1941-44 and 1946. For 1945, monthly figures were not available but only quarterly rates.

The separation factors so obtained are used in Table 25 which illustrates (Sinhalese male deaths, 1941-46) how deaths in the age-groups " under 5 " have been estimated for 12 month-periods ending on March 19 for each year 1942-46, corrections being made for under-registration.

But first we may explain how we have dealt with under-registration of infant deaths. For the correcting factors we devised for the under-registration of deaths were " general " correcting factors applicable to deaths *of all ages* as a whole for the year and population group concerned. Thus we estimated that registered Sinhalese male deaths in 1941 have to be increased (as a whole) by 1·79 per cent. (vide Table 22 on page 26).

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[1] The 1911 Census was taken on March 10.

[2] The 1946 Census was taken on March 19.

[3] i.e., the reproductive habits of the population are less " under control " and therefore tend to follow the same pattern every year.

[4] In fact, the percentages (above) that we propose to use for the 1911 and 1946 periods differ very little (by less than 1%) between themselves if calculated for (say), the 1st quarter of the year.

Table 23.—Deaths by Months, Sinhalese, 1906–1911

	1906	1907	1908	1909	1910	1911
March 1–31	5,892	7,049	6,097	7,305	5,230	6,886
March 1–10 [1]	1,901	2,274	1,967	2,356	1,687	4,443
January (whole)	7,996	9,911	7,076	9,994	6,334	7,549
February (whole)	5,974	7,870	6,320	7,923	5,308	7,105
January 1–March 10	15,871	20,055	15,363	20,273	13,329	19,097
January 1–December 31	88,035	73,938	75,349	77,713	68,980	94,894
March 11–December 31	72,164	53,883	59,986	57,440	55,651	75,797
January 1–March 10 (%)	18·0	27·1	20·4	26·1	19·3	20·1
March 11–December 31 (%)	82·0	72·9	79·6	73·9	80·7	79·9

[1]Deaths during March 1–10 are calculated on a proportionate basis from " March 1–31 " figures.

Table 24.—Deaths by Months, 1941–46, All Races, both Sexes

	1941	1942	1943	1944	1945	1946
March 1–31	9,695	8,967	10,151	10,678		14,138
Therefore, March 1–19	5,942	5,496	6,222	6,545	24·8	8,666
January 1–31	13,246	11,720	10,849	12,918		19,392
February 1–28	10,909	10,462	10,601	12,691		16,197
Therefore, January–March 19	30,097	27,678	27,672	32,154	21·493	44,254
Whole year	113,003	112,044	131,061	133,985	87·8	135,937
Therefore, March 20–December 31	82,906	84,366	103,389	101,831		91,683
January 1–March 19 (%)	26·634	24·703	21·114	23·998	24·479	32·555
March 20–December 31 (%)	73·366	75·297	78·886	76·002	75·521	67·445

Table 25.—Sinhalese Male Deaths, 1941–46 (First Approximations)

Row			1941	1942	1943	1944	1945	1946
1	Total registered deaths		38,826	39,758	45,926	47,829	50,797	48,040
2	General deaths increase p. c.		1·790	0·819	—	—	0.305	1·276
3	Therefore unregistered deaths		695	326	—	—	155	613
4	Registered infant deaths		9,666	9,313	11,559	11,171	12,120	12,923
5	Birth p. c. for increasing infant deaths		3·212	1·520	—	—	0.609	2·311
6	Therefore unregistered infant deaths		310	142	—	—	74	299
7	Therefore unregistered non-infant deaths		385	184	—	—	81	314
8	Registered non-infant deaths		29,160	30,445	34,367	36,658	38,677	35,117
9	Unregistered non-infant deaths as p. c. of registered non-infant deaths		1·320	0·604	—	—	0.209	0.894
10	Registered deaths	0 +	9,666	9,313	11,559	11,171	12,120	12,923
11		1 +	1,725	1,517	2,104	2,588	2,416	2,272
12		2 +	1,608	1,435	1,918	2,537	2,585	2,222
13		3 +	1,382	1,316	1,778	2,120	2,078	1,856
14		4 +	880	853	1,190	1,411	1,225	1,095
15		All ages	38,826	39,758	45,926	47,829	50,797	48,040
16	Registered + unregistered deaths	0 +	9,976	9,455	11,559	11,171	12,194	13,222
17		1 +	1,748	1,526	2,104	2,588	2,421	2,292
18		2 +	1,629	1,444	1,918	2,537	2,590	2,242
19		3 +	1,400	1,324	1,778	2,120	2,082	1,873
20		4 +	892	858	1,190	1,411	1,228	1,105
21		All ages	39,521	40,083	45,926	47,829	50,953	48,653
22	Separation factors	J–M	26·634	24·703	21·114	23·998	24·479	32·555
23	Do.	M–D	73·366	75·297	78·886	76·002	75·521	67·445
24	0 +	J–M	2,657	2,336	2,441	2,681	2,985	4,304
25		M–D	7,319	7,119	9,118	8,490	9,209	8,918
26	1 +	J–M	466	377	444	621	593	746
27		M–D	1,282	1,149	1,660	1,967	1,828	1,546
28	2 +	J–M	434	357	405	609	634	730
29		M–D	1,195	1,087	1,513	1,928	1,956	1,512
30	3 +	J–M	373	327	375	509	510	610
31		M–D	1,027	997	1,403	1,611	1,572	1,263
32	4 +	J–M	238	212	251	339	301	360
33		M–D	654	646	939	1,072	927	745

Row				1941	1942	1943	1944	1945	1946
34	All ages	J–M	.. ..	10,526	9,902	9,697	11,478	12,473	15,839
35		M–D	.. ..	28,995	30,181	36,229	36,351	38,480	32,814
	Therefore deaths corrected for 12 month-period ending on March 19 :								
36	0 +	..	.. ..	—	9,655	9,560	11,799	11,475	13,513
37	1 +	..	.. ..	—	1,659	1,593	2,281	2,560	2,574
38	2 +	..	.. ..	—	1,552	1,492	2,122	2,562	2,686
39	3 +	..	.. ..	—	1,354	1,372	1,912	2,121	2,182
40	4 +	..	.. ..	—	866	897	1,278	1,373	1,287
41	All ages	..	.. ..	—	38,897	39,878	47,707	48,824	54,319

Note.—The figures in this table were themselves revised before the final computation of the child population. This table is given here to explain the first computation and the general method adopted to estimate deaths for the twelve-month periods concerned. The above and related figures appear in their final revised form in Tables 30 to 33.

But it is well known that infant-deaths are under-registered to a greter extent than non-infant deaths. The deaths of children who die in their first week or even month of life often escape registration. This tends to swell up the number of unregistered deaths among infants.

Since no survey has been taken in Ceylon to determine the extent of under-registration of infant deaths, we are taking the degree of such under-registration to be equal to that of births in the same period.

Thus, in the case of Sinhalese males (1941), we have estimated that births have to be increased by 3·212 per cent. (vide Table 22 on page 26). We therefore increase registered infant deaths by the same percentage (vide Table 25, row 5, under 1941).

In this table, by applying the percentage Row 2 to the registered deaths in Row 1, we get unregistered deaths (all ages) in Row 3. By applying the birth-increase percentages in Row 5 to (registered) infant deaths in Row 4, we get the unregistered infant deaths in Row 6. By deducting this Row from Row 3, we get unregistered non-infant deaths in Row 7. This is then found as a percentage (in Row 9) of registered non-infant deaths which are in Row 8.

The percentages in Row 9 are then applied to the registered deaths (in Rows 11 to 14) to give the corresponding corrected figures in Rows 17 to 20 ; while the percentages in Rows 5 and 2 are applied to Rows 10 and 15 respectively.

We have thus corrected deaths in the relevant age groups for the calendar years. The deaths-separation-factors for the periods (i) January 1-March 19 and (ii) March 20-December 31 of the years concerned, obtained from Table 24, are given in Rows 22 and 23 respectively. Thus Rows 26-35 are similarly obtained.

We can now estimate the deaths in the required age-groups for each twelve-month period ending on March 19 of the years 1942-1946. Thus, the number of deaths of Sinhalese male children in the " 3+ " age-group during the 12 month period ending on March 19, 1945 (viz. : 2121 in Row 39 under year 1945) is obtained by adding the number of " 3+ " deaths during March 20-December 31, 1944 (i.e., 1611 in Row 31) + deaths during January 1-March 19, 1945 (i.e., 510 in Row 30).

Thus the other figures also in Rows 36 to 41 are obtained.

The births for 12 month-periods have been similarly computed.

The child population at the two censuses were then estimated as follows :—

$$P_0 = B^t - 0.7\, d_0^t$$

$$P_1 = B^{t-1} - 0.7 \times d_0^{t-1} - 0.3 \times d_0^t - 0.5 \times d_1^t$$

$$P_2 = B^{t-2} - 0.7 \times d_0^{t-2} - 0.3 \times d_0^{t-1} - 0.5 \times d_1^{t-1} - 0.5 \times d_1^t - 0.5\, d_2^t$$

$$P_3 = B^{t-3} - 0.7 \times d_0^{t-3} - 0.3 \times d_0^{t-2} - 0.5 \times d_1^{t-2} - 0.5 \times d_1^{t-1} - 0.5 \times d_2^{t-1} - 0.5\, d_2^t - 0.5 \times d_3^t$$

$$P_4 = B^{t-4} - 0.7 d_0^{t-4} - 0.3 \times d_0^{t-3} - 0.5 \times d_1^{t-3} - 0.5 \times d_1^{t-2} - 0.5 \times d_2^{t-2} - 0.5 \times d_2^{t-1} - 0.5 \times d_3^{t-1} - 0.5 \times d_3^t - 0.5 \times d_4^t$$

where p_r represents the population that has completed r years of life and the superscript of the d's represents the year of occurrence of death (e.g. t-r the year ending r years before census date) and the subscript the age-group.

The above formulae are based on the assumptions that : (i) mortality occurs evenly throughout the year during the 2nd and subsquent years of life and (ii) about 3/10ths of the children under one who die during a year would have been born in the previous year.

Neither assumption is quite correct[1], but where, as in Ceylon, during the period concerned, deaths have not been concentrated in any short period during the time concerned (as might happen if there had been an epidemic of short duration), and the number of births remains fairly uniform from year to year (and not, for instance, rapidly declining as in some western countries where birth control is widely practised), no serious error may be introduced by these assumptions[2].

Using the above formulae, therefore, for estimating the child populations concerned, we obtain the figures in Table 26.

Table 26.—Estimates of the Sinhalese Child Populations at the 1911 and 1946 Censuses (2nd Approximation)

	Males	*Females*
1911 Census	234,750	225,245
1946 Census	346,264	334,899

4—FINAL ESTIMATES OF CHILD POPULATION

As these estimates are different from our earlier, and rather arbitrary estimates[3] of the child populations, the new figures we would obtain for inter-censal increase and the correcting factors for births and deaths under-registration would differ from our earlier ones (in Table 20). The new figures arrived at by the same method as before are as follows :—

Table 27.—Correcting for inter-censal births and deaths (1st and 2nd estimates compared)

	New Figures (2nd Approxn.)	*Old Figures (1st approxn.)*	*New Figures as percentage of old figures*
Deaths—Males	3·295,654%	3·661,618%	90.005%
Females	5·726,594%	6·362,502%	90.005%
Births—Males	6·081,960%	6·432,217%	94.555%
Females	6·739,674%	7·092,079%	95.031%

This would mean that our earlier estimate of the child population and the correcting factors it gave rise to (for births and deaths) logically led to new estimates of child population and birth and death-correcting factors different from the original ones the difference in degree being indicated in the above table. If, for instance, the first estimates had been perfectly accurate, the second set of c.ff. would be identical with the first set. As it is they differ by from about 5 per cent to 10 per cent. This difference is perhaps not very much in absolute terms, since it is the percentage (difference) of a percentage (increase in births or deaths registered). But since we are going to construct Life Tables, &c., based on figures determined by these correcting factors, we are approximating further to obtain results which may be more consistent with each other.

Accordingly, we proceed as before, and determine from the second set of births-and deaths-correcting factors discussed above, new corrected figures for Sinhalese male and female births and deaths for each year of the period 1906 to 1946. After the necessary adjustments, we estimate the child populations from these as before, making allowances for seasonal variations in the birth-and death-rates, &c. We then obtain the following child-population figures :—

Table 28.—Estimates of Sinhalese, Child Population at the 1911 and 1946 Censuses [4] (3rd Approximation)

1911 Census	232,810	223,115
1946 Census	346,592	335,192

---

[1] For example, a slightly larger number of children are more likely to die during the first six months of the second year of their life than during the last six months, but this unevenness will probably not affect our estimates appreciably, as would, for instance, the assumption (which we are not making) that deaths were evenly distributed during the first year of life.

[2] C. I. D. V. Glass, *A note on the under-registration of Births in Britain in the 19th Century*—Population Studies, Vol V, No. 1—July, 1951.

Also, 1911 Census of England and Wales, Vol. VII, PP. XXXI–XXXII. Cf. V. Valaoras' article *Refined Rates of Infant and Childhood Mortality* in Population Studies, Vol IV, No 3, December, 1950

[3] Vide Table 19 on page 24.

[4] Details of these child population figures by each year of age are in Tables 48 to 51.

From these we get our third set of correcting factors, as follows :—

Table 29.—Third set of correcting factors for Births and Deaths (compared with the earlier sets of C.FF)

	New C. FF. (3rd Approxn.)	*New C.FF. (as percentage 2nd set of C.FF.)*	*2nd set of C.FF. as percentage of 1st set*
Deaths—Males	3·275,115	99·4%	90·0%
Females	5·690,905	99·4%	90·0%
Births—Males	6·163,565	101·3%	94·6%
Females	6·821,732	101·2%	95·0%

The above table shows how close the 3rd set of correcting factors are to the 2nd set. In other words, our second set of approximations have given rise to relationships that are alomost perfectly consistent with each other. Male births, for instance, had to be increased from 1,000 to 1,064 on our first assumption, but this seemed to imply at the same time that 1,061 was the correct figure ; this discrepancy (of 3 in 1,000) appeared a little too high, and so we " tried " the 2nd figure (1061) which in turn implied that 1,062 was correct. The discrepancy here (really less than 1 in 1,000), we regard as quite negligible. So with female births. And in the case of deaths (both male and female) these discrepancies are even smaller, being indeed closer to 0 than to 1 in a thousand[1].

We are therefore treating the general correcting factors for the under-registration of births and deaths for the inter-censal period (given in table 27), obtained on our second set of approximations, as correct. And we shall use the results that follow from these C. FF.—viz., estimates of the child population, inter-censal differences and correcting factors for births and deaths for single years—to construct Life Tables for Sinhalese males and females for both the 1911 and the 1946 periods.

Tables 30 to 34 and 36 and 37 give the corrected as well as uncorrected figures of births and deaths by sex, for each year ; also the tables showing the preparation of the final child population estimates.

Table 30—Sinhalese Male Deaths—1911 Period*

		1906	*1907*	*1908*	*1909*	*1910*	*1911*
Total registered deaths (all ages)		43,637	37,733	37,836	38,703	34,557	45,876
General deaths increase p.c.		8·188	8·094	6·034	6·082	3·256	5·364
Therefore unregistered deaths (all ages)							
Registered infant deaths		9,621	8,112	10,196	9,982	9,495	11,818
Births p.c. for increasing infant deaths		15·203	15·025	11·202	11·291	6·046	9·958
Therefore unregistered infant deaths							
Therefore unregistered non-infant deaths							
Registered non-infant deaths							
Unregistered non-infant deaths as p.c. of registered non-infant deaths		6·203	6·195	4·128	4·272	2·199	3·770
Registered deaths	0 +	9,621	8,112	10,196	9,982	9,495	11,818
	1 +	2,411	1,710	1,750	1,885	1,631	2,495
	2 +	2,280	1,800	1,786	1,728	1,612	2,208
	3 +	2,571	1,922	1,841	1,881	1,489	2,398
	4 +	1,703	1,384	1,258	1,327	948	1,454
	All ages	43,637	37,733	37,836	38,703	34,557	45,876
Registered and unregistered deaths	0 +	11,084	9,331	11,338	11,109	10,069	12,995
	1 +	2,561	1,806	1,822	1,966	1,667	2,589
	2 +	2,421	1,912	1,860	1,802	1,647	2,291
	3 +	2,730	2,041	1,917	1,961	1,522	2,488
	4 +	1,809	1,470	1,310	1,384	969	1,509
	All ages	47,210	40,787	40,119	41,057	35,682	48,337
Separation factors : J–M		18·0	27·1	20·4	26·1	19·3	20·1
M–D		82·0	72·9	79·6	73·9	80·7	79·9

[1] It may be noted that these correcting factors follow the general pattern of inequality in such cases ; thus birth under-registration is greater than death under-registration for both males and females ; also, the male correcting factors are less than the females correcting factors in the case of both births and deaths.

* Some of the figures showing the " working " do not appear in this table, but all the essential figures are included.

		1906	1907	1908	1909	1910	1911
0 +	J–M	1,995	2,529	2,313	2,899	1,943	2,612
	M–D	9,089	6,802	9,025	8,210	8,126	10,383
1 +	J–M	461	489	372	513	322	520
	M–D	2,100	1,317	1,450	1,453	1,345	2,069
2 +	J–M	436	518	379	470	318	460
	M–D	1,985	1,394	1,481	1,332	1,329	1,831
3 +	J–M	491	553	391	512	294	500
	M–D	2,239	1,488	1,526	1,449	1,228	1,988
4 +	J–M	326	398	267	361	187	303
	M–D	1,483	1,072	1,043	1,023	782	1,206
All ages	J–M	8,498	11,053	8,184	10,716	6,887	9,716
	M–D	38,712	29,734	31,935	30,341	28,795	38,621
Therefore deaths corrected for 12-month period ending on March 10 :							
0 +		—	11,618	9,115	11,924	10,153	10,738
1 +		—	2,589	1,689	1,963	1,775	1,865
2 +		—	2,503	1,773	1,951	1,650	1,789
3 +		—	2,792	1,879	2,038	1,743	1,728
4 +		—	1,881	1,339	1,404	1,210	1,085
All ages		—	49,765	37,918	42,651	37,228	38,511

Table 31—Sinhalese Female Deaths—1911 Period

		1906	1907	1908	1909	1910	1911
Total registered deaths (all ages)		44,398	36,205	37,513	39,010	34,423	49,018
General deaths increase p.c.		14·085	13·920	10·378	10·461	5·600	9·224
Therefore unregistered deaths (all ages)		6,253	5,040	3,893	4,081	1,928	4,521
Registered infant deaths		9,054	7,358	9,375	9,447	8,461	11,205
Births p. c. for increasing infant deaths		17·112	17·060	12·849	11·757	7·951	10·628
Therefore unregistered infant deaths		1,549	1,255	1,205	1,111	673	1,191
Therefore unregistered non-infant deaths		4,704	3,785	2,688	2,970	1,255	3,330
Registered non-infant deaths		35,344	28,847	28,138	29,563	25,962	37,813
Unregistered non-infant deaths expressed as a p. c. of registered non-infant deaths		13·309	13·121	9·553	10·046	4·834	8·806
Registered deaths: 0 +		9,054	7,358	9,375	9,447	8,461	11,205
1 +		2,688	1,936	2,019	2,113	1,786	2,885
2 +		2,908	2,135	2,127	2,182	2,045	2,762
3 +		3,141	2,209	2,221	2,356	1,796	2,866
4 +		2,057	1,521	1,508	1,574	1,158	1,720
All ages		44,398	36,205	37,513	39,010	34,423	49,018
Therefore: Registered and unregistered deaths: 0 +		10,603	8,613	10,580	10,558	9,134	12,396
1 +		3,577	2,190	2,212	2,325	1,872	3,139
2 +		3,870	2,415	2,330	2,401	2,144	3,005
3 +		4,180	2,499	2,433	2,593	1,883	3,118
4 +		2,738	1,721	1,652	1,732	1,214	1,871
All ages		50,651	41,245	41,406	43,091	36,351	53,539
Separation factors :	J–M	18·0	27·1	20·4	26·1	19·3	20·1
	M–D	82·0	72·9	79·6	73·9	80·7	79·9
0 +	J–M	1,909	2,334	2,158	2,756	1,763	2,492
	M–D	8,694	6,279	8,422	7,802	7,371	9,904
1 +	J–M	644	593	451	607	361	631
	M–D	2,933	1,597	1,761	1,718	1,511	2,508
2 +	J–M	697	654	475	627	414	604
	M–D	3,173	1,761	1,855	1,774	1,730	2,401
3 +	J–M	752	677	496	677	363	627
	M–D	3,428	1,822	1,937	1,916	1,520	2,491
4 +	J–M	493	466	337	452	234	376
	M–D	2,245	1,255	1,315	1,280	980	1,495
All ages	J–M	9,117	11,177	8,447	11,247	7,016	10,761
	M–D	41,534	30,068	32,959	31,844	29,335	42,778
Therefore : Deaths corrected for 12-month period ending on March 10 :							
0 +		—	11,028	8,437	11,178	9,565	9,863
1 +		—	3,526	2,048	2,368	2,079	2,142
2 +		—	3,827	2,236	2,482	2,188	2,334
3 +		—	4,105	2,318	2,614	2,279	2,147
4 +		—	2,711	1,592	1,767	1,514	1,356
All ages		—	52,711	38,515	44,206	38,860	40,096

Table 32—Sinhalese Male Deaths—1946 Period

		1941	1942	1943	1944	1945	1946
Total registered deaths (all ages)		38,826	39,758	45,926	47,829	50,797	47,040
General deaths increase p.c.		1·724	0·910	—	—	0·479	1·294
Therefore unregistered deaths (all ages)		669	362	—	—	243	622
Registered infant deaths		9,666	9,313	11,559	11,171	12,120	12,923
Birth p. c. for increasing infant deaths		3·201	1·698	—	—	0·889	2·401
Therefore unregistered infant deaths		309	158	—	—	108	310
Therefore unregistered non-infant deaths		360	204	—	—	135	312
Registered non-infant deaths		29,160	30,445	—	—	38,677	35,117
Unregistered non-infant deaths as p.c. of registered non-infant deaths		1·235	0·670	—	—	0·349	0·888
Registered deaths	0 +	9,666	9,313	11,559	11,171	12,120	12,923
	1 +	1,725	1,517	2,104	2,588	2,416	2,272
	2 +	1,608	1,435	1,918	2,537	2,585	2,222
	3 +	1,382	1,316	1,778	2,120	2,078	1,856
	4 +	880	853	1,190	1,411	1,225	1,095
	All ages	38,826	39,758	45,926	47,829	50,797	48,040
Registered and unregistered deaths	0 +	9,975	9,471	11,559	11,171	12,228	13,233
	1 +	1,746	1,527	2,104	2,588	2,424	2,292
	2 +	1,628	1,445	1,918	2,537	2,594	2,242
	3 +	1,399	1,325	1,778	2,120	2,085	1,872
	4 +	891	859	1,190	1,411	1,229	1,105
	All ages	39,495	40,120	45,926	47,829	51,040	48,662
Separation factors :	J–M	26·634	24·703	21·114	23·998	24·479	32·555
	M–D	73·366	75·297	78·886	76·002	75·521	67·445
0 +	J–M	2,657	2,340	2,441	2,681	2,993	4,308
	M–D	7,318	7,131	9,118	8,490	9,235	8,925
1 +	J–M	465	377	444	621	593	746
	M–D	1,281	1,150	1,660	1,967	1,831	1,546
2 +	J–M	434	357	405	609	635	730
	M–D	1,194	1,008	1,513	1,928	1,959	1,512
3 +	J–M	373	327	375	509	510	609
	M–D	1,026	998	1,403	1,611	1,575	1,263
4 +	J–M	237	212	251	339	301	360
	M–D	654	647	939	1,072	928	745
All ages	J–M	10,519	9,911	9,697	11,478	12,494	15,842
	M–D	28,976	30,209	36,229	36,351	38,546	32,820
Therefore deaths corrected for 12-month period ending on March 19 :							
0 +		—	9,658	9,572	11,799	11,483	13,543
1 +		—	1,658	1,594	2,281	2,560	2,577
2 +		—	1,551	1,493	2,122	2,563	2,689
3 +		—	1,353	1,373	1,912	2,121	2,184
4 +		—	866	898	1,278	1,373	1,288
All ages		—	38,887	39,906	47,707	48,845	54,388

Table 33—Sinhalese Female Deaths—1946 Period

		1941	1942	1943	1944	1945	1946
Total registered deaths (all ages)		36,702	36,235	42,599	44,665	49,357	46,843
General deaths increase, p. c.		2·965	1·565	—	—	0·824	2·224
Therefore unregistered deaths (all ages)							
Registered infant deaths		8,655	8,168	10,301	9,984	10,968	11,814
Births p. c. for increasing infant deaths		3·814	1·901	—	—	1·059	3,213
Therefore unregistered infant deaths							
Therefore unregistered non-infant deaths							
Registered non-infant deaths							
Unregistered non-infant deaths as p.c. of registered non-infant deaths		2·703	1·468	—	—	0·758	1·890
Registered deaths	0 +	8,655	8,168	10,301	9,984	10,968	11,814
	1 +	1,882	1,667	2,317	2,951	2,852	2,715
	2 +	2,007	1,660	2,401	3,058	3,207	2,679
	3 +	1,630	1,703	2,366	2,521	2,570	2,198
	4 +	1,074	1,047	1,439	1,654	1,561	1,277
	All ages	36,702	36,235	42,599	44,665	49,357	46,843

		1941	1942	1943	1944	1945	1946
Registered and unregistered deaths	0 +	8,985	8,323	10,301	9,984	11,084	12,194
	1 +	1,933	1,691	2,317	2,951	2,874	2,766
	2 +	2,061	1,684	2,401	3,058	3,231	2,730
	3 +	1,674	1,728	2,366	2,521	2,589	2,240
	4 +	1,103	1,062	1,439	1,654	1,573	1,301
	All ages	37,790	36,802	42,599	44,665	49,764	47,885
Separation factors :	J–M	26·634	24·703	21·114	23·998	24·479	32·555
	M–D	73·366	75·297	78·886	76·002	75·521	67·445
0 +	J–M	2,393	2,056	2,175	2,396	2,713	3,970
	M–D	6,592	6,267	8,126	7,588	8,371	8,224
1 +	J–M	515	418	489	708	704	900
	M–D	1,418	1,273	1,828	2,243	2,170	1,866
2 +	J–M	549	416	507	734	791	889
	M–D	1,512	1,268	1,894	2,324	2,440	1,841
3 +	J–M	446	427	500	605	634	729
	M–D	1,228	1,301	1,866	1,916	1,955	1,511
4 +	J–M	294	262	304	397	385	424
	M–D	809	800	1,135	1,257	1,188	877
All ages	J–M	10,065	9,091	8,994	10,719	12,182	15,589
	M–D	27,725	27,711	33,605	33,946	37,582	32,296
Therefore deaths corrected for 12-month period ending on March 10 :							
0 +		—	8,648	8,442	10,522	10,301	12,341
1 +		—	1,836	1,762	2,536	2,947	3,070
2 +		—	1,928	1,775	2,628	3,115	3,329
3 +		—	1,655	1,801	2,471	2,550	2,684
4 +		—	1,071	1,104	1,532	1,642	1,612
All ages		—	36,816	36,705	44,324	46,128	53,171

Table 34—Sinhalese Births (Final Corrections)

The female figures below are deduced from the male figures below.

1941–1946	1941	1942	1943	1944	1945	1946
Corrected births (males)	78,700	79,515	88,719	82,229	85,465	93,454
Separation factors :						
J–M	23·986	23·986	23·986	23·986	23·986	23·986
M–D	76·014	76·014	76·014	76·014	76·014	76·014
Therefore corrected births (males) :						
J–M	18,877	19,072	21,280	19,723	20,800	22,416
M–D	59,823	60,443	67,439	62,506	64,965	71,038
Births adjusted for 12-month period ending on "Census Day"	—	B^{t-4} =	B^{t-3} =	B^{t-2} =	B^{t-1} =	B^{t} =
MALES	—	78,895	81,723	87,162	83,006	87,381
FEMALES	—	76,375	79,112	84,378	80,354	84,590

1906–1911	1906	1907	1908	1909	1910	1911
Corrected births (males)	58,121	54,117	65,133	57,816	60,914	60,902
Separation factors :						
J–M	21·398	21·398	21·398	21·398	21·398	21·398
M–D	78·602	78·602	78·602	78·602	78·602	78·602
Therefore corrected births (Males)						
J–M	12,437	11,580	13,937	12,371	13,034	13,032
M–D	45,684	42,537	51,196	45,445	47,880	47,870
Births adjusted for 12-month period ending on "Census Day"	—	B^{t-4} =	B^{t-3} =	B^{t-2} =	B^{t-1} =	B^{t} =
MALES	—	57,264	56,474	63,567	58,479	60,912
FEMALES	—	55,435	54,670	61,536	56,611	58,966

5—SINHALESE LIFE TABLES FOR THE 1911 AND 1946 PERIODS

We propose to construct Life Tables for Sinhalese males and females separately using the estimated Sinhalese mid-year population of 1911 and 1946, and the corrected deaths during the 3-year periods 1910–12 and 1945–47.

The mid-year populations have been estimated as follows :—Since the Censuses were taken in March, and the child population was under-enumerated, (i) the Census child-population was replaced by this corrected child-population ; (ii) the number of births and deaths, and hence the natural increase, of the Sinhalese population was estimated for the interval between Census day and mid-year on a proportionate basis with reference to the natural increase for the whole year ; (iii) the natural increase for this short period was then proportionately distributed between the different age-groups[1].

In correcting the registered deaths for the three-year periods 1910–12 and 1945–47, different correcting factors were used for infant and non-infant deaths, as illustrated earlier in Table 25. The actual correcting factors used appear in Tables 30 to 33 (for 1910, 1911, 1945 and 1946 among other years). The corresponding C.ff. for 1912 and 1947 are given below :—

Table 35—Deaths-correcting factors (Increase percentages over registered figures) for 1912 and 1947

	1912		*1947*	
	Males	*Females*	*Males*	*Females*
All ages	4·454	7·660	0·910	1·565
Infants	8·269	10·108	1·698	1·565
Non-infants	3·304	6·997	0·588	1·565

The mortality figures for the calendar years 1910–12 and 1945–47 (given in the Registrar-General's Administration Reports for the relevant years) were corrected for each age group according to these C.ff. and the mean figures obtained for the two periods.

The Reed-Merrell method for constructing abridged Life Tables[2] was used for constructing Life Tables for the Sinhalese, for both males and females, for the 1911 and 1946 periods. The following age-classification was used : 0+, 1+, 2 to 4+, 5 to 14+, 15 to 24+, and so on by 10-year intervals.

The average annual death-rates were accordingly found for each of these age-groups by dividing the average annual number of deaths (for the three-year periods mentioned) by the corresponding mid-year population[3].

For the 1911 period it was not possible to do this beyond the 65th year, since the Census population figures were not classifiable in 10-year groups beyond that age. For this period, therefore, the average annual (specific death-rates) $({}_{n}M_{x})$ and the other values of $({}_{n}Q_{x})$ and l_x were calculated up to the 65th year. The values of l_x were then plotted on a graph, and the curve was extended to touch the age-line (x–axis) at about the 90th year point. The curve was terminated virtually at the 90th year after a comparison with Indian[4], West Indian and other comparable Life Tables and curves.

In the case of the 1946 population figures, age-classification had gone up to 100 years. Our l_x's and other Life-table values were accordingly prepared up to the 100th year

The principal Life Table values obtained for the 1911 and 1946 periods are given in Tables 46 and 47[5].

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[1] Vide Tables 48 to 51 on pp. 41 to 43.

[2] *A short method for constructing an abridged Life Table* by Lowell J. Reid and Margaret Merrell (The American Journal of Hygiene, Vol. 30, No. 2, September, 1939).

[3] No graduation of the population or of deaths was attempted as it was expected that mis-statements of age in both the Census and the mortality tables would be somewhat similar, and would largely " neutralise " each other—the more so, as 10-year (and not 5-year) age-groups were taken after the 5th year of age.

The graph for values of l_x derived for the " under 5 " groups (viz. " 0+ ", " 1+ ", and " 2 to 4+ ") showed almost the same gradient between l_1 and l_2 as between l_2 and l_5, the " l_1 to l_2 " portion of the curve not " harmonising " well with the " l_0 to l_1 " part. A smoother and more plausible curve was obtained by joining l_0, l_1 and l_5, ignoring l_2. But the resultant change in the total expectation of life was less than half a month. The original figures were therefore retained.

[4] Vide Tables 88 and 90 in Kingsley Davis' *Population of India and Pakistan* (Princeton University Press, 1951).

[5] Cf. Sarkar's Life Tables for the population of Ceylon. His values for e_x (at birth) are :

	Males	*Females*
1910–12	33·43 years	29·30 years
1945–47	46·82 years	44·80 years

But these figures cannot strictly be compared with ours since (1) they are for Ceylon (all races) and not specifically for the Sinhalese ; (2) he has not made any corrections for the under-enumeration of the child populations at the Censuses or for the under-registration of deaths (N. K. Sarkar : *A note on abridged Life Tables for Ceylon, 1900–47* in Population Studies, Vol. IV, No.4, March 1951, pp. 439–443).

Table 36—Sinhalese Births, 1901–1948, before and after correction. (Corrections for years before 1911 and after 1946 have been made by extra-polation)

Year	*Registered Births*			*Corrected Births*		*Correction (increase) as Percentage of registered Births (for some years)*	
	Males	*Females*	*Ratio : Males to 100 Females*	*Males*	*Females*	*Males*	*Females*
1900 ..	50,281	48,131	104·47	—	—	—	—
1901 ..	49,365	46,897	105·26	59,109	57,221	19·739	—
1902 ..	52,877	49,920	105·92	63,361	61,337	19·827	—
1903 ..	54,783	51,964	105·42	65,937	68,831	20·360	—
1904 ..	53,675	50,911	105·43	63,033	61,019	17·435	—
1905 ..	56,144	53,531	104·88	65,130	63,049	16·005	17·780
1906 ..	50,451	48,043	105·01	58,121	56,264	15·203	17·112
1907 ..	47,048	44,753	105·13	54,117	52,388	15·025	17·060
1908 ..	58,572	55,873	104·83	65,133	63,052	11·202	12·849
1909 ..	51,950	50,081	103·73	57,816	55,969	11·291	11·757
1910 ..	57,441	54,625	105·16	60,914	58,968	6·046	7·951
1911 ..	54,920	53,292	103·05	60,902	58,956	9·958	10·628
1912 ..	47,923	45,616	105·06	51,885	50,227	8·269	10·108
1913 ..	58,462	55,907	104·57	64,440	62,381	10·225	11·580
1914 ..	57,864	55,788	103·72	64,090	62,043	10·759	11·121
1915 ..	58,053	55,163	105·24	64,392	62,335	10·919	—
1916 ..	61,487	58,771	104·62	67,719	65,556	10·135	—
1917 ..	63,991	61,858	103·45	67,860	65,692	6·046	—
1918 ..	63,134	60,777	103·88	66,052	63,942	4·622	—
1919 ..	56,404	54,163	104·14	58,661	56,787	4·001	—
1920 ..	54,840	53,130	103·22	56,254	54,457	2·578	—
1921 ..	64,371	62,257	103·40	65,687	63,589	2·044	—
1922 ..	63,070	60,670	103·96	65,089	63,010	3·201	—
1923 ..	62,868	60,666	103·63	66,501	64,377	5·779	—
1924 ..	62,685	60,125	104·26	66,809	64,675	6·579	—
1925 ..	69,354	66,531	104·24	73,547	71,197	6·046	—
1926 ..	72,228	69,821	103·45	77,494	75,018	7·231	—
1927 ..	73,221	69,945	104·68	78,299	75,798	6·935	—
1928 ..	76,007	73,001	104·12	83,509	80,841	9·870	—
1929 ..	69,919	66,949	104·44	75,763	73,343	8·358	—
1930 ..	73,138	70,223	104·15	78,926	76,405	7·914	—
1931 ..	70,733	68,021	103·99	75,576	73,162	6·847	—
1932 ..	70,778	68,007	104·07	77,890	75,402	10·048	—
1933 ..	75,379	71,637	105·22	83,220	80,561	10·402	—
1934 ..	73,957	71,023	104·13	82,308	79,679	11·292	—
1935 ..	66,946	64,141	104·37	72,780	70,455	8·714	—
1936 ..	66,872	64,094	104·33	72,580	70,261	8·536	—
1937 ..	77,942	74,882	104·09	83,002	80,350	6·492	—
1938 ..	73,241	70,644	103·68	76,041	73,612	0·507	—
1939 ..	74,347	71,889	103·42	75,999	73,571	2·222	—
1940 ..	73,153	70,635	103·56	75,299	72,894	2·934	3·198
1941 ..	76,259	73,387	103·91	78,700	76,186	3·201	3·814
1942 ..	78,187	75,539	103·51	79,515	76,975	1·698	1·901
1943 ..	88,719	86,081	103·06	88,719	85,885	—	—
1944 ..	82,229	80,140	102·61	82,229	79,602	—	—
1945 ..	84,712	81,868	103·47	85,465	82,735	0·889	1·059
1946 ..	91,263	87,653	104·12	93,454	90,469	2·401	3·213
1947 ..	96,516	93,608	103·11	98,155	95,019	1·698	1·507
1948 ..	101,345	98,170	103·23	101,345	98,107	—	—
1949 ..	104,621	101,072	103·51	—	—	—	—

Table 37—Sinhalese Deaths, 1901–1948, before and after correction. (Corrections for years before 1911 and after 1946 have been made by extra-polation)

Year	Registered Deaths		Corrected Deaths		Correction (increase) as percentage of registered deaths (for selected years)	
	Males	Females	Males	Females	Males	Females
1900	31,974	33,036	—	—	—	—
1901	29,663	29,572	32,817	34,979	—	—
1902	31,059	31,195	34,376	36,924	—	—
1903	29,773	29,503	33,038	35,067	—	—
1904	29,213	28,999	31,927	33,633	—	—
1905	34,069	34,360	37,006	39,454	8·621	14·826
1906	43,637	44,398	47,390	50,651	8·188	14·085
1907	37,733	36,205	40,787	41,245	8·094	13·920
1908	37,836	37,513	40,119	41,406	6·034	10·378
1909	38,703	39,010	41,057	43,091	6·082	10·461
1910	34,557	34,423	35,682	36,351	3·256	5·600
1911	45,876	49,018	48,337	53,540	5·364	9·224
1912	42,428	41,559	44,317	44,743	4·454	7·660
1913	36,712	36,473	38,734	39,928	5·506	9·472
1914	41,207	41,569	43,595	45,712	5·795	9·966
1915	33,304	32,308	35,265	35,581	5·890	—
1916	39,909	36,903	38,924	40,368	—	—
1917	34,195	33,396	35,308	35,266	—	—
1918	42,362	43,308	43,417	45,163	—	—
1919	54,458	56,093	55,632	58,172	—	—
1920	40,955	39,093	41,523	40,026	—	—
1921	44,905	44,885	45,400	45,736	—	—
1922	41,428	41,167	42,142	42,388	—	—
1923	46,209	46,197	47,648	48,670	—	—
1924	37,234	36,026	38,554	38,222	—	—
1925	36,007	35,124	37,180	37,091	—	—
1926	37,940	38,190	39,430	40,769	—	—
1927	33,233	32,934	34,475	35,049	—	—
1928	41,407	41,969	43,608	45,806	—	—
1929	41,560	42,029	43,431	45,283	—	—
1930	43,169	43,447	45,008	46,632	—	—
1931	37,552	38,212	38,937	40,636	—	—
1932	35,366	34,680	37,280	37,907	—	—
1933	38,014	37,153	40,144	40,733	—	—
1934	41,993	42,974	44,547	47,470	—	—
1935	72,479	76,812	75,881	83,013	—	—
1936	40,136	38,443	41,981	41,483	—	—
1937	41,822	40,447	43,285	42,879	—	—
1938	41,540	40,328	42,396	41,756	—	—
1939	44,430	43,851	44,962	44,754	—	2·059
1940	42,268	40,898	42,936	42,010	1·580	2·718
1941	38,826	36,702	39,496	37,753	1·724	2·965
1942	39,758	36,235	40,120	36,802	0·910	1·565
1943	45,926	42,599	45,926	42,599	—	—
1944	47,829	44,665	47,829	44,665	—	—
1945	50,797	49,357	51,041	49,764	0·479	0·824
1946	48,040	46,843	48,661	47,885	1·294	2·224
1947	33,755	32,444	34,062	32,952	0·910	1·565
1948	31,657	30,511	31,657	30,511	—	—
1949	31,805	30,138	—	—	—	—

6—A BRIEF REVIEW OF THE RESULTS

We would not of course claim perfect accuracy, or even anything approaching that ideal for the estimates we have made in this thesis. But the results may perhaps be useful in giving us an idea of the degree of under-registration at any time, and therefore of the actual number of births, deaths, &c., for that time. And inferences made with regard to a group of years—say, a five year period—are likely to be much closer to the truth than inferences made with respect to a single year.

From our results as they now stand we can estimate the Sinhalese male and female population for any year between 1911 and 1946, since we have the number of births and deaths corrected for each year and, since we suppose that Sinhalese migration is negligible, the only yearly increase we have to consider is the natural increase.

The following table enables us to estimate the population on January 1, 1946 :—

Table 38—Sinhalese Population on January 1, 1946

	Males	*Females*
Corrected population on Census Day, 1946	2,458,336	2,339,482
Births (in 1946, before Census Day) [1]	22,416	21,700
Deaths (in 1946, before Census Day)[2]	15,842	15,589
Therefore population (January 1, 1946)	2,451,762	2,233,371

So, too, for the population on January 1, 1911 :

Table 39—Sinhalese Population on January 1, 1911

	Males	*Females*
Corrected Population on Census Day, 1911	1,428,126	1,309,899
Births (in 1911, before Census Day)[1]	13,032	12,614
Deaths (in 1911, before Census Day)[2]	9,716	10,761
Therefore Population (January 1, 1911)	1,341,442	1,311,752

The population on January 1, 1921 and 1931, could also be now estimated using Tables 36 and 37, as follows :—

Table 40—Sinhalese Population on January 1, 1921 and 1931

	Males	*Females*
Thus Population on January 1, 1911	1,431,442	1,311,752
Births, 1911–20 (inclusive)	622,255	602,376
Deaths, 1911–20 (inclusive)	425,052	438,499
Therefore Population on January 1, 1921	1,628,645	1,475,629
Births, 1921–30 (inclusive)	731,624	708,253
Deaths, 1921–30 (inclusive)	416,876	425,646
Therefore Population on January 1, 1931	1,943,393	1,758,236

The mean population would then be :

Table 41—Mean[3] Population during Inter-Censal Periods[4]

	Males	*Females*	*Total*
1911–21	1,530,044	1,393,691	2,923,735
1921–31	1,786,019	1,616,932	3,402,951
1931–46	2,197,578	1,995,804	4,193,382

[1] Vide Table 34.

[2] Vide Tables 30 to 33.

[3] The arithmetic means have been taken.

[4] The periods are of course between the respective New Year's days and are not in that sense strictly inter-censal.

We can estimate the average annual number of deaths and births during the periods 1911–20, 1921–30 and 1931–45 from Tables 36 and 37 and then calculate the mean annual birth-rates and death-rates for these periods.

We then have—

Table 42—Mean Annual (crude) Birth and Death-rates per 1,000 of the Sinhalese Population

Period	Death-rates				Birth-rate
	Males	Females	Total	Female % Male	Total
	(Col. 1)	(Col. 2)	(Col. 3)	(Col. 4)	(Col. 5)
1911–20	27·8 ..	31·5 ..	29·5 ..	113·3 ..	41·9
1921–30	23·3 ..	26·3 ..	24·8 ..	112·9 ..	42·3
1931–45	20·5 ..	22·5 ..	21·5 ..	109·8 ..	37·2

It will be seen from the above that the death-rate has been steadily declining for both males and females ; that the female death-rate has always been higher than the male ; but that this difference (vide Column 4) has been appreciably reduced, particularly during the last period—which suggests that the general social emancipation of women has made its influence felt not only in the educational field (as suggested by Table [2]) but in the medical and sanitary spheres also.

The birth-rate also has declined appreciably during the third inter-censal period, but had remained at about the same level during the first two periods.

For purposes of comparison, the Sinhalese and the corresponding Indian rates are given below :—

Table 43—Average Annual Death and Birth-rates for India[1] and Ceylon (both sexes)

Period	Death-rate		Birth-rate	
	Sinhalese	India	Sinhalese	India
1911–21 ..	29·5 ..	48·6 ..	42 ..	49
1921–31 ..	24·8 ..	36·3 ..	42 ..	46
1931–41 ..	— ..	31·2 ..	— ..	45
1931–46 ..	21·5 ..	— ..	37 ..	—

The Sinhalese figures are well below the Indian figures, particularlty in the case of deaths.. The corresponding rates of natural increase can now be estimated from the above as shown below :—

Table 44—Rates of Natural Increase per 1,000 of the Population

Period	Sinhalese	India	Difference
1911–21	12·4 ..	0·4 ..	12·0
1921–31	17·5 ..	9·7 ..	7·8
1931–41	— ..	13·8	1·9
1931–46	15·7 ..	—	

It would appear that both population groups have been showing a relatively high rate of growth, particularly after 1921 ; that the Sinhalese rate has been higher, but that this " lead " has been steadily reduced by India.

We may now look at the Sinhalese rate of growth with reference to their own population base, viz. : at the annual and decennial (geometric) rates of growth. These are as given below :—

Table 45—Geometric Rate of Growth of Sinhalese Population

	Mean Annual Rate	Decennial Rate
1911–1920	1·245% ..	13·2%
1921–1931	1·775% ..	19·2%
1931–1946	1·585% ..	17·0%

[1] The Indian rates are estimates of Mr. Kingsley Davis and are taken from pp. 36 and 69 respectively of his book : *The Population of India and Pakistan* (Princeton University Press, 1951).

These rates (as suggested by Table 44 also) would seem to have been highest during the 1921–31 period. But there is no indication that they will go down in the future, since though the birth-rate will probably continue to decline steadily but slowly, the death-rate with the stamping out of malaria by D. D. T., &c., and the more gradual reduction of the annual toll from other diseases—will probably decline even more rapidly.

It may be noted that the Sinhalese rates of growth during 1911–1920 and 1931–1946 were adversely affected by the influenza and malaria epedemics, respectively ; these took heavy toll of life, particularly during 1919 and 1935. The 1921–30 period was relatively free from the ravages of epidemics ; hence the higher rate of population growth.

Malaria, of course, has always taken its usual " endemic " toll. But in the last few years measures have been taken which promise to bring it well under control. The death-rate in future will therefore tend to be much lower than it ever was before 1946 ; and though the birth-rate also is slowly declining, such decline, for some more decades at least before the use of contraceptives becomes popular and effective enough, will not be enough to counteract the decline in mortality.

The chances therefore are that for the second half of the present century the Sinhalese rate of population growth will be even higher than it has been during the first half.

Table 46—Abridged Life Table for the Sinhalese 1910–1912

Age-interval x *to* x + n	*Probability of a person age* x *dying within interval* x *to* x + n	*No. surviving to exact age* x *out of 100,000 born alive*	*Average years of life remaining to survivors at age* x
Males			
0–	·161,275	100,000	34·611
1–	·038,852	83,872	40·213
2–4	·114,776	77,000	40·821
5–14	·106,303	71,361	42·944
15–24	·103,935	63,775	37·469
25–34	·131,024	57,146	31·223
35–44	·184,724	49,659	25·149
45–54	·265,878	40,486	19·681
55–64	·350,216	29,722	15·008
65–74	—	19,313	10·449
75–84	—	10,000[1]	5·575
85–94	—	1,300[1]	—
95–104	—	Nil	—
Females			
0–	·155,53	100,000	30·7
1–	·045,85	84,447	35·3
2–4	·148,42	80,575	35·9
5–14	·129,42	68,616	39·0
15–24	·135,30	59,736	34·0
25–34	·184,30	51,654	28·6
35–44	·206,52	42,134	23·9
45–54	·241,06	33,432	18·8
55–64	·415,73	25,373	13·1
65–74	—	148,25	9·0
75–84	—	5,800[1]	5.8
85–94	—	900[1]	4·2
95–104	—	Nil	—

[1] From graph.

Table 47—Abridged Life Table for the Sinhalese, 1945-47

Age-interval x to x + n	*Probability of a person age* x *dying within interval* x *to* x + n	*No. surviving to exact age* x *out of 100,000 born alive*	*Average years of life remaining to survivors at age* x
Males			
0–	·123,001	100,000	47·2
1–	·026,298	87,700	52·8
2–4	·069,47	85,394	53·2
5–14	·046,747	79,462	54·1
15–24	·051,443	75,747	46·5
25–34	·073,227	71,850	38·7
35–44	·103,935	66,589	31·4
45–54	·159,920	59,668	24·4
55–64	·243,188	50,126	18·0
65–74	·425,096	37,936	12·1
75–84	·710,152	21,810	7·4
85–94	·971,861	6,322	4·5
95–104	·999,517	178	4·2
105–114		Nil	
Females			
0–	·114,86	100,000	45·3
1–	·031,37	88,514	50·1
2–4	·087,82	85,737	50·7
5–14	·054,21	78,208	52·5
15–24	·070,97	73,968	45·2
25–34	·107,39	68,718	38·2
35–44	·111,11	61,338	32·2
45–54	·129,06	54,523	25·6
55–64	·213,64	47,486	18·6
65–74	·409,70	37,341	12·2
75–84	·726,70	22,043	7·2
85–94	·978,53	6,024	4·4
95–104	·999,78	129	4·2
105–114		Nil	

Table 48—Population Figures—Sinhalese Males, 1911

Age-group	*Official Figures Census Day*	*Corrected Figures Census Day*	*Estimated Mid-year Population*
0–1	45,462	53,395	53,539
1–2	38,283	47,398	47,526
2–3	47,117	49,460	49,594
3–4	48,637	42,064	42,178
4–5	44,746	40,493	40,602
Total 0–5	224,245	232,810	233,439
5–10	208,394	208,394	208,957
10–15	183,637	183,637	184,133
15–20	103,270	103,270	103,549
20–25	115,462	115,462	115,774
25–30	121,985	121,985	122,314
30–35	98,339	98,339	98,605
35–40	91,186	91,186	91,432
40–45	64,329	64,329	64,503
45–50	55,516	55,516	55,666
50–55	43,478	43,478	43,595
55–60	37,087	37,087	37,187
60–65	32,528	32,528	32,616
65–70	14,419	14,419	14,458
70 and over	25,686	25,686	25,755
Total	1,419,561	1,428,126	1,431,982

Table 49—Population Figures—Sinhalese Females, 1911

Age-group	*Official Figures Census-Day*	*Corrected Figures Census Day*	*Estimated Mid-year Population*
0–1	43,056	52,062	52,128
1–2	35,688	45,886	45,944
2–3	44,564	47,564	47,624
3–4	44,718	39,853	39,904
4–5	41,049	37,750	37,798
Total 0–5	209,075	223,115	223,398
5–10	197,619	197,619	197,870
10–15	160,615	160,615	160,819
15–20	106,633	106,633	106,768
20–25	122,387	122,387	122,542
25–30	118,027	118,027	118,177
30–35	88,604	88,604	88,716
35–40	65,384	65,384	65,467
40–45	59,036	59,036	59,111
45–50	39,807	39,807	39,858
50–55	51,566	51,566	51,631
55–60	21,815	21,815	21,843
60–65	26,445	26,445	26,479
65–70	8,443	8,443	8,454
70 and over	20,403	20,403	20,429
Total	1,295,859	1,309,899	1,311,561

Table 50—Population Figures—Sinhalese Males, 1946

Age-group	*Official Figures Census Day*	*Corrected Figures Census Day*	*Estimated Mid-year Population*
0–1	56,257	77,901	78,302
1–2	61,913	69,617	69,975
2–3	59,680	71,545	
3–4	67,604	65,344	200,098
4–5	62,517	62,185	
Total 0–5	307,971	346,592	348,375
5–15	593,789	593,789	596,842
15–25	477,401	477,401	479,856
25–35	358,826	358,826	360,671
35–45	284,516	284,516	285,979
45–55	187,160	187,160	188,122
55–65	114,896	114,896	115,487
65–75	64,363	64,363	64,694
75–85	24,379	24,379	24,504
85–95	5,499	5,499	5,527
95–105	915	915	920
Total	2,419,715	2,458,336	2,470,977

Table 51—Population Figures—Sinhalese Females, 1946

Age-group	*Official Figures Census Day*	*Corrected Figures Census Day*	*Estimated Mid-year Population*
0–1	54,467	75,951	76,359
1–2	59,357	67,906	68,270
2–3	57,642	69,250	
3–4	65,719	62,741	192,362
4–5	59,317	59,317	
Total 0–5	296,502	335,192	336,991
5–15	564,089	564,089	567,116
15–25	449,869	449,869	452,283
25–35	326,487	236,487	328,239
35–45	237,785	237,785	239,061
45–55	157,223	157,223	158,067
55–65	89,642	89,642	90,123
65–75	51,968	51,968	52,247
75–85	21,071	21,071	21,184
85–95	5,145	5,145	5,173
95–105	1,011	1,011	1,016
Total	2,200,792	2,239,482	2,251,500

APPENDIX A

Mis-statement of Ages at the 1921 and 1946 Censuses : Favoured Digits

(i) THE 1921 CENSUS

THE statement of age, year by year, as given in Table VIII, Vol. IV, of the 1921 Ceylon Census Publications, was analysed in the case of the Low-Country Sinhalese Females. This group was selected because the Low-Country Sinhalese form the largest single community in Ceylon (if they be treated as distinct from the Kandyan Sinhalese, as they are in the Census Table referred to above) and their migration into or out of Ceylon is negligible. This will be particularly so in the case of the females, who only are considered in this analysis.

The number of people whose ages ended in each of the digits 0–9 was totalled separately, the ages 5–94 (inclusive) only being considered, as it was thought that other elements of error (e.g., actual under-enumeration) might appreciably affect the numbers in the ages under 5, and the "over 95 s" are negligible in number. In the table below, the 3rd column figures are proportional to the 2nd column figures, the total number actually considered (795,988) in column 2 being reduced to 1,000 in column 3. Since the same number of "ages", viz. : nine (as, e.g., 7, 17, 27–87, as ages ending in the digit "7") contribute to the figures in columns 2 and 3 against each digit in column 1, we would expect the 10 items in each of column 2 and 3 to be approximately equal to each other if there had been no appreciable mis-statements of age.

TABLE

Popularity of the Digits at the Censuses

Digits in which the ages end	*1921* *No. of people in the corresponding set of ages (in '000's)*	*1921* *1,000 people divided in proportion to figures in Column 2*	*1946*
5	148,796	187	141
6	74,262	93	113
7	45,240	57	76
8	105,729	133	131
9	32,718	41	71
0	201,909	254	137
1	29,562	37	76
2	85,081	107	111
3	32,735	41	68
4	39,956	50	76
	795,988	1,000	1,000

This is, the items in column 3 should then be each nearly equal to (1,000 ÷ 10 =) 100. Strictly speaking, we might expect perhaps the number against digit 5 to be a little over 100 (Since we begin our series with the age-group 5 +) and the numbers against 6, 7, 8, 9, 0, 1, 2, 3, 4 to decline slightly in that order to a number a little below 100. But if we inspect column 3, we find how widely and irrationally the numbers differ from each other, instead of clustering round their mean 100, betraying the very imprecise nature of the age-statements. The digits "favoured" by the population group concerned would appear to be roughly as follows in descending order of popularity :—

0, 5, 8, 2, 6, 7, 4, 9, 3, 1.

(ii) THE 1946 CENSUS

A similar analysis, for the Low-Country Sinhalese (females again) was made from the 1946 Census age statements (from Table 6, Vol. II, Census of Ceylon, 1946).

The final analysis is given in column 4 (of Table above) corresponding to column 3 for 1921.

Here again it will be seen that there is considerable deviation from the mean 100, though not to the same extent as in 1921. The mean deviation for 1946 is 26·6 which is considerable ; but for 1911 it is much higher, being 56·2.

The digits, in descending order of popularity are, for 1946 as follows :—

5, 0, 8, 6, 2, 4, 1, 7, 9, 3.

APPENDIX B

Ceylon's Migration Statistics

SOME idea of the inadequacy and unreliability of the statistics relating to migration into and out of Ceylon may be obtained from the following :—

(i) From the " Report on the Census of Ceylon, 1921 " by L. G. B. Turner, Superintendent of Census—Vol. I, Part I (Ceylon Census Publications, 1921) :—

Table No. 18 on page 17 gives the following totals regarding annual migration between 1911 and 1920 (inclusive) :

Immigration	
Estate	873,385
Miscellaneous	728,517
Total	1,601,902
Emigration	
Direct estate	479,176
Total	1,425,323

It may be explained that " estate immigration covers the direct immigration from India to the estates, while the " miscellaneous immigration " is the balance of the immigration from India and elsewhere. The " direct estate emigration " figures are those supplied by the General Manager of the Railway of the number of estate labourers who leave by rail for India on the special tickets issued to estate emigrants presenting certificates from the Superintendents. As many emigrants leave without these certificates, or possibly by other means than the railway, the direct estate emigration forms only a part of the total estate emigration, the annual figures of which are not known, and the decennial figures only available by an indirect calculation. It is also to be noted that the Railway figures understate the emigration, as they show children under twelve as halves, and omit infants.

(ii) The following from the same publication (page 18) give us not only an idea of the system—or lack of system—according to which migration statistics were collected about this period, but also the unreliable and inadequate statistics that would naturally result from it :—

"Source of the Migration Statistics

Before leaving this part of the subject, it may be well to state very briefly the sources of the data. For this purpose the migration may be divided into :—

(1) Migration from or to Talaimannar or Colombo in Ceylon—

(i) To or from Dhanushkodi or Tuticorin in India :

(*a*) By rail, *via* Talaimannar and Dhanushkodi ;
(*b*) By sea, *via* Colombo and Tuticorin.

(ii) From or to Colombo, to or from all foreign ports other than Tuticorin.

(2) Migration to or from Ceylon ports other than Colombo or Talaimannar.

The figures of immigrants under head 1 (i) are collected by the Chairman of the Board of Immigration and Quarantine, the numbers of immigrants under 1 (i) (*a*) being supplied by the Port Surgeon, Talaimannar, showing estate and miscellaneous immigrants separately, and distinguishing adult males and females, and adults and children. The immigrants by sea (head 1 (i) (*b*)) are reported by the Port Surgeon, Colombo. The statements of emigrants under head 1 (i) (*a*) are collected from two sources, the Port Surgeon, Talaimannar, furnishing a statement of the total emigrants to India, and the General Manager of the Railway reporting estate coolies emigrating on the special ticket, two half tickets being counted as a whole ticket, and infants being omitted.

With regard to emigration under 1 (i) (*b*) a statement is furnished by the Agent of the British India Steam Navigation Company.

With regard to 1 (ii), the Criminal Investigation Department of Ceylon Police keeps a register of all immigrants and emigrants to and from all foreign ports, with the exception of ships' crews signed on or discharged at Colombo, details of whom are kept by the Shipping Master. An account of migration at other ports, head (2), is generally kept by the local Collector of Customs, but there appears to be considerable unrecorded migration at some of the smaller ports, which might go far to explain the migration error. None of the records shows the race of the migrant, and

only the immigrant returns from Talaimannar show separately adult males and females, and adults and children. Finally, it may be noted that the error in the immigration records is probably less than in the case of emigration, and is shown, by inquiry, to be in accordance with the actual probabilities of the case ."

(iii) The 1911 Census Superintendent, E. B. Denham, wrote to similar effect in his " Ceylon at the Census of 1911 " (page 42) :

" But an examination of the figures for arrivals and departures of immigrant coolies showed that, while the returns may be accepted as approximately correct for arrivals, the omissions under the departures more than account for the difference between the estimated and the actual population of Ceylon. It appears that the departures of immigrant coolies by the boats of the Ceylon Steamship Company to Pamben, Tondi, and Ammapatam were not included in the returns of departures. 45,868 deck passengers travelled to these ports by this line between 1901 and 1910.

Further, in furnishing the figures of departures to Ammapatam, Tondi and Pamben prior to 1909, the agents of the British India Steam Navigation Company did not separate miscellaneous and estate coolies, with the result that the coolies carried by this line to these ports were probably all included under Miscellaneous in the Plague Committee's returns, and so were omitted from the returns of departures of immigrant coolies . . . . . ".

These extracts show how unreliable and inadequate Ceylon's migration statistics were during this period.

(iv) The (Ceylon) Registrar-General in his Administration Report on Vital Statistics for 1935 remarks that " the migration records are defective . . . . . ." (Page Q 5).

APPENDIX C

Ceylonese and Sinhalese Migration

THAT the indigenous Ceylonese migrated little out of the Island, and that Sinhalese migration in particular was quite negligible is attested to by the 1911 and 1921 Census Superintendents. The Ceylon Tamils in fact migrated much more than the Sinhalese ; and among the Ceylon Tamils the Jaffnese (i.e. the Tamils from the Jaffna Peninsula to the North of the Island) migrated most.

Ceylonese migration, unlike Indian migration, was not for manual work, but was nearly always for white collar jobs or for skilled work, and as such was not (and could not have been) in large numbers. This is not surprising when we consider the fact that Ceylon is swamped by Indian labourers, and Ceylonese would naturally not try to displace the ubiquitous Indian from the field of manual work in some foreign country when they cannot compete with him in their own country.

As it was, nearly all Ceylonese migration was to the Federated Malay States and the adjoining territories.

Mr. E. B. Denham, the Ceylon Census Superintendent in his " Ceylon at the Census of 1911 " (p. 68) stresses the preponderance of the Ceylon Tamil in Malaya but does not appear to think that the Sinhalese had migrated there in any appreciable numbers : " Kuala Lumpur, the principal Town in the Federated Malay States, has been called ' the little Jaffna ' . . . . In the Federated Malay States Census Report for 1901 a recommendation appears that ' in the returns for Abstracts of population under the heading of ' Other Races ' the nationality of Egyptians might well be omitted, as there are none here, and the words ' Jaffna Tamils ' be inserted instead ". (It is significant that the term " Ceylonese " was not suggested instead of "Jaffna Tamil ". It strongly suggests that Sinhalese and other Ceylonese formed relatively a very small number in Malaya compared to the Jaffna Tamils). Mr. Denham continues : " In the Straits Settlements the district of birth place was not given. 1,843 males and 278 females gave Ceylon as their birth place, of whom 305 males and 72 females were Sinhalese ; the very large majority of the rest were no doubt Jaffnese ". (This indicates that the Sinhalese in the Straits Settlements were small both in absolute number as well as in relation to the whole Ceylonese community there).

Really, the Jaffnese emigration itself was not very big in absolute numbers ; hence Sinhalese migration would be quite negligible. Thus, Mr. Denham in his Report further down (p. 274) : " With the third of these (i.e., ' movement of population *out* of the Country ') Ceylon is little concerned ; the only emigration which is taking place to any considerable extent is that of the Jaffnese to the Straits Settlements and Federated Malay States . . . The following figures show the extent of the emigration to the Straits Settlements and to the Federated Malay States :—

	Total	*Males*	*Females*
Number of persons born in Ceylon enumerated in the Straits Settlements ..	2,121 ..	1,843 ..	278
Number of persons born in Ceylon enumerated in the Federated Malay States	7,249 ..	5,975 ..	1,274
Comprising :			
(1) Tamils and ' Other Indians '	6,003 ..	5,096 ..	907
(2) Sinhalese, &c.	739 ..	578 ..	161

There were 377 Sinhalese (305 males and 72 females) enumerated in the Straits Settlements, and 949 Sinhalese (683 males and 246 females) were enumerated—as compared with 584 at the last Census—in the Federated Malay States. The percentage of Sinhalese born and enumerated in the Federated Malay States is 22 per cent. pointing to a small settlement there . . . . ".

We are essentially concerned with the net inter-censal migration of the Sinhalese and this would appear to run into a few hundreds only about this period.

The 1921 Ceylon Census Superintendent also, though prone to take his Balancing Equations perhaps a little too seriously, concedes : " The figures for 1911–1921 are seen to be more in accordance with what is generally supposed to be the case, namely, that the Sinhalese migration is small, and that it probably shows an excess of emigrants over immigrants ". (P. 198, Report on the Census of Ceylon, 1921, by L. J. B. Turner, Vol. I, Part I)[1].

The Malayan Census Reports confirm the general impression that Sinhalese migration into that part of the world is negligible. The following table is taken from " Malaya : A report on the 1947 Census of Population " pp. 304 and 305) :—

Ceylonese in Malaya and Singapore

	Federation of Malaya	*Colony of Singapore*	*Total*
Ceylon Tamil :			
Persons	15,411	1,372	16,783
Males	8,627	825	9,452
Females	6,784	547	7,331
Sinhalese :			
Persons	2,126	820	2,946
Males	1,194	498	1,692
Females	932	322	1,254
Other, unspecified or indeterminate Ceylonese peoples :			
Persons	2,265	768	3,033
Males	1,271	463	1,734
Females	994	305	1,299

Thus, there were less than 3,000 Sinhalese in Malaya and Singapore, forming less than 13 per cent. of the total Ceylonese population there, or less than 1 in 1,000 to the Sinhalese population of Ceylon.

The following table, comparing the 1921 Malayan-Sinhalese population with the 1947 population (taken from the same Report—pp. 80 and 81) is perhaps even more revealing. The figures relate to the populations as enumerated at the 1921, 1931 and 1947 Censuses :

Ceylonese in Malaya

	1921	*1931*	*1947*
Ceylon Tamil	?*	?	16,783
Sinhalese	2,215	?	2,946
Other Ceylon peoples	?	?	3,033
Total : Ceylonese	?	18,490	22,762

* Included with Indian Tamils in 1921.

It will be seen that not only is the absolute number of Sinhalese at the 1921 and 1947 Censuses small, but the difference roughly covering natural increase + net migration during the inter-censal periods is quite negligible[2].

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[1] Also see pp. 26 and 236 of Vol. I, Part I, and p. 3 of Vol. I, Part II, of the same Report.

[2] Also see p. 81, § 320 of same Report ; also p. 87, § 308 of " British Malaya : A report on the 1931 Census " by C. A. Vlieland, Superintendent of Census.

APPENDIX D

The Births and Deaths Registration Ordinance of 1895 and Subsequent Amendments[1]

I give below extracts from the 1895 Ordinance which came into effect on July 1, 1897, and from subsequent amending Ordinances, &c. :—

"CHAPTER 94

BIRTHS AND DEATHS

An Ordinance to amend and consolidate the Law relating to the Registration of Births and Deaths.

"1. This Ordinance may be cited as the Births and Deaths Registration Ordinance."

"9. (1) It shall be the duty of every Registrar to inform himself carefully of every birth and every death that shall happen in the division, and to ascertain and register accurately and with all convenient despatch, in the language prescribed by the Provincial Registrar with the approval of the Registrar-General, the particulars required to be registered of births and deaths respectively in books which shall be supplied by the Registrar-General according to the forms A and B in the Schedule.

(2) Every such entry shall be made in duplicate in the order of the time in which information satisfactory to the Registrar shall have been given, and such entries shall be numbered progressively from the beginning to the end of the book and shall be signed by him.

". . . . if no birth or death shall have been registered during the period, the Registrar shall send to the Assistant Provincial Registrar of the district . . . . a certificate that no birth or death, as the case may be, was registered.

"REGISTRATION OF BIRTHS

"10. (1) The father or mother of every child born in Ceylon, or in the case of the death, illness, absence, or inability of the father and mother the occupier or an inmate of the house in which such child shall have been born shall, within forty-two days next after the day of every such birth, give information to the Registrar of the division according to the best of his knowledge and belief of the several particulars hereby required to be known and registered touching the birth and name of such child, and in the presence of the Registrar, shall sign the register.

"11. In case any living new-born child is found exposed, it shall be the duty of any person finding such child, and of any person in whose charge such child may be placed, to give, to the best of his knowledge and belief, to the Registrar of the division, within seven days after the finding of such child, such information of the particulars required to be registered concerning the birth of such child as the informant possesses, and in the presence of the Registrar to sign the register.

"12. Where a birth has, from the default of the persons required to give information concerning it, not been duly registered, the Registrar of the division may at any time at the end of forty-two days from such birth, or, in the case of a living new-born child found exposed, at the end of seven days after the finding of such child, require, by notice in writing, any person required by this Ordinance to give information concerning such birth to attend personally at the Registrar's Office within such time (not less than seven days after the receipt of such notice, nor more than three months from the date of the birth or of the finding of the living new-born child) as may be specified in such notice, and to give information, to the best of such person's knowledge and belief, of the particulars required to be registered concerning such birth, and to sign the register in the presence of the Registrar ; and it shall be the duty of such person, unless the birth is registered before the expiration of the time specified in such requisition, to comply with such requisition . . . .

"13. It shall be the duty of the Registrar . . . . to register the birth . . . . without fee or reward from the informant . . . . ."

"REGISTRATION OF DEATHS

"21. The death of every person dying in the Island, and the cause of such death, shall be registered by the Registrar of the division where such death occurred in the manner and form prescribed."

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[1] Vide the *Births and Deaths Registration Act, No. 17 of 1951* (Ceylon Government Press, Colombo) an Act to amend and consolidate the law relating to the registration of births, deaths and still births.

"22. (1) When a person dies—

(*a*) in a house, it shall be the duty of the nearest relatives present at the death, or in attendance during the last illness of the deceased . . . . to give . . . . to the Registrar of the division, within the five days next following the day of such death, information of the particulars required to be registered concerning such death, and in the presence of the Registrar to sign the register ; or

(*b*) in a place which is not a house, or a dead body is found elsewhere than in a house, it shall be the duty of every relative of such deceased person having knowledge of any of the particulars required to be registered concerning the death . . . . to give to the Registrar, within the five days next after the death . . . . such information of the particulars required to be registered concerning the death as the informant possesses, and in the presence of the Registrar to sign the register."

"23. (1) In case of the death of any person who has been attended during his last illness by a medical practitioner, that practitioner shall sign and give to some person required by this Ordinance . . . . a certificate in the form I in the Schedule, stating to the best of his knowledge and belief the cause of the death, and such person shall, upon giving information concerning the death, deliver the certificate to the Registrar . . . .

(2) If any such medical practitioner neglects or refuses forthwith to sign and give such certificate, or if any person to whom such certificate is given by such medical practitioner fails to deliver the certificate to the Registrar, he shall be guilty of an offence and liable on conviction to a penalty not exceeding fifty rupees."

"REGISTRATION OF DEATHS IN PROCLAIMED PLACES

"30. (1) It shall be lawful for the Governor, from time to time by Proclamation in the *Government Gazette* to declare that the provisions of this and the six following sections shall come into operation in any town, district, or place on a date to be fixed by such Proclamation."

"31. (1) In any town, district, or place proclaimed under the provisions of sub-section (1) of the preceding section, no dead body shall from the date fixed in the Proclamation be buried or cremated, or otherwise disposed of or removed for such purpose, or be permitted by the keeper of any place used for such purpose to be buried or cremated, or otherwise disposed of—

(*a*) unless a person required by this Ordinance to give information to a Registrar has obtained a certificate in the form L in the Schedule from such Registrar that notice of such death has been duly given to him or a certificate of registration in form Y issued under section 32 (*ss. 2, 33 of 1935*) ; or

(*b*) unless a certificate in the form M in the Schedule has been obtained by such person from a police officer or headman resident in the division of such Registrar . . . . ; or

(*c*) unless a certificate has been obtained . . . . signed by a medical practitioner . . . . or, &c.

"(2) The certificate of a Registrar, police officer, or headman, or medical practitioner, and the order of an Inquirer, and the authority of a superintendent as aforesaid, shall be given without fee or reward from the applicant . . . . .

(3) The certificate of a Registrar, police officer, or headman, or medical practitioner . . . . (*ss. 2, 33 of 1935*) shall before the dead body is buried, cremated, or otherwise disposed of be produced to the person having charge of or control over any place in which the body may be buried, cremated, or otherwise disposed of ; and until the production of such certificate or authority he shall not permit the body to be buried, cremated, or otherwise disposed of.

(4) The duplicate of the certificate of a police officer, or headman or medical practitioner, or order of an Inquirer into Deaths shall, within five days after the death, be delivered to the Registrar of the division by the person who received it from the police officer, headman . . . .

(5) The Registrar . . . . shall thereupon register in the prescribed form and manner such death . . . .

(6) Any person who acts in breach of sub-sections (1), (2), (3) or (4) of this section, and any Registrar, police officer . . . . knowingly causes unnecessary vexation to any person, shall be guilty of an offence, and shall be liable on conviction to a fine not exceeding one hundred rupees."

"32. (1) In any town, district, or place proclaimed under the provisions of section 30 no dead body shall be buried, cremated, or otherwise disposed of except in a cemetery or burial ground duly established or registered for such place under the provisions of the Cemeteries and Burials Ordinance.

(2) No dead body shall be removed outside such town, district, or place for burial, cremation, or other disposal in any place other than a cemetery or burial ground duly established or registered . . . . unless a person . . . has . . . . (*ss. 3, 33 of 1935*)—

(*a*) give such information to the proper Registrar and obtained from him a certificate of registration of the death . . . . ."

SCHEDULE

FORM A

Register of Births

No. ——— ——— Province. ——— District.

When and where born	December 17, 1894 ; Colombo, Maliban Street, No. 25 (or Waskaduwa on Munwattabage Pattu)
Name	James
Sex	Male
Name and surname of father	Arthur Peiris
Name and maiden name of mother, and nationality ..	Louisa Peiris, *nee* De Mel ; Sinhalese
Rank or profession and nationality of father ..	Merchant ; Sinhalese
Parents, if married	Married at the Registrar's office, Pohaddaramulla (or Wesleyan Chapel Kalutara)
Name and residence of informant, and in what capacity he gives information	David Peiris of Waskaduwa, uncle of child (*or* occupier of the house where the birth occurred, *or* present at the birth)
Informant's signature	David Peiris
When registered	December 27, 1894
Signature of Registrar	A. Fonseka
Name, if added or altered after registration of birth ..	Robert
Date of addition or alteration	September 14, 1895

Note—Tamils or Moors must be described as " Ceylon " Tamils or Moors, or " Indian " Tamils or Moors.

FORM B

Register of Deaths

No. ——— ——— Province ——— District.

When and where died	January 7, 1893 ; Robinson Street, Cinnamon Gardens, No. 85
Name in full	Magage Gabriel Perera
Sex and nationality	Male ; Sinhalese
Age	48 years
Rank or profession	Carpenter
Names of parents*	Magage Selestinu Perera and Wedige Ango Nona
Cause of death and place of burial	Smallpox ; Jawatta Cemetery
Name and residence of informant, and in what capacity he gives information	Magage Thomas Perera of Robinson Street, brother of deceased (*or* occupier of the house where the death occurred *or* present at the death)
Informant's signature	Thomas Perera
When registered	January 15, 1893
Signature of Registrar ..	P. Dias

Note—Tamils or Moors must be described as " Ceylon " Tamils or Moors, or " Indian " Tamils or Moors.

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* If the deceased was an estate labourer, here insert also the name of Kangany.

APPENDIX E

Under-registration of Births and Deaths

It may be instructive to consider the standard of registration of births and deaths in other countries comparable to Ceylon. Here we shall briefly review certain estimates of the degree of under-registration of births and deaths in India, the West Indies, and Britain in the 19th Century.

In England, death registration seems to have been better than birth registration during the last century, when registrations would have been roughly at about the same level of efficiency and comprehensiveness as it would have been in Ceylon during the first half of the present century. Professor Glass, discussing the registration of births and deaths during this period, has assumed completeness of death registration and explains : " That death registration was much less defective than birth registration was always the view of the General Register Office . . . . "[1].

G. W. Roberts, discussing mortality in Jamaica, says : " The problem of vital registration early engaged the attention of the Registrar-General, who concluded that it was probably nearer realisation in the case of deaths . . ."[2].

He quotes from the " Annual Report of the Registrar-General's Department, 1880–81 " : " It is easy for some births to escape registration. With many persons the only inducement to register is the knowledge of the law's requirements and its penalties . . . . not an appreciation of the importance or the advantages of the public record . . . . and hence in cases where the birth occurs away from the possible cognizance of a Registrar, it is not strange that the duty should be neglected. In the case of deaths this escape from registration is not so easy . . . .the surrounding circumstances of the case, the funeral, and in all but a few instance the services of the minister give a greater publicity than in the case of births. Farther than this, the minister of religion performing the burial service, is bound by law to report the burial to the nearest registrar, unless he receives at the same time a certificate showing that registration has been attended to. With these safeguards, the losses to the death-registers are probably few . . . . ".

The general attitude of people in Jamaica towards registration as indicated by the above is roughly comparable to what may have prevailed in Ceylon, particularly during the first half of this century. (One factor, viz. : the responsibility of the minister to report deaths when necessary—does not operate in Ceylon ; and in any case, the Christians form only a small minority in Ceylon[3]. But, on the other hand, there is the long standing legal requirement which requires the registration of every death before burial can take place in any urban area)[4].

In India, the degree of under-registration of births and deaths would seem to vary considerably from province to province. Still, it would be instructive to consider the position of registration there since, though the standard of literacy is markedly lower in India than in Ceylon and the means of transportation and the number of offices for the registration of births and deaths are much less per (say) a million of the population than in Ceylon, resulting in a much greater degree of under-registration of births and deaths, the kinship between the two peoples through blood religion, culture and their political and social history and institutions gives them in other respects a common background, and a study of the position in India may therefore be instructive.

The following extracts from Gyan Chand's " India's Teeming Millions "[5] are suggestive : " The Census Superintendents have themselves tried to measure the degrees of error in the registration of births and deaths. The extent of error in Bengal was estimated in 1921 at 26 to 29 per cent. for male deaths and 28 to 29 per cent. for females and omission of births was taken to be one to two per cent. higher in both cases. In 1931 the birth and death-rates for 1921–31 were deduced from Census figures and compared with them the reported rates of births and deaths were found to be in defect by 50 and 40 per cent., respectively" (p. 96).

Referring to "the progressive states of Mysore, Travancore and Baroda " the writer says : " In Mysore[6]. it is admitted that 50 per cent. of deaths and an even larger proportion of births go unreported. In Travancore[7], the margin of error in births and deaths was estimated at nearly 50 per cent., the calculated birth and death-rates being

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[1] D. V. Glass : " A Note on the under-registration of Births in Britain in the 19th century "—p. 75, Population Studies, Vol. V, No. 1, July 1951.

[2] G. W. Roberts : " A Note on Mortality in Jamaica ", Population Studies, June 1950 (Vol. IV, No. I), p. 64.

[3] 603,200 at the 1946 Census, i.e., about 9 per cent. of the population.

[4] Vide footnote p. 21

[5] London : George Allen & Unwin (1939).

[6] Mysore Census Report, 1931, pp. 106, 107.

[7] Travancore Census Report, 1931, pp. 32, 33.

41·5 and 20 per thousand compared with the reported rates of 20·4 and 11·1 per thousand respectively. In Baroda,[1] vital statistics have been estimated to be in defect by 32·4 per cent. in the case of births and 32·8 per cent. in the case of deaths ". (p. 97).

Mr. Chand sums up : " The death rates in India are known to be less defective than the birth-rates and if their relative position is not to be changed, an addition of 30 per cent. will probably achieve the same measure of approximation in their case as 33 per cent. in that of the birth-rates " (p. 98).

One fact emerges very clearly from Chand's observations (for all India) and from his quotations from the various provincial Census Reports (Bengal, 1921 ; Bengal, 1931 ; Mysore, 1931 ; Travancore, 1931 ; and Baroda, 1931)—it is that in all the cases considered births were under-registered to a greater extent than deaths (except in Baroda, where they were practically equal).

And this general rule, we find, also holds for England during the middle of the last century and for Jamaica during this Century[2].

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[1] Baroda Census Report, 1931., pp. 31 and 51.

[2] Egypt, however, would appear to be an exception. Vide p. 52, " The Population Problem in Egypt ", W. Clelland (1936) (Printed in U. S. A. Science Press Printing Company, Lancaster, Pennsylvania).