सत्यमेव जयते

CENSUS OF INDIA 1961

MONOGRAPH SERIES

MONOGRAPH

No. 7

THE CHANGING POPULATION OF KERALA

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NEW DELHI-11

ACKNOWLEDGEMENTS

I take this opportunity to express my deep appreciation to the Registrar General, India, for his kind invitation to work on this monograph. I also wish to keep on record my appreciation of the help I received from the Office of the Superintendent of Census Operations, Kerala, Trivandrum. I am also indebted to the University of Kerala for giving me facilities to carry out part of the work related to this monograph at the University-Department of Statistics, Trivandrum. There are many people who have made a contribution to the development of this volume. I particularly wish to express my gratitude to my Tabulation Assistant, Mrs. Maya Devi, whose contribution in preparing the tables and in the statistical analyses of the data has been incalculable.

March, 1968 N. Krishnan Namboodiri

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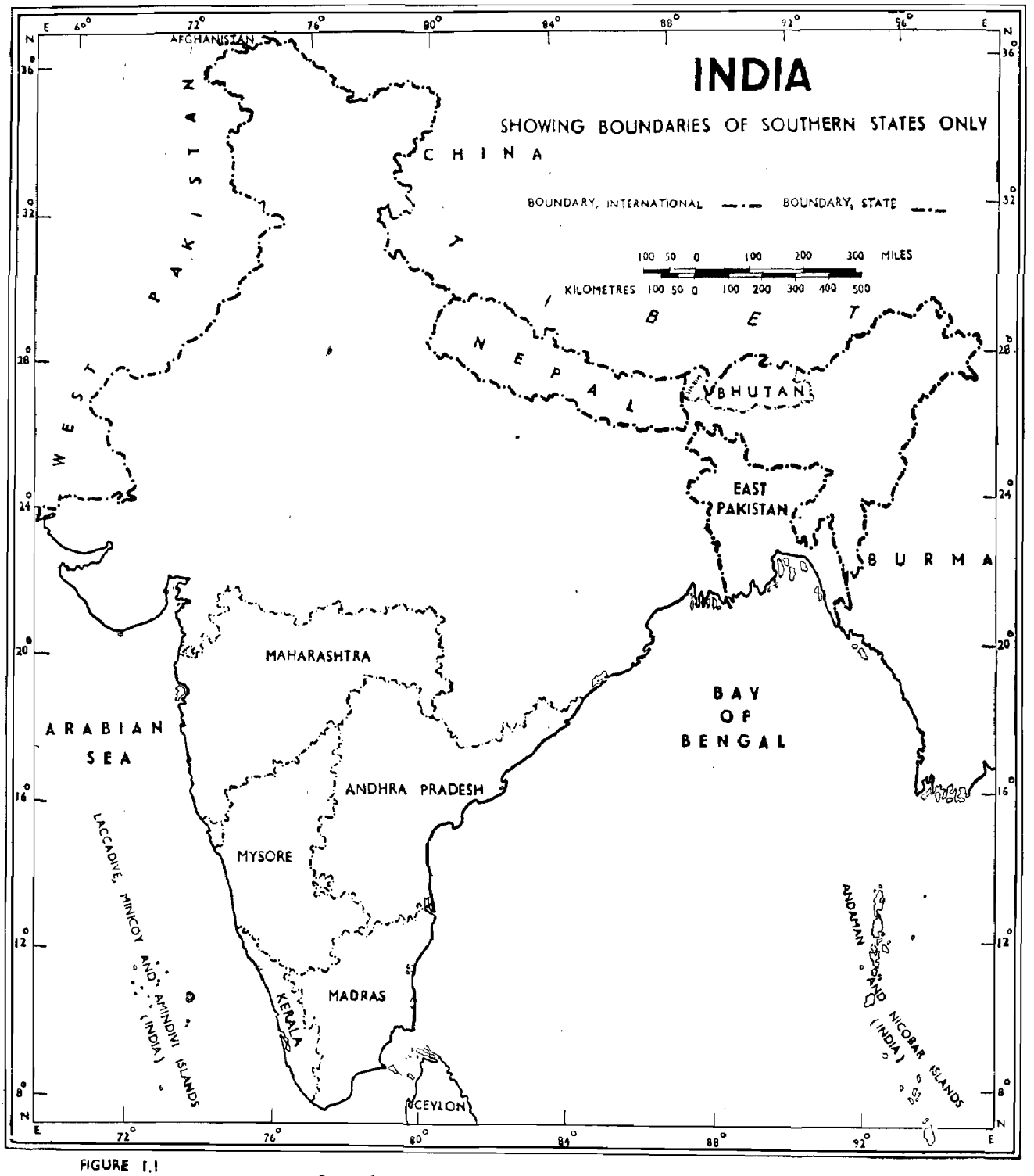

INDIA
SHOWING BOUNDARIES OF SOUTHERN STATES ONLY
BOUNDARY, INTERNATIONAL
BOUNDARY, STATE
100 50 0 100 200 300 MILES
KILOMETRES 100 50 0 100 200 300 400 500
AFGHANISTAN
CHINA
PAKISTAN
WEST
NEPAL
BHUTAN
EAST PAKISTAN
BURMA
MAHARASHTRA
ARABIAN SEA
BAY OF BENGAL
ANDHRA PRADESH
MYSORE
MADRAS
KERALA
LACCADIVE, MINICOY AND AMINDIVI ISLANDS (INDIA)
ANDAMAN AND NICOBAR ISLANDS (INDIA)
CEYLON
E 60° 72° 76° 80° 84° 88° 92° 96° E
N 36° 32° 28° 24° 20° 16° 12° 8° N

FIGURE 1.1

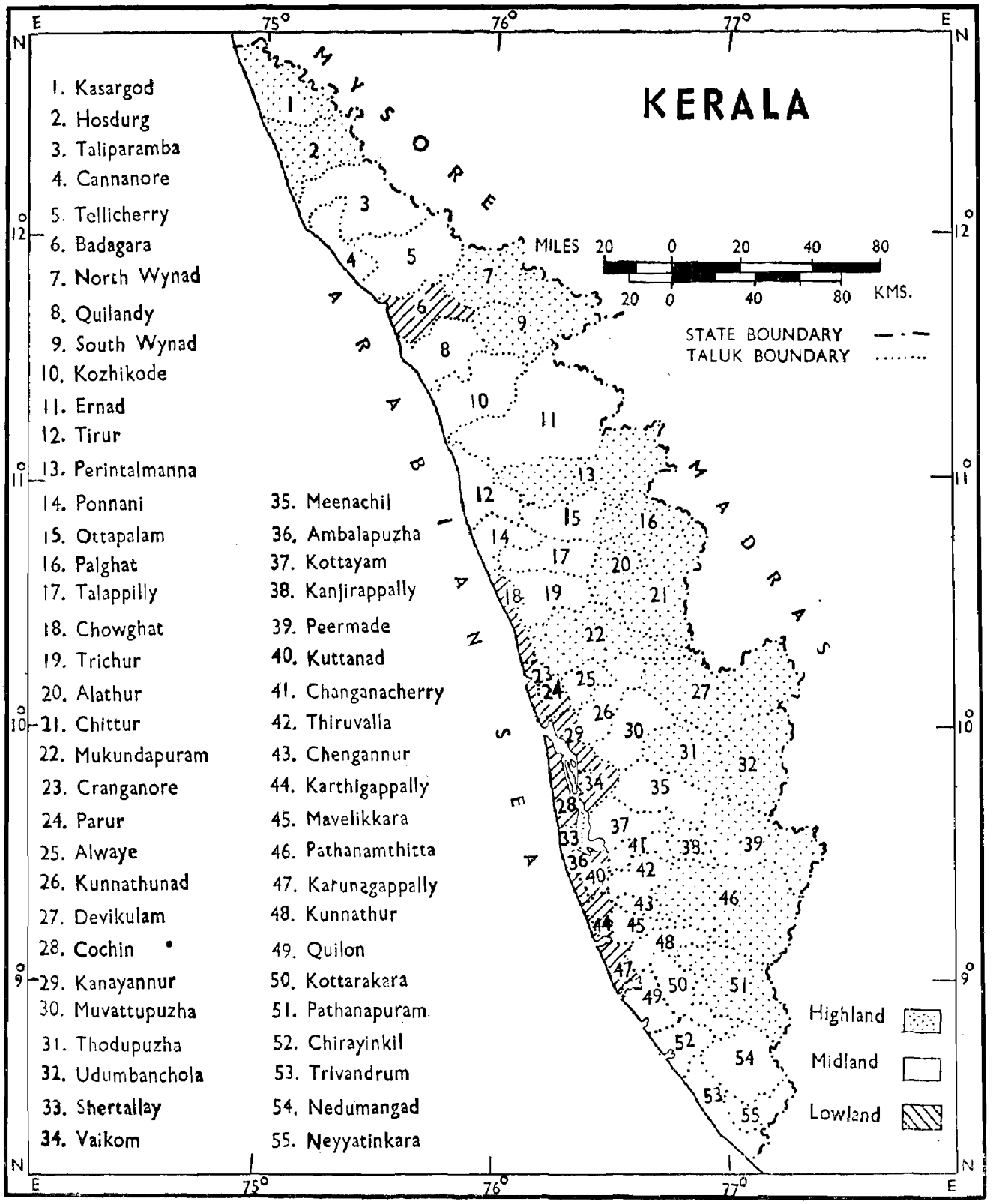


Figure 1.2-Showing taluks falling in different natural divisions.

CHAPTER I

INTRODUCTION

Kerala State lies on the Western coast of India flanked by the Arabian Sea on the West and the Western Ghats on the East. (*See* fig. 1.1). The whole State is between 8°17′30″ and 12°47′40″ N latitude and 74°51′ and 77°23′ E longitude. Its boundaries touch the Mysore State in the north and northeast and Madras State in the east and south.

Kerala was created in 1956 at the time of the reorganization of States in India by bringing together a small part of the former Madras State and a large portion of the erstwhile Travancore-Cochin State. The whole of Malabar district and Kasaragod Taluk of the South Kanara district which formerly belonged to Madras State are now parts of Kerala, so also are all taluks of the former Travancore-Cochin State except Thovala, Agastheeswaram, Kalkulam, Vilavancode, and the bulk of Shencottah taluks which now form part of Madras State. In integrating parts of the former Travancore-Cochin State and of Madras to form the present Kerala State the intention was to bring together under the same State administration the regions where the language spoken is predominantly Malayalam.

Physical Features

The total length of the State from north to south is about 360 miles, but its width ranges only from 20 to 75 miles, the north and the south ends being narrower than the middle.

The State territory may be broadly classified into three natural divisions, the highland, the midland and the lowland. (Fig. 1.2). The highland is mostly mountainous terrain ranging in height from 3,000 feet to 9,000 feet above sea level. The upper ranges of the highland region are thickly forested while plantations abound in the lower ranges. The lowland region stretches along the sea coast and is characterized by numerous lakes and lagoons. Hemmed in between the lowland and highland regions lies the undulating terrain of midland.

The climate in the highland region is cool and comfortable throughout the year, but in the plains it is hot and humid. However, the temperature seldom goes outside the range 70° to 90°F. The rainfall is quite high, often regular in timing and in quantity, and is fairly spread throughout the year. The annual rainfall is about 100 inches in the southern parts and about 115 inches in the northern parts of the State. Since the State gets rain from both north-east and south-west monsoons, the former giving rain from October to December and the latter from May to September, January to April are practically the only dry months of the year.

The regularity in quantity and timing of the rainfall in the highland region and the other suitable climatic conditions prevailing there have made this region ideally suitable for the high value yielding plantation crops in the low ranges ; and again the climatic conditions are mostly responsible for the rich forest growth in the high ranges. The abundant rainfall may also be seen as responsible for the large number of rivers (44 in number) which form one of the chief assets of the State. While the entire area of the State accounts for only 1.2 per cent of the area of India, the water potential of the State accounts for 5 per cent of that of the nation as a whole. The large number of steep falls in the western course of the rivers provide also a rich potential for generation of low-cost hydro-electric power.

The midland region is rich with laterite soil and is suitable for cultivation of paddy tapioca, spices and cashewnut.

The western coastal regions are good for growing coconuts. The lakes and lagoons along the coast provide natural retting facilities for the coir industry, one of the main industrial activities of this area. The backwaters also provide a wide network of cheap inland waterways along the coast line.

Kerala's economy underdeveloped

Despite all these favourable physical features, Kerala remains one of the most backward States in India from the point of view of economic development. The *per capita* income of Kerala in 1955-56 was 10.3 per cent less than the corresponding all-India figure. The developmental efforts of the Third Five Year Plan did not succeed in reducing that gap between the two *per capita* income figures. While there has been little change in the age composition of the population between 1931 and 1961, the working force participation rate slumped down during this period from 48 per cent to 33 per cent.

The fast deteriorating unemployment condition of the State is clearly brought out by this trend although the figures are not strictly comparable on account of the differences in the concepts used in the different censuses.

The average size of land holdings in Kerala is only 1.5 acres as against the all-India average of 7.5 acres. While agricultural labourers form about 40 per cent of the agricultural population in Kerala as compared to the corresponding all-India figure of 17.5 per cent, the extent of underemployment among them is one of the highest in India. The number of days of employment per agricultural labourer in Kerala was only 170 days per year in 1956-57, the lowest for the whole of India. The average annual income of agricultural labour households declined about 10 per cent during the period 1950-51 to 1956-57, while the corresponding decline in India as a whole was only 2 per cent.

The net value added per worker in factory enterprises as well as in non-factory enterprises in Kerala fall short of all-India estimates by 50—60 per cent.

	Net value added Rs. (1955-1956)	
	Kerala	India
Factory enterprise	1,059	2,500
Non-factory enterprise	413	915

Source : National Council of Applied Economic Research Techno-economic Survey of Kerala, New Delhi, 1961 p. 271.

Average annual earnings of factory employees in Kerala is one of the lowest in India. *See* Table below.

Average per capita *Annual Earnings of Factory Workers by States*

(Rupees per worker)

States	1961	1960	1959	1956
Andhra Pradesh	1,080	823	885	595
Assam	1,234	1,370	1,607	1,526
Bihar	1,484	1,394	1,386	1,236
Bombay	..	..	1,500	1,415
Gujarat	1,617	1,623	..	..
Kerala	1,118	960	965	735
Madhya Pradesh	1,252	1,212	1,212	982
Maharashtra	1,609	1,620	..	..
Madras	1,411	1,294	1,884	950
Mysore	1,278	1,107	1,093	853

Average per capita *Annual Earnings of Factory Workers by States*

(Rupees per worker)

States	1961	1960	1959	1956
Orissa	1,154	1,090	1,076	949
Punjab	1,100	899	766	991
Rajasthan	730	846	912	770
Uttar Pradesh	1,201	1,154	1,134	1,014
West Bengal	1,310	1,285	1,226	1,142

Source : *Statistical Abstract*, Central Statistical Organization, Government of India.

The economic backwardness of Kerala which is apparent from the above figures is all the more puzzling when it is realized that Kerala stands in the forefront of India in literacy, in general education, in standards of public health services, in transportation and communication facilities, and in several other respects, progress in which generally implies progress towards economic development. Far from being fit for an isolated-subsistence-farming-type of economy, Kerala's physical and cultural features make the State better suited than are many of the other States in India to play the role of an exchange economy. Kerala is deficient in the production of food and other consumption articles while she contributes substantially towards the foreign exchange earnings of the country as a whole by exporting goods originating mostly in its agricultural sector ; the foreign exchange earnings through such exports alone comes to about 10 per cent of the total annual foreign exchange earnings of India. Such being the state of affairs it is doubly puzzling why these potentialities are not developed and the retardation in the progress towards economic development of the State arrested.

Kerala's problem of economic development a population problem

It has been argued by many that Kerala's problem of economic development is mainly a population problem. It is therefore interesting to know about the population growth pattern, changes in population composition, and territorial distribution and redistribution of the population of the State.

This monograph attempts to examine the available data in the above respects with a view to understanding their implications for economic and social change in the State.

CHAPTER II

POPULATION SIZE AND TERRITORIAL DISTRIBUTION AND CHANGES THEREIN DURING 1901-1961

Population growth

Kerala's population doubled itself during the first 45 years of this century ; and the indication is that the next doubling will take less than thirty years. (*See* fig. 2.1). The growth pattern, however, has not been quite regular in the past ; but from 1931 onwards, a tendency for accelerated growth is clearly discernible. (*See* Table 1 and figures 2.2 and 2.3).

Population density

To put the above growth pattern in the proper perspective, one should consider the population density associated with it. In Table 2 the 1951-1961 growth rate along with the rank of the different States in India with respect to population size, density and area as of 1961 are shown. From these figures it can be easily seen that while Kerala ranks last in respect to area, it is first with respect to density. The density of Kerala was 903 persons per square mile in 1951 as against 1127 in 1961. It is rather rare that a population as rural as is that of Kerala experiences a growth rate as high as 25 per cent (the growth rate of Kerala during the decade 1951-1961) when the density is as high as 903 persons per square mile.

Table 1

Population Growth in Kerala, 1901-1961

Year	Population in '000s	Growth rate (%) during the decade
1901	6,396	12
1911	7,148	9
1921	7,802	22
1931	9,507	16
1941	11,032	23
1951	13,549	25
1961	16,904	..

Overall growth patterns of any population tell only part of the story. Unusually high growth rate in some parts of the region and a moderately large rate of growth in the rest can give rise to a large overall growth rate ; but the same effect may be produced by a rather uniformly high growth rate in all parts of the region. Concentration of actual or potential growth has serious economic and social implications. Hence it is important to consider the growth pattern experienced by the different parts of the State.

Table 2

Ranking of Indian States According to Population Size, Area and Density as of 1961

State	Population size	Area*	Density*
Andhra Pradesh	4	5	7
Assam	14	12	12
Bihar	2	8	3
Gujarat	9	7	11
Jammu and Kashmir	15	No data	No data
Kerala	13	14	1
Madhya Pradesh	7	1	13
Madras	6	10	4
Maharashtra	3	3	8
Mysore	8	6	9
Orissa	12	9	10
Punjab	10	11	6
Rajasthan	11	2	14
Uttar Pradesh	1	4	5
West Bengal	5	13	2

*Ranking is shown excluding Jammu and Kashmir for which the figure for area was not available.

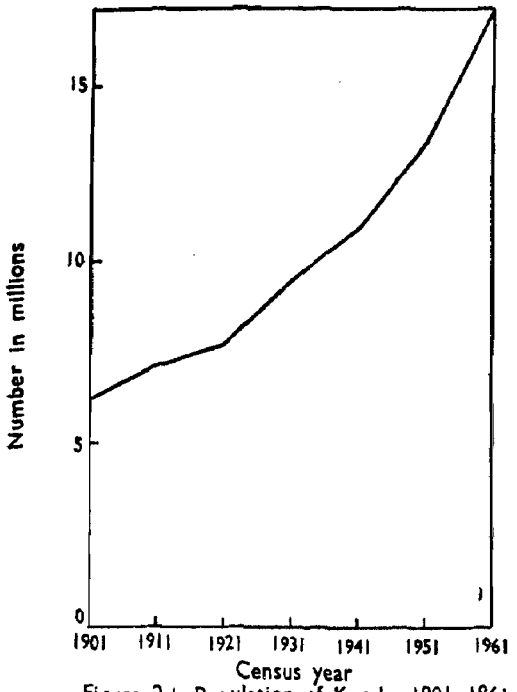


Figure 2.1 - Population of Kerala, 1901 - 1961 (Based on data in Table 1)



Figure 2.2 - Additions to the Population, Kerala, 1901 - 1961 (Based on data in Table 1)

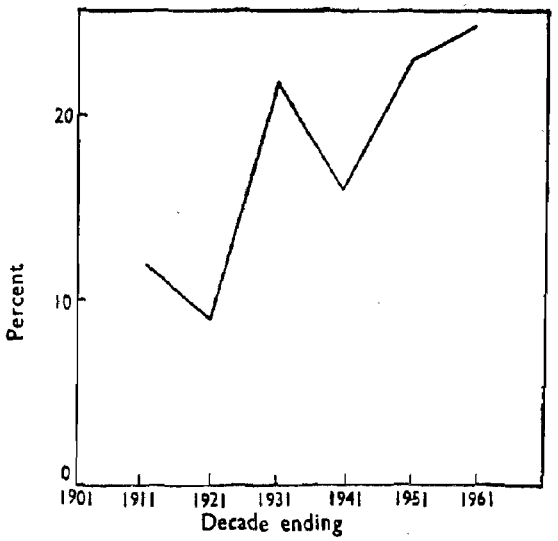


Figure 2.3 Rate of growth of Population, Kerala, 1901 - 1961

Growth pattern in different subregions of the State

For this purpose we consider separately the highland, midland and lowland regions of the different districts. Kerala State consists of 9 districts ; each district comprising several taluks each of which in turn consists of several revenue villages. The districts and taluks of 1951 and earlier censuses are not comparable to the districts of 1961 Census. But the 1961 Census authorities have estimated the 1921, 1931, 1941 and 1951 populations of 1961 taluks. This provides us with the data required to study the growth pattern of the different subregions of the State from 1921 to 1961. Population figures for 1901 and 1911 being not available, we are forced to confine our attention to the period 1921-1961. Further, since we do not have population figures for areal units smaller than taluks (*e.g.*, villages), we are compelled to use taluk as the unit of analysis in this investigation.

A word about how taluks are classified according to the natural divisions is in order here. From very early census onwards, villages have been classified into lowland, midland and highland based on the physical features of the area. Thus it is possible to determine to which natural division the maximum portion of each taluk belongs. On that basis the classification of taluks into the three natural divisions, lowland, midland, and highland, has been effected.

In Table 3 are presented the growth rate experienced by the taluks in the different Natural Divisions. The corresponding density figures are shown in Table 4.

As a summary index of the tendency for concentration of growth rate, one might use the standard deviation or the coefficient of variation. These figures are presented in Table 5. In the lowland region, the standard deviation tended to decrease over time whereas in the midland region, the tendency had been for consistent decrease until 1941-51 whence the trend was reversed, and in the highland region the reversing of the declining trend occurred one decade earlier than it did in the midland region. It is interesting to note that while the increase in the standard deviation in growth rate over the period 1941-51 to 1951-61 was only slight in the case of the midland region, it was astoundingly large in the case of the highland. Looking at the growth rate experienced by the different taluks in the different decades presented in Table 3, it becomes apparent that the deviation from the general tendency towards uniformity in subregional population growth rate is mainly due to the growth rate pattern experienced by a very few taluks. Among the taluks which have deviated far from the general pattern especially when the last two decades are taken into consideration are Udumbanchola in the highland region and Taliparamba, Changanacherry, Thiruvalla, and Chengannoor in the midland region. The growth rate experienced by Udumbanchola in 1951-61 decade was 675.8 per cent which is 17 times that of 1941-51 decade and 31 times that of 1931-41 decade. This sudden increase in growth rate in this taluk is attributable to the net gain in migration resulting from movement of population in search of land for cultivation. Among the midland taluks which deviate markedly from the rest in the trend in growth rate, Taliparamba experienced 47 per cent growth in 1951-61 which is more than double the corresponding figure for 1941-51, while Changanacherry, Thiruvalla and Chengannoor experienced a decline ranging from 50 to 70 per cent in growth rate in 1951-61 as compared to 1941-51. It seems possible that from these taluks disproportionately large number of people migrated to other regions in 1951-61 decade. By and large, all the other taluks in the midland region maintained the 1941-51 growth rate in 1951-61 or deviated only slightly. Thus apparently the general tendency had been towards greater uniformity in growth rate of taluks, with a few exceptions, in the different natural divisions. It should be emphasised that this does not mean that the population has become more and more evenly distributed in space in the State. The lowland region is much more densely populated than the midland region which in turn is more densely populated than the highland region. Also, the taluks in these natural divisions have become over time more and more diverse in population density. (*See* Table 6).

Is growth rate related to density? That is, do the areal units with high density tend to grow faster or is there a tendency in the opposite direction? Figures presented in Table 7 are interesting in this connection. In no natural division, consistently high correlation between density and growth rate showed up. Maximum correlation was observed in the highland region in all decades examined. In that region, the

tendency had been for the low density areas to grow faster. In the other two regions, the relationship ran in the opposite direction. However, the fact that out of the 12 correlation coefficients examined, only 2 turned out to be statistically significant seems to indicate that the growth pattern of taluk populations of the state is not influenced by strong constraints connecting density and growth rate.

Table 3

Decennial Growth Rate of Taluk Populations

Highland Taluks

Taluk	Decade			
	1951—1961	1941—1951	1931—1941	1921—1931
1 Kasaragod	21·0	20·1	13·3	17·6
2 Hosdurg	28·9	20·1	13·3	17·6
3 N. Wynad	51·4	59·2	15·9	8·3
4 S. Wynad	68·7	59·2	15·9	8·3
5 Perintalmanna	20·3	17·7	11·8	10·5
6 Palghat	8·3	18·2	6·8	8·6
7 Alathur	12·9	18·2	6·8	8·6
8 Chittoor	12·4	21·5	8·1	10·7
9 Mukundapuram	24·5	24·7	16·8	26·1
10 Thodupuzha	17·2	29·2	36·4	58·4
11 Devikulam	48·4	32·0	10·1	74·5
12 Udumbanchola	675·8	40·6	21·7	84·4
13 Kanjirappally	28·3	27·6	27·5	41·0
14 Peermedu	54·6	48·4	41·0	91·6
15 Pathanamthitta	32·4	27·0	39·0	37·1
16 Pathanapuram	39·9	42·3	18·8	36·0

Table 3

Decennial Growth Rate of Taluk Populations—contd.

Midland Taluks

	Taluk	Decades			
		1951—1961	1941—1951	1931—1941	1921—1931
1	Thaliparamba	47·2	20·1	11·6	15·2
2	Cannanore	20·9	20·1	11·6	15·2
3	Tellicherry	28·7	24·1	13·0	13·5
4	Quilandy	25·5	24·2	7·8	15·9
5	Kozhikode	27·9	26·9	17·0	19·6
6	Tirur	16·8	17·1	11·1	15·9
7	Ernad	29·6	19·1	13·1	13·7
8	Ponnani	15·6	15·6	9·7	17·5
9	Ottapalam	11·3	17·7	11·8	10·5
10	Talappilly	15·7	17·5	16·2	19·0
11	Trichur	22·9	28·2	22·5	25·4
12	Alwaye	29·9	22·3	18·6	21·5
13	Kunnathunad	25·4	15·9	19·1	23·2
14	Muvattupuzha	19·3	15·1	24·7	31·7
15	Meenachil	11·0	14·2	21·3	25·8
16	Kottayam	19·4	22·3	21·6	33·6
17	Changanachery	8·6	27·7	27·8	41·4
18	Thiruvalla	11·9	22·6	9·4	23·3
19	Chengannur	12·0	22·6	9·4	23·3
20	Mavelikkara	20·4	19·6	11·3	20·2
21	Kunnathur	28·6	27·9	23·6	25·3
22	Quilon	32·1	29·7	22·8	25·9
23	Kottarakara	32·4	33·2	36·5	26·5
24	Chirayinkil	25·4	26·7	17·8	22·6
25	Trivandrum	32·4	28·9	24·3	29·0
26	Neyyttinkara	30·9	29·4	12·0	26·7
27	Nedumangad	37·3	42·1	19·2	40·3

Table 3

Decennial Growth Rate of Taluk Populations—concld.

Lowland Taluks

	Taluk	Decades			
		1951—1961	1941—1951	1931—1941	1921—1931
1	Badagara	22·0	24·2	7·8	15·9
2	Chowghat	15·4	15·6	9·7	17·5
3	Crangannur	21·1	15·7	13·9	23·1
4	Parur	18·6	17·5	13·6	19·9
5	Kanayannur	21·5	17·9	16·9	20·2
6	Cochin	20·4	25·2	22·8	29·5
7	Vaikom	17·8	13·0	13·6	28·4
8	Sherthallai	22·3	11·0	12·2	26·6
9	Ambalapuzha	22·2	20·9	22·2	28·7
10	Kuttanad	24·5	22·2	23·2	30·9
11	Karthigappally	21·8	20·2	7·5	21·2
12	Karunagappally	25·1	17·7	13·3	21·7

Table 4

Population Density of Taluks at each Census from 1921

Highland Taluks

	Taluk	Year				
		1921	1931	1941	1951	1961
1	Kanjirappally	373	526	670	855	1,097
2	Alathur	706	767	820	969	1,093
3	Palghat	719	781	834	986	1,068
4	North Wynad	103	112	130	207	313
5	Kasaragod	372	437	496	595	720
6	Hosdrug	306	359	407	489	631
7	Thodupuzha	145	230	314	406	475
8	Udumbanchola	15	28	34	48	376
9	Chittur	374	414	447	543	610
10	Pathanapuram	162	220	261	372	520
11	Peermade	43	82	115	171	265
12	Mukundapuram	402	507	592	738	919
13	South Wynad	103	112	129	206	347
14	Perintalmanna	312	345	386	454	546
15	Devicolam	48	83	92	121	180
16	Pathanamthitta	136	187	260	330	437

Table 4

Population Density of Taluks at each Census from 1921—contd.

Midland Taluks

	Taluk	Year				
		1921	1931	1941	1951	1961
1	Chengannur	1,383	1,705	1,865	2,285	2,559
2	Changanacherry	885	1,252	1,600	2,043	2,218
3	Mavelikkara	1,265	1,520	1,691	2,023	2,436
4	Trivandrum	1,743	2,248	2,794	3,601	4,766
5	Alwaye	785	954	1,132	1,385	1,798
6	Thiruvalla	1,243	1,533	1,676	2,054	2,300
7	Quilon	1,351	1,701	2,088	2,710	3,580
8	Chirayinkil	1,097	1,345	1,585	2,008	2,519
9	Kunnathur	621	778	961	1,229	1,581
10	Ponnani	1,086	1,276	1,399	1,617	1,870
11	Cannanore	1,273	1,467	1,637	1,966	2,378
12	Kottayam	854	1,141	1,387	1,697	2,025
13	Kottarakkara	511	646	882	1,175	1,556
14	Neyyattinkara	868	1,100	1,231	1,593	2,086
15	Trichur	777	975	1,194	1,531	1,882
16	Ottapalam	795	879	983	1,156	1,287
17	Muvattupuzha	525	692	863	993	1,185
18	Talappilly	665	791	919	1,079	1,248
19	Kunnathunad	411	507	603	699	876
20	Tirur	1,145	1,327	1,474	1,726	2,016
21	Meenachil	574	722	876	1,000	1,111
22	Quilandy	638	740	795	991	1,244
23	Nedumangad	295	414	494	702	963
24	Kozhikode	767	917	1,073	1,362	1,742
25	Tellicherry	499	567	640	794	1,022
26	Taliparamba	266	306	342	410	604
27	Ernad	302	344	382	463	600

Table 4

Population Density of Taluks at Each Census from 1921—concld.

Lowland Taluks

	Taluk	Year				
		1921	1931	1941	1951	1961
1	Cranganore	1,630	2,007	2,285	2,644	3,202
2	Cochin	2,408	3,117	3,830	4,795	5,772
3	Ambalapuzha	1,684	2,167	2,649	3,202	3,914
4	Parur	1,576	1,889	2,145	2,520	2,989
5	Karunagapally	1,677	2,041	2,313	2,722	3,404
6	Karthigapally	1,646	1,996	2,145	2,577	3,139
7	Chowghat	1,767	2,076	2,277	2,631	3,035
8	Kuttanad	672	879	1,083	1,323	1,648
9	Sherthallai	1,305	1,653	1,855	2,060	2,518
10	Kanayannur	1,514	1,820	2,128	2,510	3,049
11	Vaikom	868	1,115	1,267	1,432	1,687
12	Badagara	796	922	994	1,235	1,507

Table 5

Mean, Standard Deviation and Coefficient of Variation in Population Increase of Taluks in Different Natural Divisions, During the Decades, 1921-31, 1931-41, 1941-51 *and* 1951-61

Natural division	Decade	Mean	Standard deviation	Coefficient of variation
Highland	1921—31	33·7	27·92	0·828
	1931—41	19·0	12·41	0·653
	1941—51	31·6	13·78	0·436
	1951—61	71·6	156·88	2·192
Midland	1921—31	23·0	7·63	0·379
	1931—41	17·2	6·79	0·395
	1941—51	23·4	6·17	0·264
	1951—61	23·7	8·98	0·379
Lowland	1921—31	23·6	4·97	0·211
	1931—41	14·7	5·35	0·364
	1941—51	18·4	4·23	0·230
	1951—61	21·7	2·25	0·107

Table 6

Mean, Standard Deviation and Coefficient of Variation in Taluk Population Density in 1921, 1931, 1941, 1951 *and* 1961 *in Different Natural Divisions*

Natural division	Year	Mean	Standard deviation	Coefficient of variation
Highland	1921	270	211	0·780
	1931	324	229	0·707
	1941	374	248	0·662
	1951	468	287	0·614
	1961	600	291	0·486
Midland	1921	838	373	0·445
	1931	1031	467	0·452
	1941	1207	548	0·454
	1951	1492	702	0·470
	1961	1831	886	0·484
Lowland	1921	1462	466	0·319
	1931	1807	591	0·327
	1941	2081	731	0·351
	1951	2471	920	0·372
	1961	2989	1108	0·371

Analysis of variance of growth rates

We have employed another method to investigate whether there has been any tendency for the growth rate to be concentrated in any subregions and if so whether there has been any change in that tendency. The method employed is the classical analysis of variance. Taluks were classified into a two-way Table : natural divisions by districts. With 9 districts and 3 natural divisions, there are 27 subclasses (cells). Three of these cells did not contain any taluk. The number of taluks in the different cells was not the same. (*See* Table 9). The analysis of variance technique involving disproportionate number in subclasses was therefore employed. The technique yields, among other things the following :

(1) The proportion of the total variance in y (*i.e.*, the taluk growth rate) accounted for by both the classifications, districts and natural divisions together, and

(2) the proportion of the total variance in y accounted for by the special features attributable to the districts different from those attributable to the natural divisions and similarly the proportion of the total variance attributable to the special features of the natural divisions eliminating the effect of the special features of the districts.

A quantitative measure of the combined explanatory power of the districts and natural divisions, given by item (1) above, is especially important in the present context.

Table 7

Correlation Between Density and Growth Rate to Taluk Populations in the Different Divisions

Natural division	Coefficient of correlation between			
	1921—31 growth rate and 1931 density	1931—41 growth rate and 1941 density	1941—51 growth rate and 1951 density	1951—61 growth rate and 1961 density
Highland	—0·565	—0·386	—0·681	—0·270
Midland	0·126	0·056	0·197	0·033
Lowland	0·083	0·367	0·302	0·045

Table 8

Variation in Growth Rate of Taluk Populations in Different Decades Beginning 1921 *Attributable to Different Sources Expressed as Per Cent of Total Variation*

Source	1921—1931	1931—1941	1941—1951	1951—1961
1. Districts	56·4	44·5	21·7	11·7
2. Natural Divisions	8·1	3·4	23·1	6·4
3. Districts and Natural divisions combined	66·3	51·9	49·0	16·6
4. Interaction between Districts and Natural divisions	20·0	12·9	16·2	12·2
5. Unexplained	13·6	35·2	34·8	71·2

Table 9

Number of Taluks in Each District Falling in Different Natural Divisions

	Lowland	Midland	Highland
1. Cannanore	..	3	3
2. Kozhikode	1	4	1
3. Palghat	..	2	4
4. Trichur	2	2	1
5. Ernakulam	3	3	1
6. Kottayam	1	3	4
7. Alleppey	4	3	..
8. Quilon	1	3	2
9. Trivandrum	..	4	..

For if there is any tendency for the taluk growth rate to be concentrated in any subregion, the classification of taluks into meaningful subclasses should account for a substantial proportion of the total variance in y (taluk growth rate). Here the classification employed, namely, districts by natural divisions, seems to be quite appropriate in that they together tend to classify the taluks into categories more or less homogeneous in physical and cultural features. If such a classification fails to account for the bulk of the total variance in taluk growth rate in any decade we might conclude that there was virtually no tendency for the taluk growth rate to be concentrated in any subregions of the State in that decade.

With these preliminary remarks, let us now take a look at the results of the analysis. We have analysed the growth rate of taluk populations for four decades, 1921-31, 1931-41, 1941-51 and 1951-61. The results are presented in Table 8.

Several important findings emerge from the data presented in the above Table. We find that the districts have become much more similar among themselves over time with respect to their influence on the growth rate of the taluk populations. About three-fifth of the total variation in growth rate was accounted for by differences among districts in 1921-31 decade, whereas the corresponding figure for 1951-61 decade was less than one-eighth. Further the trend in the proportion of total variance in growth rate of taluk populations attributable to district-differences was consistent throughout the four

decades examined—a steady decline 56.4 per cent to 11.7 per cent.

We also note that the combined explanatory power of the two-way classification, districts by natural divisions, has been steadily declining over the period in question. In the first decade examined, the proportion of the total variance accounted for by the two classifications together is 66.3 per cent, in 1931-41 decade this figure declines to 51.9 per cent, in 1941-51 to 49.0 per cent, and in the last decade examined it becomes just 16.6 per cent. We take this steady and marked decline in this figure to mean that the tendency for the taluk population growth rate to be influenced by the physical and cultural differences of the subregions has declined substantially over time.

Another important finding that emerges from the above analysis is that the differences in the growth rates of taluk populations due to the influence of the special features of the natural divisions are not different from one district to another. This is evident from the fact that the interaction sums of squares have not turned out to be substantially high in any of the decades. In 1921-31 decade, only one-fifth of the total sum of squares is accounted for by the interaction component, the corresponding figures for the later decades being substantially less (12 per cent to 16 per cent).

The analysis of variance furnishes another set of figures too. They have to do with the net effect on the dependent variable of the categories of the variables used for the classification. Thus we have in the present case estimates of the relative effects of the three natural divisions and of the relative net effects of the special features associated with each district on the growth rate of the taluk population (the dependent variable in our analysis). It seems to be meaningful to talk about the net effect of the district-features and of the natural-division-features. For apart from the differential composition of the districts in terms of the natural divisions, there may be substantial differences between them in features affecting the growth rate of taluk populations ; for example, some districts might be more rural than others, some districts might contain industrial complexes while others don't, some districts may contain educational centres while others don't, and so on. In a similar manner one can see that it makes sense to talk about the net effect of the natural divisions on growth rate of population. As has already been mentioned, the lowland has an equitable climate, and the land is easily cultivable. The lakes and lagoons in this region furnish retting facilities for the coir industry and also form a source of abundant supply of fish. "The cheapness of living in an area where variation in temperature is unknown, the comparative ease with which food is produced, the existence of industries and the abundance of communication facilities " all are special features of lowland region making for faster growth of population. On the other hand in the midland, though the soil is fertile, cultivation of rice which forms the staple food of the people is possible only in selected areas while the soil and climatic conditions are suitable for the cultivation of cash crops such as pepper, ginger, cashew, lemon grass and coconut. The highland region is mostly forested and a sizeable portion is devoted for plantation crops leaving only very little in different pockets available for the population to spread. Thus each of the natural divisions has its own physical features having pronounced effect on growth of populations.

What the analysis of variance furnishes is a measure of the effect of the special features of each natural division on growth rate of taluk populations eliminating the effect of the social and cultural features associated with the districts, and similarly measures of the effect of the special features of each district on the growth rate of taluk populations eliminating the effect due to the physical and geographical features of the natural divisions ; in what follows we shall refer to the former set of measures as net effect of the natural divisions and the latter the net effects of the districts. Let us take a look at the figures in the following Table.

From the figures in Table 10 it is clear that the factors associated with the lowland and midland regions have produced a below average growth rate in the taluk populations virtually in all decades. The below average performance of the lowland and midland regions has been compensated for by the above average rate of the highland regions. By and large, the effect of the factors associated with the midland regions has been closer to the average compared to that of the factors associated with the lowland region. What interpretation can be given to this finding ? It does not seem plausible that birth and death rates differ substantially in the three regions. Hence the differences in the growth rate seem to be the result of net emigration from lowland region to midland region and perhaps from both to the highland region. Presumably the lowland region

has reached closer to the saturation point with respect to population density than do the other regions while midland comes next to lowland in this respect. This is consistent with the direction of net emigration hypothesized above. Unfortunately we do not have data to analyse the direction of net migration from one natural division to another.

Table 10

Net Relative Effect of the Special Features of Natural Divisions on the Growth Rate of Taluk Populations : Estimates Obtained from Analysis of Variance

Natural divisions	Net relative effect of natural division on growth rate of the decade			
	1921—1931	1931—1941	1941—1951	1951—1961
Lowland . . .	—3.7	—3.8	—6.3	—17.3
Midland . . .	—4.8	0.4	—2.8	—15.6
Highland . . .	8.5	3.4	9.2	32.9

Table 11

Net Relative Effect of the Special Features of Districts (Eliminating the Effect of Natural Divisions) on the Growth Rate of Taluk Populations : Estimates Obtained from Analysis of Variance

District	Net relative effect of special features of districts on growth rate of the decade			
	1921—1931	1931—1941	1941—1951	1951—1961
Cannanore	—13.5	—5.4	—1.0	—12.6
Kozhikode	—8.9	—4.7	4.8	2.7
Palghat	—19.2	—9.8	—12.1	—40.2
Trichur	—2.3	—0.1	—3.0	—10.4
Ernakulam	5.5	6.1	—2.1	—5.7
Kottayam	24.4	5.1	0.4	62.6
Alleppey	2.9	—1.0	—0.4	—1.0
Quilon	2.8	8.4	4.0	—5.4
Trivandrum	8.2	1.3	9.5	10.1

Now turning to the figures in Table 11 a general tendency discernible seems to be that northern districts (Cannanore, Palghat, Kozhikode and Trichur) have been able to produce less than average growth rates while the southern districts (Kottayam, Quilon, and Trivandrum) have been able to produce more than average rate of increase. The coastal

district of Alleppey has been very near the average throughout the four decades while Ernakulam situated somewhat near the centre of the State was above average in 1921-31 and 1931-41 but went below average in effect afterwards. There are, however, a few exceptions to the above generalizations. Kozhikode, one of the northern districts, has come above average lately from a below average position in the early decades. Among the southern districts, Quilon deviated from the general pattern in that it came below average in 1951-61 decade.

It is strange that Ernakulam containing the industrial complex around Alwaye and the Port of Cochin has not been above average. Of course one need not attach too much importance to the fact that Ernakulam remained below average in 1941-51 decade ; for in that decade no district showed any great deviation from the average level. But the case of 1951-61 decade is different ; some explanation as to why Ernakulam went below average seems to be called for. It may be that the effect of the special features of Kottayam district during the decade remained far above the average that the effect of the special features of all other districts became dwarfed. It may also be that Ernakulam's potential for growth will take some more time to be clearly manifested in substantially large net gains in immigration.

Population characteristics of areal units classified by population size

The data examined so far tell us that by and large no sub-region of Kerala can be said to be experiencing unusually large or small growth rate compared to the average pattern. The general tendency has been for the sub-regional disparity in growth rate, in so far as it existed in the past, to diminish over time. This means that the tendency for any sub-region to absorb more people than do other regions has become less and less recently. The spatial pattern in population growth rate tells only part of the story. A region's growth rate may remain low even when the population turnover happens to be large. In other words, a region might absorb from other regions disproportionately large number of persons belonging to certain classes while giving away to other regions disproportionately large number of persons of other kinds; population turnover of this type might leave the growth rate practically unaffected but at the same time producing drastic change in the composition of the population. A taluk might attract industrial workers from neighbouring taluks and send away agricultural labourers thus producing a marked change in the composition of the population leaving the growth rate at average level. Therefore, a lack of tendency towards concentration for the growth rate of the population should not be taken to mean that very little population redistribution is taking place. And, since population redistribution is a symptom of social and economic change, it is important to know to what extent the population gets redistributed and in what manner. From what has been said above regarding the possible impact on the population composition of population redistribution, it seems to be fruitful to enquire how the population composition varies from one category of areal units to another. But of course the population composition of an areal unit (*e.g.*, taluk) can be affected by social mobility within the unit ; for example, agricultural workers might become converted into industrial workers. But there are some characteristics (*e.g.*, literacy, education status) which are more affected by geographical mobility than by vertical mobility. Therefore, it seems worthwhile to investigate whether population composition in these latter respects show any consistent variation when areal units are suitably categorized.

What mode of classification of areal units is appropriate from this point of view ? One mode of classification that seems promising is in terms of the population size of the areal units. It is generally believed that population that inhabit larger places tend to have different characteristics from those inhabiting smaller places. "If we were able to observe the course of development of a pre-literate group, or lacking that if we had sufficient knowledge of pre-literate peoples to enable us to compare the structures of residence groups arranged in order of size from smallest to largest, we would undoubtedly observe....(that) each increment in size is accompanied by an advance in the complexity of organization."[1] According to another student, "in societies, as in living bodies, increase of mass is habitually accompanied

1. Amos H. Hawley, *Human Ecology: A Theory of Community Structure*, New York: The Ronald Press, 1950, p. 197.

by increase of structure,"[1] that is, social and economic organizational characteristics in complexity with increase in population size of the residential group. But the use of the word society in the above proposition gives the critic an opportunity to point out as a counter evidence that India and China with very large population have a very low level of economy while the U.S. with a much smaller population has a highly developed economy.[2] This objection has been taken into consideration when Emile Durkheim, a French Sociologist, proposed the following modification to the above proposition.[3] Durkheim observed that organizational complexity is more closely associated with social density, that is frequency of intercommunication and interchange between persons rather than simple physical density, that is, population per unit area. The implication of Durkheim's theory is that when one is looking for systematic variation in compositional characteristics, the areal units used for the investigation should not be segmented entities, rather they should be spatial entities with more or less unit character in the sense they should be internally interdependent wholes. From this stand point there is little sense in comparing India and the U.S. in illustrating an argument connecting population size and organizational complexity, because India's population consists of an aggregation of an astoundingly large number of isolated small populations each of which is with a very low level of economy.

Areal units such as villages, towns and cities are ordinarily supposed to be internally integrated wholes and non-segmented entities. Therefore, if population redistribution takes place in response to changes in economic organization, one should expect consistent pattern in demographic, economic, and social characteristics of such areal units when classified by population size. Population transfers related to occurrence of natural catastrophes or problems such as those of refugees have been rather negligible in this State. Hence the major mechanism behind whatever population redistribution has taken place here has been voluntary migration. The driving force behind this process might have been the desire of thousands of people to improve their lot in life. Whether or not the voluntary migration has been selective of particular types of persons and environments one cannot be sure without adequate data on the internal migration. But the general experience in other populations has been that if the economic organization of the different areal units differs from one another, the voluntary migration of individuals which is mostly motivated by a desire to improve one's lot tend to be highly selective. It is such selective migration that brings forth consistent pattern of demographic, economic and social characteristics of areal units by population size. A necessary condition for the voluntary migration to produce consistent patterns in areal characteristics by size of place is, therefore, the existence of significant differences in economic organization from one areal unit to another. Ordinarily as size of the settlement unit increases changes in economic organization also occur. But this need not be true of the village units of Kerala. That is so because the villages in Kerala are far from settlement units.

Village as is understood in Kerala is an artificial creation of the revenue administration. No visible signs show where one village ends and another begins. There is no central point around which the 'village life' is organized. Localizing influences such as community ditches and ponds dug for purposes of irrigation or water supply are rare. Conditions of self-sufficiency among farmers continue to be present even today.

If villages do not represent residential groups in the sociological sense of an aggregate of individuals involved in a common collective life process, there is little likelihood of economic structure of the villages varying with population size of the villages. In such situation, it is likely that the areal characteristics (demographic, social and economic) do not show consistent variation with size of place. That is so because population redistribution takes place without regard to differences in economic structure. If the preceding argument is correct we should not expect much of consistent variation in areal characteristics by size of place in Kerala. We have analysed a few characteristics of villages after classifying them by population size. Tables 13—19 show the findings.

The characteristics examined are the following :—

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[1]Herbert Spencer, *The Principles of Sociology*, Vol. 1, New York: Appleton-Century-Croft, Inc., 1921, p. 471, quoted in Hawley, *ibid.*, p. 195.

[2]See Hawley, *ibid.*, p. 195.

[3]See *ibid.*, p. 1916. (For more details about Durkheim's thesis, refer G. Simson, *Emil Durkheim on the Division of Labor in Society*, New York, 1933, pp. 256-263.)

Table 12

Number of Villages by Population size in each District of Kerala (1961)

District	Population Size Class							
	Under 5,000	5,000—7,499	7,500—9,999	10,000—14,999	15,000—19,999	20,000—24,999	25,000—29,999	30,000+
1. Cannanore	103	52	44	29	6	Nil	1	Nil
2. Kozhikode	75	43	48	38	4	1	Nil	1
3. Palghat	155	93	35	11	2	2	Nil	Nil
4. Trichur	116	59	34	19	7	3	Nil	Nil
5. Ernakulam	8	8	18	32	21	12	6	2
6. Kottayam	9	6	6	33	21	16	8	2
7. Alleppey	5	4	10	31	30	11	6	2
8. Quilon	Nil	Nil	8	27	28	21	9	5
9. Trivandrum	5	7	12	25	22	5	7	4
All Districts	476	372	215	245	141	71	37	16

Table 13

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic : Mean Density[1] (Population per acre)

District	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
1. Cannanore	1.31	1.82	2.60	3.01	2.38	*	5.69	*
2. Kozhikode	2.37	1.19	2.87	2.86	1.59	1.85	*	1.22
3. Palghat	1.82	2.21	2.66	2.45	0.79	2.75	*	*
4. Trichur	2.35	3.40	4.32	4.36	3.94	5.06	*	*
5. Ernakulam	2.63	3.26	1.84	2.34	3.13	4.64	4.91	5.57
6. Kottayam	0.45	1.29	1.65	3.15	2.33	2.54	1.74	0.82
7. Alleppey	2.26	4.88	3.54	3.84	3.69	3.86	4.77	4.87
8. Quilon	..	..	2.43	2.60	2.82	3.85	5.87	6.21
9. Trivandrum	5.83	2.65	3.38	3.52	3.70	4.65	4.98	3.87
All Districts	1.96	2.53	2.93	2.97	3.09	3.74	4.47	4.39

[1]See Table 12 for the number of observations on which the means in this Table are based.

*There are no villages in this cell.

Table 14

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic: Mean No.[1] of Households per 1,000 Acres of Land

Districts	Population size class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
1. Cannanore	226	302	419	466	362	*	958	*
2. Kozhikode	405	437	477	445	278	301	*	220
3. Palghat	333	391	464	443	154	490	*	*
4. Trichur	394	584	724	801	646	840	*	*
5. Ernakulam	424	535	312	394	522	758	814	880
6. Kottayam	65	228	284	359	385	433	386	154
7. Alleppey	373	858	626	680	669	669	854	874
8. Quilon	..	..	443	455	492	661	981	1060
9. Trivandrum	962	474	607	664	598	826	936	1192
All Districts	340	434	496	510	526	637	795	881

[1]See Table 12 for the number of cases on which the means in this Table are based.
*No village in this cell.

Table 15

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic : Mean[1] Sex Ratio : $\frac{\text{Male}}{\text{Female}} \times 1000$

Districts	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
1. Cannanore	970	968	935	952	1,055	*	1,098	*
2. Kozhikode	961	979	968	1,014	1,040	1,089	*	1,029
3. Palghat	916	903	924	930	940	1,012	*	*
4. Trichur	918	895	919	920	945	924	*	*
5. Ernakulam	971	972	992	985	999	979	978	993
6. Kottayam	1,083	1,115	1,005	1,015	1,027	1,059	1,048	1,091
7. Alleppey	1,067	953	982	973	972	962	980	983
8. Quilon	..	..	1,016	1,014	1,004	999	986	1,023
9. Trivandrum	959	983	969	999	984	994	991	988
All Districts	941	947	952	985	996	1,002	1,001	1,015

[1]See Table 12 for the number of observations on which the means in this Table are based.
*No village in this cell.

Table 16

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic : Average[1] Per Cent Literates

Districts	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
Males								
1. Cannanore	41·9	50·1	54·5	53·1	53·2	*	51·0	*
2. Kozhikode	52·5	48·8	48·3	49·5	45·8	55·0	*	47·0
3. Palghat	39·5	42·3	41·3	42·6	34·5	38·0	*	*
4. Trichur	50·5	54·9	56·6	55·4	51·9	55·7	*	*
5. Ernakulam	63·9	52·5	60·7	57·2	54·2	53·4	56·5	50·0
6. Kottayam	42·1	56·8	60·7	63·2	64·3	64·3	58·6	50·5
7. Alleppey	66·8	63·8	64·6	66·4	61·2	64·6	62·5	58·0
8. Quilon	..	..	56·3	56·0	57·3	57·0	57·7	59·8
9. Trivandrum	54·8	48·9	53·1	50·1	51·5	49·6	49·6	49·5
All Districts	45·7	48·7	52·4	55·8	56·7	58·1	56·8	53·8
Females								
1. Cannanore	20·0	24·8	32·5	33·2	36·7	*	37·0	*
2. Kozhikode	29·5	27·8	26·3	28·7	28·8	45·0	*	32·0
3. Palghat	24·5	28·0	25·0	25·1	17·0	18·0	*	*
4. Trichur	38·5	42·4	43·0	41·2	39·3	42·3	*	*
5. Ernakulam	45·5	38·6	47·9	41·9	39·1	40·4	43·5	34·5
6. Kottayam	22·9	40·7	50·2	51·0	54·0	52·7	44·0	32·5
7. Alleppey	54·4	49·0	51·6	55·6	45·8	51·5	49·5	38·0
8. Quilon	..	..	42·0	43·2	43·3	41·5	41·6	45·2
9. Trivandrum	39·2	30·3	34·4	34·2	34·3	36·0	34·4	34·0
All Districts	28·5	30·5	34·7	40·3	42·1	44·4	42·2	37·8

[1]See Table 12 for the number of observations on which the means in this Table are based.

*No village in this cell.

Table 17

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic : Average[1] Per Cent* Workers in Primary Sector

Districts	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
Males								
1. Cannanore	56	43	39	43	58	*	69	*
2. Kozhikode	42	43	39	44	57	72	*	59
3. Palghat	59	51	49	50	67	48	*	*
4. Trichur	50	38	32	39	40	38	*	*
5. Ernakulam	48	45	60	57	44	32	38	25
6. Kottayam	69	73	66	63	58	64	57	67
7. Alleppey	50	41	45	53	54	52	51	36
8. Quilon	..	..	72	72	69	60	47	46
9. Trivandrum	41	62	47	55	57	56	54	45
All Districts	53	45	44	53	56	53	50	45
Females								
1. Cannanore	71	62	60	57	73	*	74	*
2. Kozhikode	48	45	40	43	65	67	*	68
3. Palghat	73	60	61	65	84	79	*	*
4. Trichur	57	42	33	30	38	29	*	*
5. Ernakulam	61	52	58	63	48	33	42	21
6. Kottayam	82	71	73	55	54	65	74	81
7. Alleppey	70	34	58	58	49	53	38	12
8. Quilon	..	..	66	53	45	41	21	25
9. Trivandrum	47	62	33	43	43	35	32	16
All Districts	64	52	50	52	49	48	42	31

[1]See Table 12 for the number of observations on which the means in this Table are based.

*No village in this cell.

Table 18

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristics : Average[1] Per Cent Workers in Secondary Sector

Districts	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
Males								
1. Cannanore	9	17	21	22	16	*	4	*
2. Kozhikode	10	11	14	13	9	4	*	8
3. Palghat	15	14	17	17	12	21	*	*
4. Trichur	14	20	24	16	21	14	*	*
5. Ernakulam	17	17	11	13	19	27	28	33
6. Kottayam	5	8	9	10	12	12	14	12
7. Alleppey	13	20	14	14	16	15	19	21
8. Quilon	..	..	12	10	12	15	23	20
9. Trivandrum	14	11	14	13	14	13	12	20
All Districts	12	14	17	14	15	16	18	20
Females								
1. Cannanore	7	10	14	14	9	*	2	*
2. Kozhikode	20	20	25	23	5	1	*	4
3. Palghat	9	11	13	9	6	8	*	*
4. Trichur	9	21	29	35	32	44	*	*
5. Ernakulam	9	19	11	10	24	41	32	55
6. Kottayam	1	12	4	19	9	5	4	5
7. Alleppey	3	54	21	19	38	29	43	79
8. Quilon	..	..	26	32	41	45	66	52
9. Trivandrum	8	13	38	22	27	41	39	51
All Districts	10	16	20	20	28	31	36	46

[1]See Table 12 for the number of observations on which the means in this Table are based.

*No village in this cell.

Table 19

Demographic Characteristics of Rural Areal Units (Villages) by Population Size in Each District of Kerala (1961)

Characteristic : Average[1] Per Cent Workers in Tertiary Sector

Districts	Population Size Class							
	Under 5,000	5,000-7,499	7,500-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-29,999	30,000+
Males								
1. Cannanore	34	40	39	35	26	*	27	*
2. Kozhikode	48	45	47	44	35	24	*	33
3. Palghat	27	35	35	33	20	31	*	*
4. Trichur	36	42	44	44	39	48	*	*
5. Ernakulam	35	38	28	29	37	41	35	43
6. Kottayam	26	19	25	26	29	25	29	21
7. Alleppey	37	39	41	32	30	33	31	42
8. Quilon	..	..	18	17	20	25	30	36
9. Trivandrum	46	27	36	33	28	31	33	35
All Districts	34	40	39	32	29	30	31	36
Females								
1. Cannanore	22	28	26	29	19	*	25	*
2. Kozhikode	32	35	35	34	30	32	*	28
3. Palghat	18	29	26	26	10	13	*	*
4. Trichur	33	37	38	35	29	26	*	*
5. Ernakulam	30	29	29	27	28	26	27	23
6. Kottayam	17	17	22	26	36	28	23	15
7. Alleppey	26	12	21	21	13	18	20	9
8. Quilon	..	..	8	15	14	15	12	22
9. Trivandrum	44	25	29	35	30	23	29	33
All Districts	25	32	29	27	23	22	22	23

[1]See Table 12 for the number of observations on which the means in this table are based.

*No village in this cell.

(1) Density, that is, number of persons per acre in the village.

(2) Household density, that is, number of households per acre in the village.

(3) Sex ratio, that is, number of males per 1000 females in the village population.

(4) Literacy rate by sex, that is, for each sex the proportion of the total population of the village classified as literate.

(5) Proportion of workers engaged in primary industries, by sex.

(6) Proportion of workers engaged in secondary sector by sex, and

(7) Proportion of workers engaged in tertiary sector by sex.

Each of these characteristics was separately calculated for each village and the resulting frequency distributions examined ; arithmetic means were then calculated which are presented in Tables 13 to 19.

Among the characteristics examined, the only ones showing a gradient are density, number of households per acre and sex ratio, and that too only when the averages for Kerala as a whole are examined. District by district investigation shows that virtually none of the characteristics shows systematic variation. This is consistent with what has been said above, namely, the voluntary migration takes place without regard to economic structural differences, that, in turn, because the economic structure of villages does not vary according to the population size of the village, the village being not in the usual sense of the term a residential group.

A word about the implications of the segmented character of the villages may be in order here. Any attempt by an external agency to bring forth social change by deliberate efforts is likely to be more difficult in the case of Kerala villages because each household will have to be handled separately whereas had the village life been organized in the collective sense it would be possible for the outside influence to penetrate into the villagers through the village leadership, a process which is likely to be more efficient and easier to manage.

Another implication has to do with the difficulties involved in getting the rural population organized into enterprises which are market oriented. Such enterprises require the participants to be ready to become more and more specialized. This is possible only if the underlying social structure in the villages is one of internal interdependence.

Then there is the higher cost involved in welfare programmes such as rural electrification, and provision for running water supply to each household, etc.

So far we have examined only the characteristics of village units. How about towns and cities? Other investigators have found that characteristics of Indian cities and towns vary consistently with population size. Thus, for example, Davis found that sex ratio, literacy, and proportion of labour force engaged in the combined category of industry, trade and transport, vary directly with size of the city.[1] These findings have been interpreted on the premise that these are consequences of the economic basis of modern urbanization. The argument runs somewhat as follows : The larger the city, the greater its growth rate ; gains due to migration may be ascribed to the pull exerted by the availability of economic opportunities in the city ; among the migrants who come to the city, males predominate and literacy is relatively greater in that group.

Recent students, however, have found reasons to doubt the validity of the assumption that modern urbanization in the non-Western world is governed by the principles applicable to that in the West. Urban growth in India has occurred in the recent past and is occurring without a corresponding trend towards industrialization. "Whereas at a roughly equivalent degree of urbanization in the European countries only a little more than half of the population derived its livelihood from agriculture, more than two-thirds of the population derived their livelihood from agriculture in India in 1951 ; and whereas more than a quarter of the European people derived its livelihood from manufacturing, only a tenth of India's population depended upon manufacturing for its livelihood."[2] Also, recent literature abounds with observations that urbanization in India has not been showing the characteristic features of modern urbanization as they have been observed in Western coun-

[1]Kingsley Davis, *The Population of India and Pakistan*, Princeton, New Jersey, The Princeton University Press, 1951, pp. 134-144.

[2]Bert F. Hoselitz, "The Role of Urbanization in Economic Development, Some International Comparisons," in Roy Turner, (ed.) *India's Urban Future*, Berkly & Los Angeles: University of Californea Press, 1961, p. 164.

tries. Illustrative of the contrasts are the following features of Indian urbanization : the relatively small accumulation of industrial capital, the unorganized nature of enterprises in the cities, and the lack of opportunities for social mobility for the people involved.[1]

When we look at the urbanization process in Kerala, we find that there has not been a spurt in that process here even in the recent past. The proportion of the population living in urban areas in 1951 was 13.5 per cent which increased to only 15.1 per cent by 1961, a good part of this increase being due to annexation of new areas to existing towns rather than to rural-urban migration. In fact, it has been observed that in some parts of the State urban areas lost population due to migration during the decade, 1951-61. What is further more, a general tendency has been for the proportion of population living in urban areas in the State to be much less than that in India as a whole.

Most of the urban centres in Kerala are trading or service centres. Very little tendency seems to exist towards accumulation of capital or amalgamation of enterprises. There is no reason to believe that the other features of Indian urbanization which we have referred to above are not applicable to the urbanization in Kerala. Because of these reasons it is unlikely that consistent patterns in areal characteristics will be observed when towns are classified by population size. Table 20 present results for towns comparable to those presented for villages in Tables 13 to 19.

Table 20

Demographic Characteristics of Towns in Kerala classified by Population size
(1961 *Data*)

Characteristics	Population Size Class							
	Under 5,000	5,000-9,999	10,000-14,999	15,000-19,999	20,000-24,999	25,000-39,000	40,000-99,999	100,000 or more
Number of towns	1	18	18	15	16	10	10	4
Mean density (population per acre of land)	6	7	7	7	8	12	19	19
Average number of households per 1,000 acres of land	968	1201	1141	1128	1233	1970	2930	3018
Mean sex ratio	1084	992	1081	978	989	987	1010	1037
Mean Literacy (per cent literate)								
Male	68	59	59	60	60	60	64	67
Female	61	40	43	45	46	42	50	51
Mean per cent workers in primary sector[2]								
Male	1	21	23	27	21	16	10	6
Female	1	19	27	22	24	14	11	5
Mean per cent workers in secondary sector[3].								
Male	37	27	25	24	25	28	23	25
Female	10	36	29	28	28	45	25	24
Mean per cent workers in tertiary sector[4].								
Male	61	52	52	49	54	56	67	69
Female	89	45	45	50	48	41	65	71

[1]Hoselitz, *ibid*, pp. 164–171.

[2]Primary sector consists of the following industry classes :

Class I (cultivation), Class II (Agricultural labour), and Class III (Mining, quarrying, livestock, forestry, fishing, hunting and plantations, orchards and allied activities).

[3]secondary sector consists of the following industry classes :

Class IV (Household industry), Class V (Manufacturing other than household industry) and Class VI (Construction).

[4]Tertiary sector consists of the following classes :

Class VII (Trade and commerce), Class VIII (Transport, storage, and communications), and Class IX (other services).

Summary

In this chapter we have examined the changes in the size and territorial distribution of the population of Kerala during the period, 1901-61.

The population of the state has been increasing at an unusually rapid rate during the decades in question. Seldom do rural populations experience such high growth rates even after attaining a high population density. Kerala is a glaring exception in that respect.

Our analysis showed no clear tendency towards concentration of growth in any particular area or areas of the state. In fact, we found that the subareas (taluks) tended to become increasingly similar rather than dissimilar with respect to decennial growth rate.

Population redistribution in the state seems to have been taking place not in close relation to areal differences in population characteristics. No consistent patterns emerged in demographic characteristics of areal units when classified by population size.

CHAPTER III

COMPONENTS OF POPULATION CHANGE

MORTALITY TRENDS

Fertility, mortality and mobility are the three components of population change. In this chapter we shall discuss the recent trend in mortality in Kerala. The other components will be discussed in the subsequent chapters. Usually death statistics available from registration records furnish the most reliable data on mortality trends. But in this State as in other parts of India, vital statistics registration is not good enough to give any satisfactory picture of the recent trends in mortality. Indirect methods of ascertaining mortality trends are the only means available. The ultimate basis of almost all sound estimates of vital rates in India is likely to be the series of decennial censuses.

The Bureau of Economics and Statistics of the Government of Kerala has prepared mortality rates by age by comparing consecutive decennial censuses.The principle underlying the procedure is quite simple. When migration is negligible, the difference between population in any age group, say $(a, a+4)$, in the year t and the population in the age group 10 years older, here $(a+10, a+14)$, in the year $t+10$ equals the number of deaths experienced by the original cohort aged $(a, a+4)$ in the year t. Unfortunately, the age reporting in Indian censuses is faulty to the extent that precise estimates of mortality rates by age cannot be derived by differencing consecutive censuses. In order to adjust for the errors in ages reported, the age data obtained in each census are always smoothed before the differencing technique is applied. The age data are particularly defective, it may be noted, in the very young ages, therefore, the problem of estimating the correct numbers of persons in these ages is extremely difficult and consequently a high degree of arbitrariness enter into the estimates.

Because of the difficulties inherent in estimating death rates by differencing census figures after adjusting for the errors in age reporting, it is important to scrutinize the plausibility of the mortality rate thus obtained. In this chapter we propose to do such a scrutiny. First we present the abridged life tables prepared by the Bureau of Economics and Statistics of the Government of Kerala. Then we examine the survival ratios implicated in these tables for their plausibility on the consideration that successive life tables should show regularity in mortality risks by age. How far there is regularity in the mortality risks implicated in the official life tables will be examined by comparing them with the Model Life Tables prepared by the United Nations.

Table 1 shows the official life tables prepared by the Bureau of Economics and Statistics, Government of Kerala. Only three columns of the life Tables are shown in Table 1. Altogether five life tables for males and five life tables for females are reproduced in Table 1. These life tables represent the mortality pattern prevalent in the decades, 1911-21, 1921-31, 1931-41, 1941-51 and 1951-61. Thus we have life table values for all the decades upto 1961 except the first 1901-11. At the time of writing this the life table for 1901-11 was not available.

Table 1

MORTALITY

Abridged Life Tables for Kerala, Prepared by the Bureau of Economics and Statistics, Government of Kerala

Males

Age	1911-1921			1921-1931		
	5qx	lx	e^o_x	5qx	lx	e^o
0	0.35196	1,00,000	25.49	0.32970	1,00,000	29.54
5	0.08712	64,804	33.94	0.07932	67,030	38.58
10	0.08324	59,158	31.96	0.05793	61,713	36.71
15	0.06883	54,234	29.64	0.04213	58,138	33.83

Table 1

MORTALITY

Abridged Life Tables for Kerala, Prepared by the Bureau of Economics and Statistics, Government of Kerala—Contd.

Males

Age	1911-1921			1921-1931		
	5qx	1x	e_x^o	5qx	1x	e_x^o
20	0.06019	50,501	26.66	0.03497	55,689	30.21
25	0.08131	47,461	23.21	0.05812	53,742	26.21
30	0.11439	43,602	20.03	0.09090	50,619	22.66
35	0.13972	38,614	17.28	0.11878	46,018	19.67
40	0.16153	32,377	15.13	0.15056	40,552	16.97
45	0.20980	27,147	12.56	0.18343	34,446	14.53
50	0.29822	21,452	10.22	0.24058	28,128	12.28
55	0.35789	15,055	8.51	0.29417	21,361	10.32
60	0.44539	9,667	6.91	0.36208	15,077	8.59
65	0.54363	5,361	5.54	0.44015	9,618	7.10
70	.64793	2,447	4.39	0.52695	5,385	5.81
75	0.75072	862	..	0.61937	2,547	..
80	0.84255	215	..	0.71247	969	..
85	0.92181	34	..	0.79979	279	..
90	0.92792	3	..	0.87451	56	..
95+	1.00000	..	..	1.00000	7	..

Age	1931—1941			1941-1951			1951-1961		
	5qx	lx	e_x^o	5qx	lx	e_x^o	5qx	lx	e_x^o
0	0.28102	1,39,086	33.19	0.24472	1,32,401	39.89	0.17559	1,00,000	46.17
5	0.07207	1,00,000	40.76	0.03964	1,00,000	47.51	0.02820	82,441	50.80
10	0.05463	92,793	38.74	0.02547	96,036	44.37	0.01740	80,116	47.22
15	0.03757	87,724	35.84	0.02164	93,590	40.47	0.01361	78,722	43.01
20	0.04172	84,428	32.14	0.02912	91,565	36.31	0.01945	77,651	38.57
25	0.06347	80,906	28.43	0.04033	88,899	32.32	0.02823	76,141	34.28
30	0.07502	75,771	25.18	0.05401	85,314	28.57	0.03562	73,992	30.20
35	0.08635	70,087	22.03	0.06900	80,706	25.05	0.05016	71,356	26.22
40	0.10686	64,035	18.86	0.08877	75,137	21.72	0.07517	67,777	22.47
45	0.13822	57,192	15.82	0.11755	68,467	18.58	0.10606	62,682	19.08
50	0.19742	49,287	12.94	0.15609	60,419	15.72	0.13191	56,034	16.03
55	0.26549	39,557	10.49	0.20399	50,988	13.15	0.20098	48,082	13.26
60	0.35178	29,055	8.38	0.26447	40,587	10.87	0.26116	38,418	10.95
65	0.45625	18,834	6.59	0.33759	29,853	8.89	0.33521	28,385	8.94
70	0.57504	10,241	5.11	0.42721	19,775	7.16	0.42349	18,870	7.22
75	0.69945	4,352	3.90	0.52785	11,327	5.72	0.52430	10,879	..
80	0.81575	1,308	2.96	0.63613	5,348	4.52	0.63295	5,175	..
85	0.90456	241	2.24	0.74358	1,946	3.53	0.74127	1,899	..
90	0.95652	23	1.70	0.84369	499	2.72	0.83858	491	..
95+	1.00000	1	..	1.00000	78	2.00	1.00000	79	..

Table 1

MORTALITY

Abridged Life Tables for Kerala, Prepared by the Bureau of Economics and Statistics, Government of Kerala—Contd.

Females

Age	1911-1921			1921-1931		
	5qx	lx	e_x^o	5qx	lx	e_x^o
0	0.32490	1,00,000	27.41	0.28787	1,00,000	32.70
5	0.05783	67,510	35.20	0.04713	71,213	40.76
10	0.05257	63,606	32.22	0.02962	67,857	37.67
15	0.06418	60,262	28.87	0.03009	65,847	33.74
20	0.09048	56,394	25.68	0.04912	63,866	29.71
25	0.12164	51,291	22.97	0.07878	60,729	26.10
30	0.14013	45,052	20.80	0.10347	55,945	23.11
35	0.14667	38,739	18.79	0.11465	50,156	20.49
40	0.15601	33,057	16.60	0.13283	44,406	17.82
45	0.18560	27,900	14.20	0.17090	38,508	15.16
50	0.25380	22,722	11.87	0.23015	31,927	12.76
55	0.30711	16,955	10.05	0.27711	24,579	10.82
60	0.37322	11,748	8.42	0.34261	17,768	9.03
65	0.44835	7,363	7.01	0.41858	11,681	7.46
70	0.53113	4,062	5.78	0.50392	6,792	6.12
75	0.61881	1,905	..	0.59595	3,369	..
80	0.70715	726	..	0.69009	1,361	..
85	0.79065	213	..	0.78005	422	..
90	0.86347	45	..	0.85881	93	..
95+	1.00000	5	..	1.00000	13	..

Age	1931-1941			1941-1951			1951-1961		
	5qx	lx	e_x^o	5qx	lx	e^o	5qx	lx	e_x^o
0	0.25189	1,33,670	35.00	.0.21936	1,28,100	42.34	0.17389	1,00,000	50.00
5	0.05629	1,00,000	41.43	0.04815	1,00,000	48.98	0.02338	82,611	55.33
10	0.04558	94,371	38.76	0.03003	95,185	46.34	0.00999	80,680	51.60
15	0.04773	90,070	35.50	0.01425	92,327	42.71	0.00688	79,874	47.11
20	0.06289	85,771	32.15	0.01914	91,011	38.29	0.01742	79,324	42.41
25	0.07594	80,377	29.13	0.03324	89,269	33.99	0.02533	77,942	38.11
30	0.08290	74,273	26.32	0.04411	86,302	30.06	0.03045	75,968	34.04
35	0.08685	68,116	23.48	0.05924	82,495	26.33	0.04566	73,655	30.03
40	0.09669	62,200	20.47	0.07774	77,608	22.83	0.06328	70,292	26.34
45	0.11521	56,186	17.39	0.09728	71,575	19.53	0.08271	65,844	22.94
50	0.16825	49,713	14.32	0.13720	64,612	16.36	0.11317	60,398	19.78
55	0.23241	41,349	11.69	0.18953	55,747	13.55	0.14108	53,563	16.97
60	0.30685	31,739	9.47	0.24973	45,181	11.12	0.18285	46,006	14.34
65	0.39800	22,000	7.56	0.32757	33,898	8.99	0.23518	37,594	11.98
70	0.50483	13,244	5.96	0.42191	22,794	7.17	0.29952	28,753	9.90
75	0.62214	6,558	4.63	0.53085	13,177	5.64	0.37667	20,141	..
80	0.74011	2,748	3.56	0.64850	6,182	4.38	0.46614	12,554	..
85	0.84472	644	2.72	0.76392	2,173	3.37	0.56540	6,702	..
90	0.92000	100	2.07	0.86550	513	2.56	0.66928	2,913	..
95+	1.00000	8	1.37	1.00000	69	1.96	1.00000	963	..

Among the different statistics in the life tables the best known seems to be the estimate of expectation of life (e^{o}_{x}), that is, the average remaining life time, in years, for persons who have attained a given age (x). These values for selected ages are presented in the third column of each of the life tables in Table 1. The expectation of life at birth (e^{o}_{o}) is the most widely used statistics among the different life expectancy values. This measure represents the average number of years that the life table cohort may live altogether. It is important to remember that expectation of life at birth is strongly affected by the relatively large number of deaths that occur during the first year of life. Uncertainties regarding the estimates of infant mortality rates used in the calculation of life table values considerably affect the accuracy of the estimated life expectancy at birth. In preparing the life tables, the Bureau of Economics and Statistics, Government of Kerala, was confronted with the fact that there was no way of getting reliable estimates of infant mortality rates for the population of Kerala. A considerable amount of arbitrariness could not, therefore, be avoided in deciding the level of infant mortality to be used in preparing the life tables for the different periods. The estimates actually used are shown below :

Period	Infant mortality rates	
	Males	Females
1911-21	244	240
1921-31	220	200
1931-41	184	162
1941-51	160	145
1951-61	120	120

Source: R. S. Kurup & K. A. George (Eds.) *Population Growth in Kerala*, Trivandrum, Kerala: Demographic Research Centre, p. 87.

The figures for 1941-51 were arrived at after studying whatever data were available indicating the level of infant mortality prevailing in the population during that period. The figures for the earlier decades were obtained by assuming that the rate of change in infant mortality rate in Kerala was the same as that revealed in the life tables for Madras State. For 1951-61, the estimates prepared by the Indian Census Actuary were used.[1]

The life expectancy values at other ages are not affected by the arbitrariness that is characteristic of the above estimates of infant mortality rates. Moreover, expectation of life at different ages being some kind of overall average of measures of mortality risk at various ages, they are litt[illegible] it follows even by the inaccuracies in the es[illegible]changes in probabilities of surviving age by age. For in the averaging process, such errors tend to cancel out.

Table 2 shows the gain in life expectancy values at various ages in each of the life tables from the previous one. From what has been said just above it follows that one would not expect abrupt changes in the gain of life expectancy values as one goes from one age to the next. But the fact is that several of the columns of Table 2 fail to show regularity in pattern. For example, the figure against age 0 for males exceeds those against other ages in the second and fourth columns but is exceeded by other figures in other columns. The figures in column 1 (pertaining to gains in life expectancy for males over the period 1911-21 to 1921-31) show a tendency to increase with age at first till age 10 is reached, then to decrease till age 45, then again to increase and finally to decrease. The figures in the next column for males (pertaining to gains in life expectancy over the period 1921-31 to 1931-41) tend to decrease rather continuously from age 0 to age 20, then to increase till age 30, and finally to decrease from then on. But the figures in the last columns for males consistently decrease as age increases. Whereas in almost all columns for males the gain in life expectancy at age 5 is more than that at ages 10 to 20, for females it is not so in all columns ; in column 2 pertaining to gain over the period 1921-31 to 1931-41 the figure against age 5 is 0.67 which is less than all the other figures except the last three in that column.

The irregularities apparent in Table 2 may be due to the fact that errors in the estimated probabilities of survival age by age are so varying that they fail to cancel out when averages are taken. The inaccuracies in the estimated survival probabilities against the different age points will become clearer if we were to examine the figures presented in Table 3. In that Table we have

[1]Kurup & George (Eds.), *ibid.*, p. 87.

Table 2

Gains in Life Expectancy Shown in the Official Life Table Series

Age	e_x^o(1921-'31) —e_x^o(1911-'21)	e_x^o(1931-'41) —e_x^o(1921-'31)	e_x^o(1941-'51) —e_x^o(1931-'41)	e_x^o(1951-'61) —e_x^o(1941-'51)
Males				
0	4.05	3.65	6.70	6.28
5	4.64	2.18	6.75	3.29
10	4.75	2.03	5.63	2.85
15	4.19	2.01	4.63	2.54
20	3.55	1.93	4.17	2.26
25	3.00	2.22	3.89	1.96
30	2.63	2.52	3.39	1.63
35	2.39	2.36	3.02	1.17
40	1.84	1.89	2.86	0.75
45	1.97	1.29	2.76	0.50
50	2.05	0.66	2.78	0.31
55	1.81	0.17	2.66	9.11
60	1·68	0.21	2.49	0.08
65	1.56	0.51	2.30	0.05
70	1.42	0.70	2.05	0.06
Females				
0	5.29	2.30	7.34	7.65
5	5.56	0.67	7.55	6.35
10	5.45	1.09	7.58	5.26
15	4.87	1.76	7.21	4.40
20	4.03	2.44	6.14	4.12
25	3.13	3.03	4.86	4.12
30	2.31	3.21	3.74	3.98
35	1.70	2.99	2.85	3.70
40	1.22	2.65	2.36	3.51
45	0.96	2.23	2.14	3.41
50	0.89	1.56	2.04	3.42
55	0.77	0.87	1.86	3.42
60	0.61	0.44	1.65	3.22
65	0.45	0.10	1.43	2.99
70	0.34	0.16	1.21	2.73

shown the survival probabilities calculated from the life tables presented in Table 1 and the corresponding mortality level index obtained by a comparison of these values with those shown in the Model Life Tables prepared by the United Nations.[1] It seems to be fair to assume that if the survival probabilities implicated in the life tables presented in Table 1 exhibit regularity in age pattern, so will the mortality level indices obtained from the comparison with the U.N. Model Life Tables.

On examination of the figures in Table 3, we find that in several cases the mortality level is outside what is considered as feasible range in any of the populations in the recent period. Thus for example, the survival probabilities for age groups 45-49 through 75-79 implicated in the life tables for 1911-21 are found to be well below the corresponding values in the U.N. life tables with the lowest life expectancy at birth, namely, 20 years for both sexes combined. Similarly the male survival ratios for the last age group in the two most recent life tables and the female survival ratio for the same age groups in the life table pertaining to 1951-61 period are found to be well above the corresponding ratios of the U.N. life tables with the highest life expectancy at birth namely, 73.9 years for both sexes combined.

[1]See United Nations, *Manuals on methods of estimating population, Manual III: Methods for Population Projections by Sex and Age*, ST/SOA/Series A, Population Studies No. 25, New York, 1956.

Forty model life tables, ranging in life expectancy at birth from about 20 to about 74, are given in that set. It is believed that these life tables cover lowest and highest mortality levels observed in the populations of different nations in the past. Each life table is given a mortality level index, level 0 corresponds to the two life tables one for males and the other for females corresponding to a life expectancy at birth for both sexes combined 20 years, and level 115 corresponds to one male and one female life tables corresponding to life expectancy at birth for both sexes combined of 73.9 years. Each model life table is designed to represent a typical combination of age-sex specific functions of mortality, or survival, corresponding to a given general level of mortality, the general mortality level being determined in terms of the life expectancy at birth for both sexes combined.

Table 3

Survival Probabilities Calculated from the Official Life Tables and the Corresponding Mortality Level Index Obtained from the U.N. Model Life Tables

Age	1911—1921		1921—1931		1931—1941		1941—1951		1951—1961	
	S.Probability	M.Level Index	S.Probability	M.level Index	S.Probability	M.level Index	S.Probability	M.level Index	S.Probability	M.level Index
Males										
Births	0.69941	18.4	0.73539	27.8	0.77707	39.4	0.80257	47.4	0.85742	59.1
0—4	0.88168	28.1	0.87130	24.4	0.89067	31.6	0.92084	45.6	0.94640	61.3
5—9	0.91813	**	0.93339	3.6	0.93569	4.9	0.96819	33.9	0.97807	49.2
10—14	0.92357	**	0.95050	10.7	0.95492	15.3	0.97734	48.1	0.98519	66.0
15—19	0.93684	12.1	0.96302	42.5	0.96239	41.7	0.97531	62.0	0.98401	78.4
20—24	0.93113	18.7	0.95520	42.5	0.94736	34.0	0.96547	55.2	0.97625	70.7
25—29	0.90342	7.0	0.92589	21.0	0.93029	24.3	0.95303	43.6	0.96832	61.3
30—34	0.86163	**	0.89532	11.3	0.91993	23.9	0.93875	36.1	0.95787	52.9
35—39	0.83761	0.5	0.86589	9.0	0.90383	23.7	0.92180	32.7	0.93811	43.1
40—44	0.81871	4.8	0.82728	6.9	0.88028	23.0	0.89789	30.0	0.91003	35.8
45—49	0.74917	**	0.80532	9.6	0.83359	16.9	0.86440	26.8	0.87736	31.7
50—54	0.67288	**	0.72640	.9	0.77136	10.4	0.82149	23.9	0.83048	26.7
55—59	0.60381	**	0.67505	**	0.69523	3.8	0.76811	21.6	0.77060	22.3
60—64	0.51148	**	0.60287	**	0.60143	**	0.75893	37.6	0.70496	21.1
65—69	0.41154	**	0.52151	**	0.49163	**	0.57543	9.5	0.62508	23.2
70—74	0.30769	**	0.43282	1.2	0.37199	**	0.52829	27.2	0.53211	28.2
75—79	0.20583	**	0.34017	10.6	0.25345	**	0.42553	34.9	0.42884	35.9
80+	0.11336	1.0	0.28964	55.7	0.16201	13.5	0.39769	***	0.39440	***
Females										
Births	0.72964	21.3	0.73539	22.7	0.80082	41.2	0.81922	46.8	0.85811	52.1
0—4	0.89544	33.4	0.94294	57.9	0.90633	38.1	0.92866	49.3	0.95016	62.6
5—9	0.94792	16.4	0.96326	30.7	0.95005	18.1	0.96039	27.6	0.98387	62.2
10—14	0.94299	9.8	0.97168	42.4	0.95443	20.6	0.97898	54.6	0.99257	85.2
15—19	0.92363	7.2	0.96165	43.4	0.94533	25.7	0.98469	76.7	0.98831	83.5
20—24	0.89397	**	0.93644	28.1	0.93016	23.1	0.97397	65.7	0.97841	71.8
25—29	0.86832	**	0.90835	15.4	0.92018	22.2	0.96119	53.4	0.97241	65.8
30—34	0.85618	**	0.89066	12.4	0.91552	23.7	0.94882	44.9	0.96251	57.1
35—39	0.84958	3.1	0.87747	12.0	0.90890	24.3	0.93172	36.7	0.94577	45.8
40—44	0.83186	2.9	0.85024	7.9	0.89575	23.2	0.91323	31.2	0.92760	39.2
45—49	0.78306	**	0.80114	1.1	0.86194	17.8	0.88554	26.3	0.90269	34.2
50—54	0.72046	**	0.74732	**	0.80045	8.5	0.83649	18.7	0.87352	32.1
55—59	0.66296	**	0.69334	**	0.73344	2.4	0.78341	15.8	0.83958	34.4
60—64	0.59302	**	0.62315	**	0.65191	**	0.71467	14.3	0.79281	38.7
65—69	0.51516	**	0.54357	**	0.55453	**	0.62991	15.0	0.73518	46.8
70—74	0.43074	**	0.45589	**	0.44431	**	0.52992	19.2	0.66542	59.7
75—79	0.34274	4.9	0.36331	11.0	0.32852	0.3	0.41852	25.8	0.58338	75.5
80+	0.29995	50.9	0.32157	60.2	0.24714	31.1	0.37029	88.8	0.72073	***

**Less than Zero.

** Greater than 115.

Other irregularities that can be easily noted in Table 3 include the following:—

(1) There is absolutely no pattern in the mortality levels for males nor for females for 1911—21.

(2) The abrupt changes in the levels as one goes from one age group to the next is quite marked in almost all life tables especially for those pertaining to the earlier periods.

(3) Comparing the mortality level indices for given age groups over the periods covered, one finds irregularities such as the following: the level of males aged 20-24 changes from 19 in 1911-21 to 43 in 1921-31 then falls down to 34 in 1931-41 and again rises to 55 in 1941-51 and to 71 in 1951-61.

(4) Comparing the mortality level experienced by the same cohort of persons over the different years, we find again a considerable degree of irregularity. For example, the experience of the cohart aged 5-9 in 1911-21 period is patterned as follows in terms of mortality levels:

Less than 0	(1911-21)
43	(1921-31)
24	(1931-41)
33	(1941-51)
32	(1951-61)

Such abrupt changes in mortality experience is not common especially when there are no sudden changes in causes of death affecting different age groups.

To be fair one should emphasize that it is not to be expected that the mortality pattern of Kerala should conform precisely to the pattern shown under any one mortality level in the U.N. Tables. But it seems reasonable to expect that deviations from the model patterns would not be abrupt, or irregular, from one age group to another in any one period. Some corrections, therefore, seem to be in order for the 'levels' presented in Table 3.

A simple procedure has been used to arrive at a plausible set of mortality levels. First we calculated the average of the 1931-41, 1941-51 and 1951-61 levels corresponding to each age group. The three aforementioned levels and their averages age by age are shown in Table 4. Then we calculated the averages of levels cohortwise; these are presented in the last but one column of Table 4; in that column for example the first figure 50 is the average of the following three figures: 32 (mortality level for 0-4 in 1931-41 table), 48 (mortality level for 10-14 in 1941-51 table), and 71 (mortality level for 20-24 in 1951-61 table). From these average levels a sequence of adjusted levels was obtained (see last column of Table 4). The following considerations were given importance in deriving these adjusted levels: (1) There should not be any abrupt changes in the level from one age group to the next, and (2) the adjusted level should be comparable to the average levels obtained as described before unless requirement (1) demands otherwise. It is assumed that these levels represent the mortality conditions pertaining to 1941-51 period or more precisely to the year 1946.

There is some arbitrariness, to be sure, in arriving at the "adjusted" sequence shown in the last column of Table 4, and it cannot be claimed that the sequence accurately depicts the mortality conditions prevailing in the population around 1946; but it probably represents an improvement over the original figures for 1941-51 period.

Our next problem is to arrive at an age sequence of mortality levels for 1931-41 and 1951-61 periods. There is no doubt that mortality has been declining substantially over the period 1931 onwards in Kerala. The 1951 Census Report contains brief descriptions of the general and public health conditions in the Travancore-Cochin State during the decades covered. "During 1931-41 Cochin and Travancore did not face any serious famine or epidemic. But the world-wide economic depression that started in 1929 hit the States during the first half of the decade. Prices particularly of agricultural commodities, fell to the lowest depths recorded. The volume of trade shrunk. Employment was scarce and living difficult. Thus even though public health conditions were in general satisfactory, the economic depression has probably affected the growth rate to some extent."[1]

1. Census of India, 1951, Vol. XIII, Travancore-Cochin, Part I-A—*Report*, 1953, p. 13.

Table 4

Adjusted Sequence of Mortality Levels for 1941-1951

Age	Mortality level Index			Average level age by age	Average level cohortwise	Adjusted level for 1941—1951
	1931—1941	1941—1951	1951—1961			
Males						
0—4	32	46	61	46	50	50
5—9	5	34	49	29	43	50
10—14	15	48	66	43	41	50
15—19	42	62	78	61	43	50
20—24	34	55	71	53	35	45
25—29	24	44	61	43	30	40
30—34	24	36	53	38	27	35
35—39	24	33	43	33	24	30
40—44	23	30	36	30	23	25
45—49	17	27	32	25	21	20
50—54	10	24	27	20	25	20
55—59	4	22	22	16	17	20
60—64	less than 0	38	21	20	..	20
65—69	less than 0	10	23	11	..	20
70—74	less than 0	27	28	18	..	20
75—79	less than 0	35	36	24	..	20
80+	14	Greater than 115	Greater than 115	..	..	25
Females						
0—4	38	49	63	50	55	55
5—9	18	28	62	36	54	55
10—14	21	55	85	54	48	50
15—19	26	77	83	62	42	45
20—24	23	66	72	54	36	40
25—29	22	53	66	47	31	35
30—34	24	45	57	42	29	30
35—39	24	37	46	36	28	30
40—44	23	31	39	31	27	30
45—49	18	26	34	26	27	30
50—54	8	19	32	20	27	30
55—59	2	16	34	17	31	30
60—64	less than 0	14	39	18	..	30
65—69	less than 0	15	47	21	..	30
70—74	less than 0	19	60	26	..	30
75—79	0	26	76	34	..	30
80+	32	89	Greater than 115	..	..	35

"The first half of 1941-1951, covered the war years. With the fall of Burma in 1942, there was acute food shortage in the States. But the level of employment went high due to recruitment to war services and other auxiliary services and the starting of various industries as part of war effort. Rainfall and seasons were favourable. The prices of agricultural products shot up. Wage also rose correspondingly. There was a large influx of money into the remotest villages from persons who had gone on war service. Public health conditions showed steady improvement. Thus the decade was favourable to a high growth of population."[1]

"The scattered dispositions of houses so characteristic of this state is conducive to the maintenance of a high standard of environmental hygiene than would otherwise be possible. Each home, however lowly it be, stands on its own premises surrounded by a few trees, a practice which militates against the rapid spread of epidemic diseases. The people as a whole, take also particular care in keeping the premises clean and tidy. The availability of plentiful supply of water in numerous rivers, tanks and lakes has given rise to healthful habits, the daily bath—the Malayali bath is famous—and the frequent washing of clothes. These and other measures of personal hygiene supported by a relatively high percentage of literacy have been responsible to a large extent in warding of epidemics."[2]

Though only in general terms the above description is indicative of the steady improvement in mortality conditions in this part of the country. The death rates calculated from the registration data also reveal a consistent decline during the period in question in Travancore, Cochin and Malabar. (See Table below):

Decennial averages of registered death rates Kerala, 1921–60

Decade	Deaths per 1000 population
1921-30	14.18
1931-40	12.69
1941-50	11.52
1951-60	7.84

Of course the registration data are not useful to give any idea as to the magnitude of improvement in mortality conditions in the State. For this purpose we have to base our judgement on the life tables pertaining to the period 1931 onwards. The official life tables show that the gain in life expectancy at birth over the period, 1931-41 to 1941-51, has been 6.70 years and during the period, 1941-51 to 1951-61, it has been 6.28 years. This means there has been a rather uniform gain in life expectancy at birth at the rate of about 0.6 years per annum during the period 1931-41 to 1951-61. In view of the arbitrariness introduced in the estimation process, to which mention has already been made,[3] one may be skeptical regarding the reliability of the above estimate concerning the average gain in life expectancy at birth achieved by the population of Kerala during the period in question. A pattern considered as model by the United Nations' population division consists of an annual gain of 0.5 years in expectation of life at birth wherever the life expectancy at birth is below 55 years. This amounts to an improvement in the mortality level index by 10 units every 10 years. From the mortality level indices implicated in the 1931-41, 1941-51 and 1951-61 life tables (reproduced in Table 4), one gets very little guidance as to what is the appropriate rate of change in the indices at different ages during this period. In the absence of any reliable guidance in the official life tables, it was decided to follow the model pattern recommended by the United Nations. Accordingly, the age sequence of mortality level indices for 1931-41 period was derived from the adjusted sequence for 1941-51 period by substracting from each of the level in the latter sequence 10 units, and similarly by adding 10 units to each level in the 1941-51 age sequence of levels, we obtained the adjusted age sequence of mortality level indices for 1951-61 period. These adjusted age sequences of mortality level indices are presented in Table 5. The life table functions corresponding to the levels presented in Table 5 are shown in Table 6. A comparison of the life expectancy at various ages in the adjusted and official life tables reveals that by and large the adjustment resulted in reducing the life expectancy at infancy and younger ages and increasing at middle and older ages. (See Table 7).

[1] *Ibid.*, pp. 13-14.

[2] *Ibid.*, p. 19.

[3] *See* p. 30.

It would have been possible to derive adjusted life tables so as to make the life expectancy values of the adjusted and official life tables coincide at a few selected ages (*e.g.*, age 10, 20 and 30). But we thought that such a procedure was not warranted in view of the fact that the official life tables themselves are based on arbitrary adjustments to a faulty age data, on somewhat arbitrary estimates of infant mortality, and without any consideration for population changes through migration. It is our belief that the adjusted life tables represent an improvement over the official life tables.

Table 5

Adjusted Sequence of Mortality Levels for 1931-1941, 1941-1951 *and* 1951-1961 *Kerala*

Age	Males			Females		
	1931—'41	1941—'51	1951—'61	1931—'41	1941—'51	1951—'61
0 . . .	40	50	60	45	55	65
1—4 . . .	40	50	60	45	55	65
5—9 . . .	40	50	60	45	55	65
10—14 . . .	40	50	60	40	50	60
15—19 . . .	40	50	60	35	45	55
20—24 . . .	35	45	55	30	40	50
25—29 . . .	30	40	50	25	35	45
30—34 . . .	25	35	45	20	30	40
35—39 . . .	20	30	40	20	30	40
40—44 . . .	15	25	35	20	30	40
45—49 . . .	10	20	30	20	30	40
50—54 . . .	10	20	30	20	30	40
55—59 . . .	10	20	30	20	30	40
60—64 . . .	10	20	30	20	30	40
65—69 . . .	10	20	30	20	30	40
70—74 . . .	10	20	30	20	30	40
75—79 . . .	10	20	30	20	30	40
80—84 . . .	10	20	30	20	30	40
85+ . . .	15	25	35	25	35	45

Table 6

Abridged Life Tables for Kerala 1931-1941, 1941-1951 *and* 1951-1961 *from the Adjusted Sequence of Levels of Mortality*

Age	1931—1940			1941—1950			1951—1960		
	5qx	lx	e_x^o	5qx	lx	e_x^o	5qx	lx	e_x^o
Males									
0	0.19573	1,00,000	35.06	0.16909	1,00,000	39.62	0.14378	1,00,000	44.23
1—4	0.10416	80,427	..	0.08207	83,091	..	0.06356	85,622	..
5—9	0.03300	72,050	43.25	0.02565	76,272	46.64	0.01972	80,180	49.93
10—14	0.02189	69,672	39.64	0.01772	74,315	42.80	0.01340	78,599	45.88
15—19	0.03234	68,147	35.47	0.02628	73,036	38.50	0.02122	77,545	41.47
20—24	0.04976	65,943	31.57	0.04146	71,116	34.48	0.03407	59,000	37.32
25—29	0.05889	62,662	28.10	0.04850	68,168	30.86	0.03940	73,314	33.54
30—34	0.07262	58,972	24.70	0.05861	64,862	27.30	0.04733	70,425	29.82
35—39	0.09414	54,689	21.44	0.07503	61,060	23.85	0.06005	67,092	26.17
40—44	0.12918	49,541	18.40	0.10296	56,479	20.58	0.08181	63,063	22.69
45—49	0.17789	43,141	15.76	0.14187	50,664	17.65	0.11354	57,904	19.48
50—54	0.21097	35,467	13.63	0.17243	43,476	15.16	0.14139	51,330	16.66
55—59	0.25460	27,984	11.61	0.21420	35,979	12.80	0.18032	44,072	13.99
60—64	0.30635	20,859	9.72	0.26690	28,273	10.61	0.23193	36,125	11.52
65—69	0.38042	14,469	7.91	0.34245	20,727	8.56	0.30680	27,747	9.24
70—74	0.49126	8,965	6.24	0.45234	13,629	6.71	0.41431	19,234	7.23
75—79	0.61802	4,561	4.84	0.58059	7,464	5.19	0.54186	11,265	5.57
80—84	0.77725	1,742	3.63	0.73973	3,130	3.91	0.70045	5,161	4.20
85+	..	388	2.59	..	815	2.91	..	1,546	3.19
Females									
0	0.16201	1,00,000	37.96	0.13640	1,00,000	42.97	0.11154	1,00,000	48.12
1—4	0.09258	83,799	..	0.07193	86,360	..	0.05392	88,846	..
5—9	0.02970	76,041	44.57	0.02281	80,148	48.34	0.01688	84,055	52.05
10—14	0.02458	73,782	40.86	0.01916	78,320	44.41	0.01468	82,637	47.90
15—19	0.03932	71,969	36.83	0.03161	76,819	40.23	0.02479	81,423	43.57
20—24	0.05770	69,139	33.23	0.04728	74,391	36.46	0.03788	79,405	39.62
25—29	0.07180	65,150	30.11	0.05903	70,859	33.16	0.04668	76,397	36.08
30—34	0.08796	60,472	27.25	0.07062	66,676	30.08	0.05619	72,831	32.72
35—39	0.09705	55,153	24.64	0.07653	61,968	27.17	0.06019	68,739	29.52
40—44	0.10555	49,000	22.02	0.08287	57,225	24.22	0.06552	64,601	26.25
45—49	0.12027	44,544	19.32	0.09575	52,484	21.18	0.07696	60,368	22.92
50—54	0.14401	39,187	16.62	0.11686	47,458	18.16	0.09570	55,723	19.62
55—59	0.17708	33,543	14.00	0.14754	41,912	15.23	0.12364	50,390	16.43
60—64	0.23202	27,603	11.47	0.19956	35,728	12.44	0.17201	44,160	13.40
65—69	0.30678	21,199	9.18	0.27207	28,598	9.91	0.24102	36,564	10.66
70—74	0.41544	14,696	7.13	0.37863	20,817	7.68	0.34411	27,751	8.25
75—79	0.55505	8,590	5.43	0.51543	12,936	5.84	0.47796	18,202	6.27
80—84	0.71427	3,822	4.08	0.67299	6,268	4.40	0.63346	9,502	4.71
85+	..	1,092	3.04	..	2,050	3.31	..	3,483	3.54

Table 7

Life Expectancy in the Official Life Table Compared With That in the Adjusted Life Tables for Selected Areas

Age	1931—1941		1941—1951		1951—1961	
	Official	Adjusted	Official	Adjusted	Official	Adjusted
Males						
0	33.2	35.1	39.9	39.6	46.2	44.2
5	40.8	43.3	47.5	46.6	50.8	49.9
10	38.7	39.7	44.4	42.8	47.2	45.9
15	35.8	35.5	40.5	38.5	43.0	41.5
20	32.1	31.6	36.3	34.5	38.6	37.3
25	28.4	28.1	32.3	30.9	34.3	33.5
30	25.2	24.7	28.6	27.3	30.2	29.8
35	22.0	21.4	25.1	23.9	26.2	26.2
40	18.9	18.4	21.7	20.6	22.5	22.7
45	15.8	15.8	18.6	17.7	19.1	19.5
50	12.9	13.6	15.7	15.2	16.0	16.7
55	10.5	11.6	13.2	12.8	13.3	14.0
60	8.4	9.7	10.9	10.6	11.0	11.5
65	6.6	7.9	8.9	8.6	8.9	9.2
70	5.1	6.2	7.2	6.7	7.2	7.2
Females						
0	35.0	38.0	42.3	43.0	50.0	48.1
5	41.4	44.9	49.0	48.3	55.3	52.1
10	38.8	36.8	46.3	44.4	51.6	47.9
15	35.5	33.2	42.7	40.2	47.1	43.6
20	32.2	30.1	38.3	36.5	42.4	39.6
25	29.1	27.3	34.0	33.2	38.1	36.1
30	26.3	24.6	30.1	30.1	34.0	32.7
35	23.5	22.0	26.3	27.2	30.0	29.5
40	20.5	19.3	22.8	24.2	26.3	26.3
45	17.4	16.6	19.5	21.2	22.9	22.9
50	14.3	14.0	16.4	18.2	19.8	19.6
55	11.7	11.5	13.6	15.2	17.0	16.4
60	9.5	9.2	11.1	12.4	14.3	13.4
65	7.6	7.1	9.0	9.9	12.0	10.7
70	6.0	5.4	7.2	7.7	9.9	8.3

Summary

Inferences regarding the trend in mortality in the state had to be drawn solely from the series of decennial censuses, vital statistics registration being not of a quality furnishing reliable data on deaths.

For the purpose we have used the life tables prepared by the Bureau of Economics and Statistics of the Government of Kerala. These life tables were prepared by comparing data from consecutive censuses. Certain minor adjustments were made in the figures published by the Bureau so as to reduce the irregularity in mortality risks by age revealed in successive life tables. To make the adjustments we have used the U. N. Model life tables.

It cannot be claimed that the adjusted life tables presented in this chapter accurately portray the trends in the mortality conditions of the population of Kerala. However, it is our belief that the adjusted life table values represent an improvement over the tables published by the Bureau.

CHAPTER IV

COMPONENT OF POPULATION CHANGE: FERTILITY TRENDS

In the preceding chapter, the general trend in mortality conditions in this State was discussed. In the present chapter, we will discuss the fertility trend in the recent years. As in the case of mortality, the usual direct record, namely, registration data, is not of a quality to furnish reliable estimates of recent trends. The registered births in the State lead to the rates shown in Tables 1 and 2 pertaining to the years 1921-1964.

Table 1

Crude Birth Rates, Kerala, 1958-1964, *Calculated From Registration Data*

Year	Birth per 1,000 population
1958	24·58
1959	26·23
1960	23·92
1961	25·00
1962	22·73
1963	22·38
1964	23·32

Source : Bureau of Economics and Statistics, Government of Kerala, *Vital Statistics Bulletin* (Bulletin No. 28), 1965 Trivandrum, Kerala, P. 2.

Table 2

Estimated Birth Rates in Kerala From Registration Data

Period	Average number of births per 1,000 population per year
1921-30	26·92
1931-40	23·36
1941-50	24·91
1951-60	23·80

Everybody agrees that the fertility level in Kerala in recent years is much higher than what the registered figures indicate. On the basis of a recent enquiry conducted by the Bureau of Economics and Statistics, Government of Kerala, regarding the completeness of registration of vital events in the State, it was estimated that about 45 per cent of births escaped registration in the State in 1964. If one were to assume that this estimate of underregistration for 1964 is applicable to earlier years as well, one arrives at the estimated crude birth rates shown in Table 3 for the period 1921-60 and a rate of 45 births per 1,000 population for the year 1961 in the State.[1] The reliability of this figure of course depends on the reliability of the estimated underregistration for 1964 and on the validity of the assumption that the same rate is applicable to the registration data of 1961. It seems to be a fair assumption that the efficiency of registration has not decreased over time. Therefore, if at all there has been any change in the completeness of registration of birth, it must have been for the better as time passed. Hence, the estimated crude birth rate for 1961 arrived at by applying the 1964 incompleteness of registration is more likely to be an underestimate rather than an over estimate of the actual figure. If this assumption is correct, it seems quite likely that the crude birth rate of the population of Kerala around 1961 was between 40 and 45 per 1,000 population leaving some reasonable allowance to the uncertainty involved in the estimated completeness of registration of 1964. This leads one to infer that the fertility level of the population of Kerala has not changed drastically during the years under consideration. We shall now examine some of the indirect evidence in this respect.

[1]If one were to apply the completeness of registration equal to 55 per cent of the total to the average of the estimated rates for 1960, 1961 and 1962, one gets a crude birth rate of 43 per 1,000 population.

Table 3

Estimated Births per 1,000 Population, Kerala State, 1921-30, 1931-40, 1941-50, 1951-60.*

Period	Average number of births per 1,000 persons per year in each period.
1921-30	48·9
1931-40	42·5
1941-50	45·3
1951-60	43·3

*Estimated from the rates in Table 1 by applying a correction factor for underregistration equal to: (*100/55*).

If there had been any drastic reduction in fertility prior to 1961, its effect should have been reflected in the age distribution of the population; for example, a drastic reduction in fertility should produce a corresponding reduction in the ratio of young children to the total population or more especially in the ratio of children under 5 years of age to women in child bearing years. But the census data reveal no such reduction. In fact, as the figures in Table 4 show there has been a rise in the ratio of children under 5 to women aged 15-44. A small rise in this ratio of course is consistent with a fairly substantial decline in infant mortality offset by a small decline in fertility level. But if the gain in infant mortality is only moderate while the reduction in fertility has been substantial, the ratio of children to the total population or to women in child bearing years should show a substantial fall. This is clearly demonstrated in Table 5 in which the ratio of children under 5 to the total population and to women in the age group 15-44 are presented for two projected populations of India, one of the projections being based on the assumption of an unchanging fertility level and the other on a declining fertility trend both assuming the same moderately declining mortality trend—A trend which seemed to be most plausible.

The effect of fertility decline on the ratio of children to total population when the mortality gains remain moderate can be seen by comparing the rows 1 and 2 in Table 5. If fertility declines the tendency will be for the ratio to decline substantially in the short-run. In the light of the above findings one might reasonably interpret the slight rise in the ratio of children to women

Table 4

Ratio of Children Under 5 to Women Aged 15-44

Census year and territory	Ratio of children under 5 to women aged 15-44
1961-Kerala	0·6997
1951-Kerala	0·6059
1941-Travancore	0·6526
1941-Cochin	0·5960

Table 5

Ratio of Children Under 5 to Total Population in Two Projected Populations of India

Projection	1956	1961	1966	1971	1976	1981	1986
Projection A[1]	0·153	0·157	0·157	0·157	0·158	0·160	0·161
Projection B[2]	0·153	0·150	0·138	0·126	0·115	0·102	0·096

Source : A. J. Coale and E. M. Hoover. *Population Growth and Economic Development in Low-Income Countries*, Princeton, New Jersey: Princeton University Press, 1958, Appendix A, Tables 5 & 7.

[1]Projection A is characterized by an unchanging fertility level and a plausible mortality trend.

[2]Projection B is based on the assumption that fertility level declines to half its 1956 value by 1981 and then remains unchanged, mortality trend being the same as implied in Projection A.

in the child bearing years in Kerala to be indicative of the fact that there has not been much of a decline in fertility in the population. The stability in the age distribution that one observes in the population of Kerala over the period 1941-1961 gives support to the above contention.

Another set of evidence for doubting that Kerala's fertility level has been subjected to a major decline can be had in the absence of any clear-cut fertility differentials in any of the fertility studies conducted in the State. The incipient stages of fertility decline almost invariably show the emergence of significant fertility differentials, some segments of the population adopting small family patterns much earlier than other segments. Hence absence of clear-cut differentials in fertility is to be taken as evidence for the continuance of fertility at high level. Of the emperical studies, the 1951 maternity study which was undertaken along with the census is perhaps the most important one. In that study, however, no differential was clearly observed between rural and urban segments or between agricultural land holders, agricultural labourers and those depending on non-agricultural means of livelihood. (See Table 6). The number of children ever born to women 45 and over who were still married was 6.6 among rural segment and 6.4 among the urban segment of the population. The corresponding figures among tenants was 6.7, among agricultural labourers 6.3, and among population depending on non-agricultural enterprises 6.6.

The enquiries of fertility behaviour and attitudes conducted by the Bureau of Economics and Statistics of the Government of Kerala also found that no special groups of the urban populations of the State can be said to have switched on to small family pattern earlier than others. (See Tables 7 and 8).

Another point worth examining in this connection has to do with the trend in age at marriage. A rise in age at marriage is often cited as evidence for a fall in fertility, other things being equal. Calculation of age at marriage using census data on percentages of single males and females by age, however, shows that there has been very little change in this respect since 1931. (See Table 9). But the average age at marriage in Kerala is found to be higher than that elsewhere in India. This may be construed as evidence in support of the contention that fertility rates in Kerala is lower than what prevails elsewhere in India.[1] But the higher age at marriage only means that proportion of women contributing to births during the early periods of reproduction is relatively smaller in Kerala than is the case in other States. But if late start of reproduction is compensated for by relatively higher fertility at later ages the fertility level may remain unaffected even though the long term growth rate is likely to be affected thereby.[2]

Further, the effect on the birth rate of a high proportion of never married at earlier ages, which leads to the higher age at marriage, is likely to be offset by the lower proportion of widows at all ages in Kerala as compared to what is found in other States (See Table 10).

The above evidences point to the negation of the hypothesis that there has been a decline in the fertility level of the population of Kerala, or that the fertility level of Kerala is substantially lower than that prevailing in other parts of the country. But that says very little about the actual level of fertility prevailing in the State. A clear idea about the past trends in fertility in terms of such period rates as crude birth rate or age specific fertility rates is, however, necessary to make plausible conclusions concerning the components of the population change in the past as well as to make plausible conjecture about the likely future trends in fertility. As has been mentioned already any sound idea concerning the past trend in fertility will have to be had from indirect data, registration data being too inadequate to furnish anything reliable on the score.

Based on whatever data we could find in regard to fertility performance of the population of Kerala, we have tried to arrive at plausible estimates of the fertility level of the population at different points of time. These estimates show that the crude birth rate of Kerala's population remained above 45 per 1,000 population prior to 1941 and that during the period 1941-1961 there has been a slight decline in fertility probably reaching very near 40 per 1,000 population by 1961.

[1]For example, according to recent calculations the mean ages at marriage were 17·8 years for males and 15.4 years for females in India as compared to 20·7 for males and 19·9 for females in Kerala.

[2]Coale and Tye have recently demonstrated that "Chinese" high fertility results from late marriage and then very high reproduction rates into the later part of the child-bearing period. Such pattern results in slower rate of population growth, other things being equal, because of the resulting longer length of generation. See Coale, A. J. and Tye, C. T., "The significance of Age-Patterns of Fertility in High Fertility Populations," *Milbank Memorial Fund Quarterly*, 39 (4), October 1961, pp. 631-646.

Table 6

Fertility Data From 1951 Maternity Study. Ratio of Children Ever Born to Still Married and Other Mothers by Age of Mother in Rural and Urban Segments of the Population and Groups with Agricultural Land holdings, Agricultural Labour or Non-Agricultural Activities as Means of Livelihood. (Based on a 10% Sample of Census returns).

	Age of mother on 1-3-1951	No. in the sample	Ratio of children ever born to mothers	
			Still married	Widowed, Separated or Divorced
Rural	All ages	1,73,872	4·3	4·9
	Less than 20	4,196	1·2	1·8
	20-24	24,834	1·7	1·6
	25-29	27,295	2·9	1·9
	30-34	21,207	4·1	2·6
	35-39	21,539	5·3	3·5
	40-44	16,020	6·2	4·2
	45 and over	58,781	6·6	5·5
Urban	All ages	32,583	4·2	4·8
	Less than 20	982	1·2	1·4
	20-24	4,427	1·9	1·6
	25-29	5,065	3·0	2·1
	30-34	3,924	4·2	2·9
	35-39	3,808	5·4	3·9
	40-44	3,066	5·9	4·3
	45 and over	11,311	6·4	5·3
Agricultural land holders and tenants	All ages	71,876	4·5	4·9
	Less than 20	1,624	1·2	1·6
	20-24	9,867	1·7	1·5
	25-29	10,012	2·9	1·9
	30-34	8,087	4·2	2·6
	35-39	8,193	5·3	3·5
	40-44	6,735	6·2	4·3
	45 and over	27,358	6·7	5·4
Agricultural Labourers	All ages	43,129	4·1	4·9
	Less than 20	1,022	1·2	1·2
	20-24	5,933	1·7	1·5
	25-29	6,899	2·8	2·0
	30-34	5,340	4·0	2·7
	35-39	5,737	5·1	3·7
	40-44	4,119	6·0	4·2
	45 and over	14,079	6·3	5·5
Non-Agricultural Families	All ages	91,450	4·2	4·9
	Less than 20	2,532	1·2	1·9
	20-24	13,461	1·8	1·7
	25-29	15,449	3·0	1·9
	30-34	11,704	4·2	2·8
	35-39	11,417	5·5	3·6
	40-44	8,232	6·2	4·3
	45 and over	28,655	6·6	5·5

Table 7

Ratio of Number of Children Ever Born to Women in Different Household Income Groups in Principal Towns of Kerala (Number of Women in Sample Shown in Brackets)

Number of children born alive to all married females (living)

Town	Household Income Groups				
	Lowest	Lower Middle	Upper Middle	Highest	All income group
1. Cannanore	3·44 (143)	3·82 (202)	3·69 (137)	3·47 (63)	3·53 (545)
2. Kozhikode	3·33 (174)	3·62 (276)	3·45 (141)	3·74 (141)	3·47 (732)
3. Palghat	4·38 (202)	4·53 (251)	4·71 (129)	4·29 (63)	4·43 (645)
4. Trichur	3·57 (104)	3·48 (141)	3·40 (109)	3·52 (75)	3·54 (429)
5. Ernakulam	3·81 (166)	3·91 (216)	3·96 (144)	3·87 (134)	3·85 (660)
6. Attingal	3·99	4·51	3·57	4·10	4·22
7. Trivandrum	3·86	3·83	3·82	3·68	3·85

Table 8

Average Interval (Months) Between Effective Marriage and First Termination by Household Income Group

Town	Household Income Groups				
	Lowest	Lower Middle	Upper Middle	Highest	All income group
1. Cannanore	41·79	39·99	41·42	35·06	39·98 (467)
2. Kozhikode	34·72	37·48	39·41	35·45	36·08 (644)
3. Palghat	40·01	34·69	41·03	35·89	38·73 (605)
4. Trichur	18·34	29·08	27·94	32·48	22·78 (409)
5. Ernakulam	38·10	37·71	34·41	36·25	37·44
6. Attingal	29·71	31·36	29·50	44·92	30·49
7. Trivandrum	34·68	34·01	35·54	37·23	34·63

Table 9

Per Cent Single in Various Age Groups and Mean Age At Marriage Calculated Therefrom for 1931 and 1941 Travancore, 1951 Travancore-Cochin and 1961 Kerala

Age	1931 Travancore		1941 Travancore		1951 Travancore-Cochin		1961 Kerala	
	Males	Females	Males	Females	Males	Females	Males	Females
0-4	100·00	100·00	100·00	100·00	100·00	100·00		
5-9	99·88	99·23	100·00	99·97			100·00	100·00
10-14	99·11	92·04	99·84	97·47	99·96	99·87	99·86	98·56
15-19	81·30	38·79	94·74	62·43			98·67	69·62
20-24	59·47	16·21	66·00	20·33	85·85	46·53	78·26	22·74
25-29	20·06	3·93	33·08	5·32			36·93	7·98
30-34	10·97	2·74	11·93	2·42	21·20	5·73	13·18	4·50
35-39	4·83	1·85	5·16	1·68			5·51	3·23
40-44	3·82	1·62	3·13	1·28	4·46	2·68	3·38	2·92
45-49	3·17	1·32	2·40	1·03			2·72	2·22
50-54	2·89	1·21	2·04	·91	2·48	1·69	2·25	1·84
55-59	2·10	1·07	1·77	·84			2·06	1·46
60+	2·07	1·01	1·50	·69	1·76	1·12	1·48	·99
65+					1·55	·84		
Mean age at marriage	23·3	17·5	25·3	19·3	25·7	20·1	26·3	20·0

Table 10

Percentage Distribution of Females by Age and Marital Status of Kerala, Madras, Mysore and all-India (Rural)

Age group (years)	Marital status	Per cent of all women belonging to different marital status categories in			
		Kerala	Madras	Mysore	All India
Under 14	Single	99·41	98·84	94·03	91·56
	Married	0·56	1·15	5·88	8·37
	Widowed	0·01	0·01	0·09	0·06
	All	100·00	100·00	100·00	100·00
15-24	Single	42·83	26·37	7·52	10·30
	Married	53·77	71·09	88·29	86·94
	Widowed	0·22	1·01	1·93	1·39
	All	100·00	100·00	100·00	100·00
25-44	Single	4·22	0·88	1·45	0·45
	Married	83·41	82·22	81·91	87·09
	Widowed	6·96	13·62	14·72	11·18
	All	100·00	100·00	100·00	100·00
45 and over	Single	1·06	0·21	1·03	0·40
	Married	57·93	36·89	34·40	43·01
	Widowed	37·55	61·84	64·01	56·03
	All	100·00	100·00	100·00	100·00
All ages	Single	50·42	40·09	41·37	38·80
	Married	39·31	42·83	43·38	48·06
	Widowed	7·83	15·70	14·30	12·48
	All	100·00	100·00	100·00	100·00

Source : National Sample Survey, *Fertility and Mortality Rates in India*, Fourteenth Round, No. 76, The Cabinet secretariat, Government of India.

Fertility level implicated in data on child/ woman ratio

We have derived our estimates from data on ratio of children (ever born) to women in different age groups as observed at different census years. The procedure we have adopted in arriving at the estimates is based on the following assumption: The age specific fertility rate "y" at any age point x in the reproductive period can be represented by a polynomial in x, say f (x). Simple algebra, then, leads to formulae for the conventional age specific fertility rates in terms of the ratio of children (ever born) to women in different age groups. (The details of the logic are given in the Appendix. The method was proposed by William Brass who found the procedure to be valid in several instances).

Before applying the procedure referred to above, it was necessary to make certain adjustments to the reported data on the ratio of children to women in the different age groups. These adjustments are described in the appendix to this chapter. The Tables 12, 13, 14, 15 and 16 show what we have been able to derive from the available data.

Data and their limitations

Before we proceed to examine the findings of Tables 12-16, a few comments regarding the coverage and other aspects of the original data used for the analysis are in order. We have analysed fertility data for Travancore State for 1931 and 1941, for Travancore-Cochin State for 1951, and for Kerala for 1961. We shall comment briefly on all these.

First we take the data we have used for Travancore State. Fertility enquiries were conducted in Travancore in 1921, 1931 and 1941. In 1921, the enquiry was limited to municipal towns only, and therefore, we thought it not worthwhile to analyze them. In 1931, the enquiry was done on a rather elaborate scale in connection with the census. A special schedule was used for the purpose. The schedules were distributed among municipal staff in municipal towns and school masters in rural areas. The municipal officers filled out the schedules by house-to-house visits to obtain the required information from married women or their husbands. The school masters got the schedules filled out by the grown boys and girls in their respective schools. The students took the schedule home and filled out the details with the help of their parents. The 1931 Census Report says that the students showed great zeal and interest in the work and comments that the students did the work more satisfactorily than did the municipal staff in towns.[1]

Statistically speaking the procedure adopted in the 1931 Census to collect data involved the use of a biased sample. According to the census Report, this procedure was adopted on the ground that it was thought not practicable to include all married women in the enquiry. However, the Report adds, "special care was taken in the distribution of the schedules so as to obtain information about as many women as possible representative of the different strata of society. In Travancore, where there is hardly a village without a school, no difficulty was experienced in this matter."[2]

It is to be noted, however, that since information was collected through grown boys and girls attending school and that too about their mothers only, the sample must have overrepresented those in older age groups and underrepresented those in younger age groups. Also mothers without school-going children were given no chance of getting into the sample. In this connection the figures in the following Table showing the proportion of women in each age group represented in the sample are informative.

Table 11

Proportion of Married Women in Each Age Group in Travancore (1931) *Included in the Sample for Fertility Enquiry*

Age of woman	Number in the sample	Number in the sample as per cent of the total number in the population
All ages	1,02,068	9·9
Below 15	473	1·8
15—19	9,087	6·2
20—24	14,603	7·6
25—29	14,172	8·2
30—34	16,160	10·6
35—39	17,371	16·0
40—44	11,746	13·5
45 and over	18,456	13·1

Source: Census of India, Report Vol. XXVI, Travancore, (1931), p.139.

[1]Census of India, 1931, Vol. XXVIII, Travancore, Part 1-*Report*, p. 139.

[2]*Ibid.*

From the figures in Table 11, it is clear that the disproportionality in the representation of various age groups in the sample is not very bad. However, it should be emphasized that the sample is not a probability sample and hence generalization from the sample to the total population is difficult.

In attributing to the general population the fertility level revealed in the above sample, we make the assumption that married women without school-going (grown) boys or girls, have the same fertility pattern as the section represented in the sample. It may be that certain classes of the population failed to send their children to school and obviously those classes were not represented in the sample. Probably this may not be a deficiency insofar as class differentials in fertility might not have emerged by 1931 in Travancore.

In 1941, fertility data were collected in a more systematic way along with the census. In all the States in India two questions on fertility were asked; one about the age of the mother at birth of the first child and the other on the number of children ever born and the number surviving. These questions were asked of each married woman. Although fertility data were thus collected for all married women, the analysis in Travancore was confined to those religious/caste groups with a total population of 50,000 or more.[1] Data for the following groups only were brought under tabulation: Non-Malayala Brahman, Ilava, Kammala, Kurava, Nadar, Nayar, Paraya, Pulaya, Vellala, Muslim, and Syrian Christians. So long as religious/caste differentials in fertility remained not significant, there may not be serious errors in taking the pattern revealed by the sample to be representative of the pattern in the general population. It seems unlikely that fertility differentials of any kind had begun to assert themselves by 1941 in Travancore or for that matter anywhere in Kerala.

In 1951, the Government of India decided to leave to individual States one census question to be used to collect data on an optional topic. This question was utilized to get fertility data in Travancore-Cochin State. The instructions to census enumerators concerning this questions ran as follows: "The question is to be put to married, widowed, or divorced women only. Divide the space against the question into 4 compartments. In the first compartment enter the number of completed years of married life. In the second compartment give the age of mother at the time of birth of the first child, in the third, the number of children born and in the fourth the number now alive."[2]

For the purposes of detailed tabulation, a ten per cent sample of enumeration "slips" was drawn. The fertility data as well as age data were compiled from this sample only. There is, however, a slight discrepancy between the number of women in the different age groups shown in the fertility tables and the age by marital status table. The latter table shows more women than do the former tables. In age group 15-24 the excess in age by marital status table over what is included in the fertility table is 1,184 ever married women, the corresponding figures for the age groups, 25-34, 35-44, and 45 and over being 782, 719 and 1,063 respectively. The difference has been attributed to the exclusion of census slips from fertility analysis on account of vagueness or inconsistency in fertility data recorded.[3]

In calculating the ratio of children to all women in the different age groups we have ignored the fact that the age tables (from which we have taken the number of women in each five-year age group) contain slightly more women than for whom the fertility figures are given in the fertility tables. Our estimates of the average number of children (ever born) per woman are, therefore, likely to be underestimates to a slight extent. But there is no reason to believe that the influence concerning the overall fertility pattern would be seriously affected by this procedure.

Regarding the 1961 data all that needs be said is that they are from a fertility survey conducted in connection with the 1961 Census on a sampling basis (including in the sample one per cent of the rural enumeration blocks and 0.5 per cent of the urban enumeration blocks).

It is to be emphasized that we have fertility data for the state as a whole only for 1961. For early years, it has not been possible to get comparable data for the different regions constituting the present Kerala State. Only if one is prepared to make the assumption that there did not exist much regional variation (broadly speaking between Travancore, Cochin, and Malabar) in fertility pattern in the years prior to 1961 can one make any valid inference concerning the

[1]Census of India, 1941, Vol. XXV, Travancore, Part I-*Report*, p. 173.

[2]Census of India, Paper No. 5, 1953, *Maternity Data*-1951 *Census*, p. 3.

[3]*Ibid.*

fertility trend in the State as a whole during the years preceding 1961. In other words, we may be assuming that the fertility data available for Travancore represent the fertility pattern prevailing in the entire Kerala State around 1931 and 1941 and that the data for Travancore-Cochin portray the Kerala pattern around 1951, when we make use of the figures derived from the above data to talk about the fertility trend in the State prior to 1961.

Findings

With these preliminary remarks, we may now pass on to a discussion of the findings in Tables 12-16. Table 12 shows the proportion of ever married women in each age group, Table 13 the average number of children born per ever married woman in each age group, and Table 14 the ratio of children (ever born) to all women in each age group. These are the preliminary data used to derive the figures presented in Tables 15 and 16.

Table 15 shows the derived fertility rates (average number of children born per woman during the entire five years in each five-year age group) for 1931 Travancore, 1941 Travancore, 1951 Travancore-Cochin, and 1961 Kerala. In order to understand what the figures in Table 15 mean, it may be convenient to imagine a cohort of women who reach age 15 at the same point in time and who pass the child-bearing period following the age pattern of fertility performance as shown in Table 15. If such a synthetic cohort of women were to follow the pattern shown for 1931 Travancore, that cohort of women will produce during the first five years of reproductive period 635 children per 1,000 women, during the second five years (that is, when they pass the age group 20-24), the addition to the family will amount to 1,371 children per 1,000 women, during the next five years 1,518 children per 1,000 women, and so on.

Table 12

Proportion Ever Married Among Females in Various Age Groups. 1961 *Kerala,* 1951 *Travancore-Cochin,* 1941 *Travancore and* 1931 *Travancore*

Age	Proportion ever married (Females)			
	1931 Travancore	1941 Travancore	1951 Travancore-Cochin	1961 Kerala
15-19	0·61215	0·37573	0·33588	0·30333
20-24	0·83787	0·79665	0·76570	0·77219
25-29	0·96068	0·94685	0·92480	0·91982
30-34	0·97265	0·97582	0·95967	0·95464
35-39	0·98151	0·98324	0·96999	0·96736
40-44	0·98378	0·98717	0·97682	0·97047
45-49	0·98683	0·98969	0·98224	0·97755

Table 13

Ratio of Number of Children Ever Born to Ever Married Women in Different Age Groups. 1961 *Kerala*, 1951 *Travancore-Cochin*, 1941 *Travancore and* 1931 *Travancore*

Age	Ratio of number of children ever born to ever married women			
	1931 Travancore	1941 Travancore	1951 Travancore-Cochin	1961 Kerala
15-19	0·49	0·45	0·36	0·40
20-24	1·51	1·52	1·45	1·44
25-29	2·87	2·70	2·68	2·69
30-34	4·35	3·76	3·75	3·77
35-39	5·35	4·75	4·89	4·59
40-44	5·90	5·25	5·40	5·12
45 and over	6·50	6·65	..	..
45-59	..	..	5·59	5·31

Table 14

Ratio of Number of Children Ever Born to All Women in Different Age Groups. 1961 *Kerala*, 1951 *Travancore-Cochin*, 1941 *Travancore and* 1931 *Travancore*

Age	Ratio of number of children ever born to all women			
	1931 Travancore	1941 Travancore	1951 Travancore-Cochin	1961 Kerala
15-19	0·30	0·17	0·12	0·12
20-24	1·27	1·21	1·11	1·11
25-29	2·76	2·58	2·47	2·47
30-34	4·23	3·75	3·60	3·60
35-39	5·25	4·90	4·74	4·44
40-44	5·80	5·57	5·27	4·97
45-49	6·02	6·08	5·49	5·19

Table 15

Contribution to Total Fertility By the Fertility Performance in Each Age Group Estimated From the Ratio of Children Ever Born to Women in Different Age Groups in Childbearing Years. 1961 Kerala, 1951 Travancore-Cochin, 1941 Travancore and 1931 Travancore

Age	1931 Travancore	1941 Travancore	1951 Travancore-Cochin	1961 Kerala
15-19	0·6350	0·5760	0·5417	0·4976
20-24	1·3712	1·2978	1·1920	1·2682
25-29	1·5177	1·3404	1·3392	1·3293
30-34	1·2707	1·1205	1·1608	0·9796
35-39	0·8123	0·9292	0·8045	0·6470
40-44	0·3400	0·6496	0·3911	0·3941
45-49	0·0512	0·1713	0·0724	0·1033

Table 16

Age Specific Fertility Rates for 1961 *Kerala*, 1951 *Travancore-Cochin*, 1941 *Travancore and* 1931 *Travancore Derived From Table* 15

Age	1931 Travancore	1941 Travancore	1951 Travancore-Cochin	1961 Kerala
15-19	127·00	115·20	108·34	99·52
20-24	274·24	259·56	238·40	253·64
25-29	303·54	268·08	267·84	265·86
30-34	254·14	224·10	232·16	195·92
35-39	162·46	185·84	160·90	129·40
40-44	68·00	129·92	78·22	78·82
45-49	10·24	34·26	14·48	20·66

Another way to look at the figures in the Table is to think in terms of cumulative fertility rates. According to the 1931 Travancore pettern, a synthetic cohort of 1000 women starting the reproductive period (that is, reaching age 15) at the same point in time will produce altogether 635 children during the first five years; they will have borne 2006(=635+1371) children by the time they attain 25 years of age, 3524(=2006+1518) children by age 30, 4795 (=3524+1271) by age 35, 5607(=4795+812) by age 40, 5947 (=5607+340) by age 45, and 5998 (=5947+51) by the time they are through the child-bearing period (that is, by the time they reach age 50).

It will be instructive to compare the cumulative fertility rates implicated in the four age sequences given in Table 15. These are plotted in Figure 4.1. The general tendency one observes in Figure 4.1 is for the curve for each period to lie below those for the preceding periods, the only minor exception to this being the curve for 1941-Travancore at the upper end of the age range. In view of the adjustments we had to make in arriving at the figures for 1941 Travancore this deviation need not be given any special importance.

The general tendency for the graph depicting cumulative fertility pattern for each census year to lie well below the graphs of the preceding census years seems to indicate a steady decline in fertility level of the population. Perhaps a better idea about the change can be had if we examine the conventional age specific fertility rates derived from the figures in Table 15. These are presented in Table 16.

The figures in Table 16 show that there has been a consistent decline in the fertility rate for the age group 15-19. The decline is about 21 per cent during the period 1931-61. Part of this decline may be due to rise in age at marriage.[1] Of the rates for the other age groups, those for 30-34 and 35-39 for 1961 are particularly interesting in that they show considerable deviation from the trend exhibited by the rates for the other age groups. Whereas the 1961 rates for the age groups 25-29, and 40-44, are not much different from the corresponding rates for 1951, the rates for 30-34 and 35-39 for 1951 are less than the corresponding rates for 1951 by 11 and 19 per cent respectively.

We might examine the trend in crude birth rate by applying the age specific fertility rates presented in Table 16 to the age distribution of females at the different censuses. Of course, crude birth rate does not tell anything more than the age specific fertility rates. But in crude birth rate we have a summary measure of the fertility level of the population and so long as the age sex distribution of the populations compared remains stable, the inference concerning the trend in fertility level derived from the trend in crude birth rate will be valid.

The crude birth rates obtained by applying the age specific fertility rates of Table 16 to the respective populations (1931-Travancore, 1941-Travancore, 1951-Travancore-Cochin, and 1961-Kerala) are as follows:

1931-Travancore . .	45.75	births per 1000 population
1941-Travancore . .	44.60	,, ,,
1951-Travancore-Cochin	42.60	,, ,,
1961-Kerala . .	38.85	,, ,,

Some remarks on the findings

If all these rates can be taken to indicate the fertility level of Kerala as a whole for the respective periods, the first impression one gets from them is that there has been a steady decline in fertility in this State during the past 30 years or so. The 1961 level is less

[1]From what we have been able to calculate using the age by marital status distributions available for the different census years, we did not find much of a change in the average age at marriage. But recently the Bureau of Economics and Statistics of the Government of Kerala brought out the following data on average age at marriage by analyzing the results of the Sample Census (1961).

Marriage cohort by calendar year	Average age at marriage in years	
	Rural	Urban
1960 . . .	19·0	18·8
1956—59 . . .	18·9	19·1
1951—55 . . .	18·1	18·3
1946—50 . . .	17·5	17·6
1941—45 . . .	17·6	17·3
1936—40 . . .	17·2	17·0
1931—35 . . .	17·2	17·1
1930 and before . .	16·8	16·8

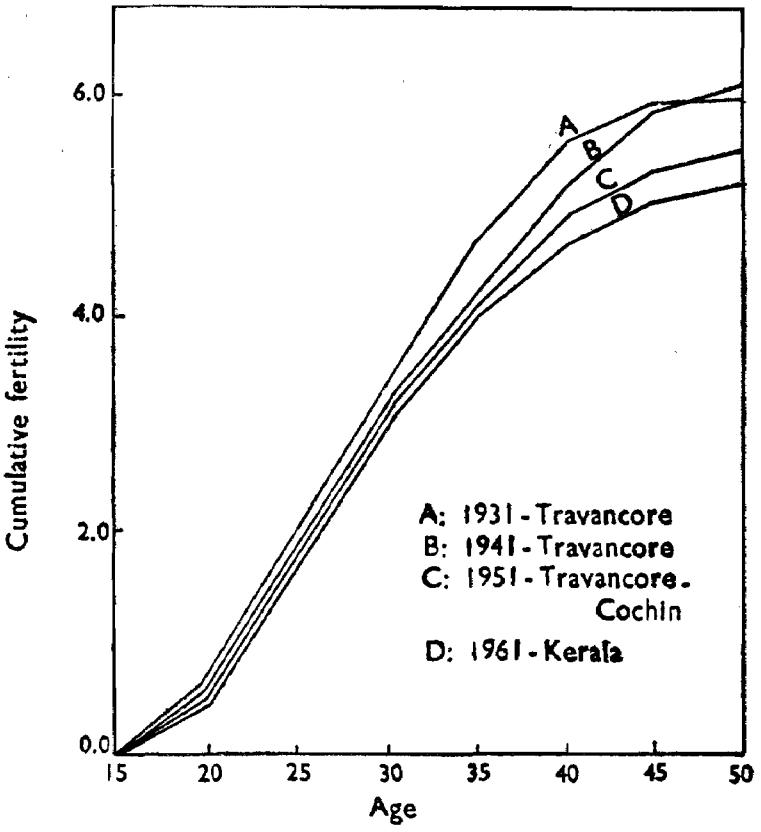


Figure 4.1 - Cumulative fertility implicated in the fertility patterns of 1931 - Travancore, 1941 - Travancore, 1951 - Travancore - Cochin and 1961 - Kerala (**Source: Table 13**)

than the 1951 level by 8.80 per cent, the 1951 level less than the 1941 level by 4.49 per cent, and the 1941 level less than the 1931 level by 2.51 per cent. This gives a picture of declining fertility at an accelerated rate. Especially the decline during 1951-1961, (8.80 per cent) is to be considered as substantial. But how sure are we that the estimated decline truly represents what has been happening in Kerala? All our estimates are based on sample only, hence all these figures carry with them a certain degree of uncertainty as to how close they are to the true values. One's confidence in the estimates one arrives at may be increased if it is found that these estimates check with those arrived at independently by others using different procedures. Therefore, it may be profitable to examine the estimates of Kerala's fertility level obtained by others. According to the calculations of S.P. Jain, (actuary, 1961 Census of India), the crude birth rate of Kerala for 1961 was 38.9 per 1000 population. This is identical with the figure we have obtained above. But on the same basis the birth rate of 1951 Travancore-Cochin has been calculated as 37.4 per 1000 population against which our estimate shows a figure of 42.60. The Fourteenth Round (1958-1959) of the National Sample Survey, India, estimated for rural Kerala a rate of 39.61 births per 1000 population. If it is assumed that rural-urban differential in birth rate in Kerala was of negligible magnitude around that period,[1] the National Sample Survey estimate may be taken as consistent with the figure arrived at by S.P. Jain. If, on the basis of these evidences, one were to accept the rate of 38.9 as depicting the actual fertility level of Kerala State around 1961, one has to be reconciled with the implication that there has been a substantial decline in fertility level of the population of Kerala prior to 1961. But the evidences we have examined at the beginning of this chapter seemed to indicate the contrary. We have been able to get another set of evidence which also indicates that there has not been much of a fertility decline in Kerala prior to 1961. This evidence comes from a comparison of the fertility data for 1961 Kerala obtained from a sample census conducted in 1961 by the Bureau of Economics and Statistics, Government of Kerala, and the data for 1931 Travancore to which we have already referred. Unfortunately the published figures based on the 1961 sample census do not give average number of children per woman in different age groups. If these were available, we could have obtained estimates of age specific fertility rates comparable to those presented in Table 16. However, we have data on average number of children per married woman by marriage duration for 1961 Kerala (obtained from 1961 sample census) and for 1931 Travancore, a comparison of which should show whether or not there has been any substantial decline in marital fertility prior to 1961. Table 17 shows the relevant data from the 1961 sample census and Table 18 those from the fertility survey of 1931 in Travancore.

Table 17

Average Number of Children Born Per Married Woman By Marriage Duration Separately For Rural and Urban Areas

(1961-Kerala State)

Marriage duration (Years)	Average number of children per married woman	
	Rural	Urban
1—4	0·83	0·83
5—9	2·21	2·28
10—14	3·64	3·74
15—19	4·85	4·87
20—24	5·56	5·47
25—29	5·96	5·79
30+	6·10	5·92

Source: Bureau of Economics and Statistics, Government of Kerala Paper No. 31, "The Fertility Pattern of Women in Kerala," 1965.

Table 18

Average Number of Children Born Per Married Woman By Marriage Duration

(1931 Travancore)

Duration of marriage (Years)	Average number of children born per woman
Under 10	1·26
10	2·75
11—19	4·13
20—31	5·69
32	6·41
33 years and over	6·61

Source: Census of India, *Vol. XXVIII, Travancore*, Part I, Report, Ch. V, Subsidiary Table VII.

[1] We have already referred to the fact that the 1951 fertility data did not reveal any significant rural-urban differential. Somewhat the same thing may be said about the situation around 1961. See in this connection, Bureau of Economics and Statistics, Government of Kerala, Paper No. 31 in which it is reported that the 1961 sample census showed very little rural-urban fertility differential (*ibid.*, p. 8).

Figure 4.2 - Child/woman ratio by duration of marriage; 1931 - Travancore and 1961 - Rural and Urban Kerala

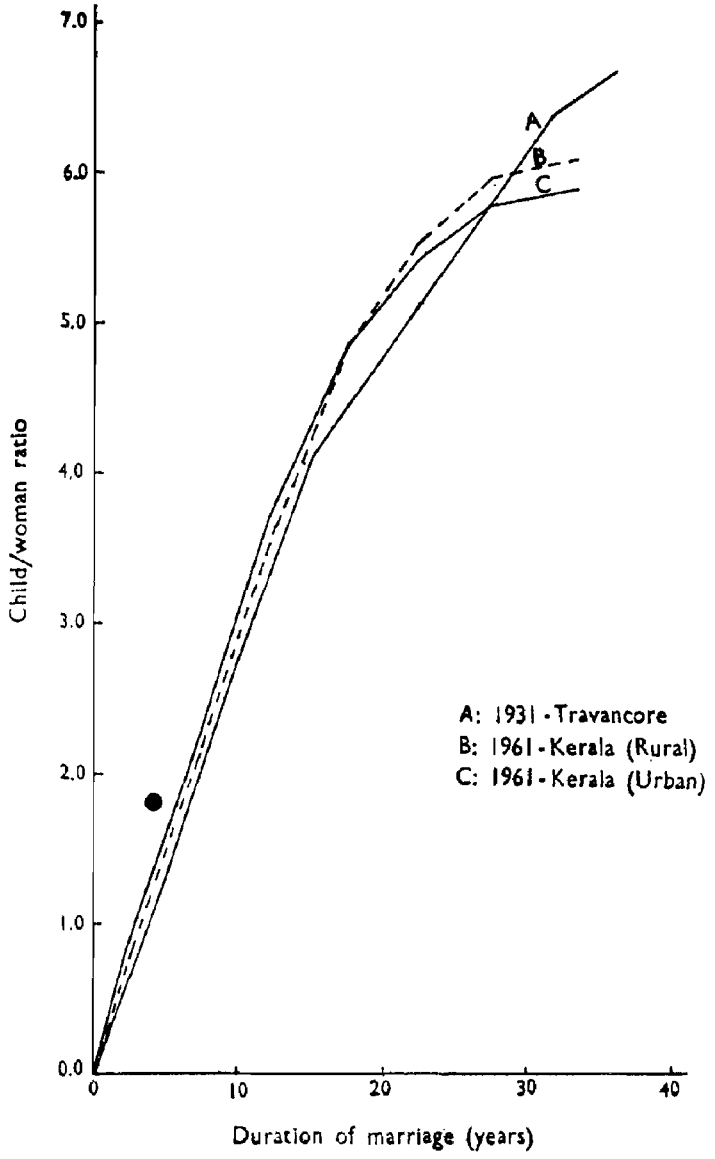


Figure 4.2 shows the average number of children per married woman by marriage duration presented in Tables 17 and 18. Surprisingly, the 1961 graph both for rural and for urban tend to lie above the 1931 graph except at the upper end of the marriage duration corresponding to 25 years or more. If then, the fertility data for 1961 obtained through the sample census can be assumed to be at least as reliable as those obtained in the fertility survey of 1931 for Travancore, the findings of the above comparison have to be accepted as indicating an increase in marital fertility rather than a decline prior to 1961. This is consistent with the improvement experienced by the population in public health and maternal care and the consequent probable reduction in pregnancy wastage and maternal mortality as well as the increase in the life expectancy of females over the period in question. Therefore, any reduction in the overall fertility level will have to be accounted for by increase in age at marriage. But it is doubtful that this factor can account for an accelerated fertility decline culminating in 8.8 per cent drop during 1951-1961. We are inclined to believe that the estimates on average number of children born per woman obtained in the 1961 fertility survey are some how underestimates.

To get further supporting evidence for this belief we analyze the 1961 Census data. From the smoothed age distribution of 1961 Kerala available in Census of India, Paper No. 2 of 1963, births occurring during the periods 1951-56 and 1956-61 were estimated by the reverse survival procedure using the mortality pattern already worked out in the previous chapter. Details of the calculations are presented in Table 19. From these estimated births we calculated the sex-age-adjusted birth rates applicable to the periods 1951-56 and 1956-61 following the procedure developed by the United Nations. The sex-age-adjusted birth rates are obtained by dividing 1000 times the births in any year by a weighted sum of females in the midyear in the various quinquennial age groups in the reproductive age range. The weights used to get the weighted sum of females are shown below:

Age group:	15-19	20-24	25-29	30-34	35-39	40-44
Weights:	1	7	7	6	4	1

These weights have been arrived at by the United Nations after examining the age pattern of fertility rates for a number of countries. It was found that irrespective of the absolute level of fertility, the relative values of the age specific fertility rates are quite similar from one country to another. The weights shown above were so chosen that they are roughly proportionate to the averages of relative values of age specific fertility rates for a large number of countries. These weights have another property also. The weighted sum obtained by applying these weights to the numbers of women in the corresponding age groups in a population would be ordinarily of the same magnitude as that of the total population. Because of these properties of the weights, the sex-age-adjusted birth rates tend to be of the same order of magnitude as the crude birth rates. The sex-age-adjusted birth rates, it may be noted, can be calculated without knowing the size of the total population; all that is needed for the calculation are the age distribution of females in the child-bearing years and the number of births. This is particularly helpful in our present case since we do not have reliable age distribution for the population of the State as a whole for earlier years. It is also true that the census data for the earlier years do not furnish us with reliable distribution of females in the child-bearing period by age. But this latter distribution could be obtained by reverse survival method from the available 1961 distribution under the assumption, of course, of no migration. From the numbers of women shown in the smoothed age data for 1961 against ages 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, and 50-54, it is possible to obtain the distribution of females in the quinquennial age groups in child-bearing period for 1956 and 1961. This is what we did. The simple averages, age group by age group of the 1951 and 1956 distributions thus obtained were used to get the sex-age adjusted birth rate for 1951-1956 period and similarly the averages of the numbers in the corresponding age groups in the 1956 and 1961 distributions were used for the calculation of the sex-age-adjusted birth rate for 1956-61 period.

The estimates obtained for 1951-56 period was 39.50 and that for 1956-61 period, 38.80. These figures indicate a decline at the rate of 0.35 per cent per year. It seems fair to assume that this estimated rate of decline is applicable to the crude birth rate also. From a crude birth rate of 42.60 for 1951 we thus obtain a crude birth rate of 41.11 for 1961. It is believed that this

estimate is closer to the true value than is the figure 38.85 implicated by the data obtained in the 1961 fertility survey.

To be fair it should be emphasized that in accepting 0.35 per cent per year, the figures obtained above, as a valid estimate of decline in birth rate during 1951 to 1961, one assumes:

(1) that the reliability of the estimated figures of children aged 0-4 and 5-9 in the smoothed age distribution is the same,

(2) the mortality pattern used in applying the reverse survival procedure truly represents the actual pattern in the different periods,

(3) the fertility level of Kerala around 1951 is indicated by a crude birth rate of 42.60 which is implicated in the fertility data obtained for Travancore-Cochin in 1951, and

(4) as mentioned above, the trend exhibited by the sex-age-adjusted birth rate is same as the trend in the crude birth rate.

Table 19

Estimates of Numbers of Births in Kerala, 1951-1956 *and* 1956-1961, *By Reverse Survival Procedure from two Cohorts of Children Enumerated in* 1961 *Census*

	Males	Females
A. *Cohort born in* 1956-1961 (*aged* 0—4 *in* 1961)		
1. Survivors enumerated in 1961 Census	1,278,927	1,248,426
2. Mortality level for P_B, 1956-1961	62.5	67.5
3. Estimated survival ratio, P_B, 1956-1961	0.8481	0.8810
4. Estimated births, 1956-1961 (item 1/item 3)	1,507,991	1,417,056
B. *Cohort born in* 1951-1956 (*aged* 5—9 *in* 1961)		
5. Survivors enumerated in 1961 Census	1,241,304	1,201,843
6. Mortality level for P_{0-4}, 1956-1961	62.5	67.5
7. Estimated survival ratio, P_{0-4}, 1956-1961	0.9481	0.9572
8. Mortality level for P_B, 1951-1956	57.5	62.5
9. Estimated survival ratio, P_B, 1951-1956	0.8331	0.8666
10. Estimated births, 1951-1956 (item 5 divided by product of items 7 and 9)	1,571,470	1,448,772
C. *Cohort born in* 1956-1961 (*aged* 0—4 *in* 1961)		
11. Survivors estimated in 1961 Census*	1,356,100	1,314,200
12. Estimated births, 1956-1961 (item 11 divided by item 3)	1,598,892	1,491,629
D. *Cohort born in* 1951-1956 (*aged* 5—9 *in* 1961)		
13. Survivors estimated in 1961 Census*	1,144,200	1,125,400
14. Estimated births, 1951-1956, (item 13 divided by product of items 7 and 9)	1,448,538	1,356,623

**Source*: Census of India, *Paper No.* 2 *of* 1963, 1961 *Census Age Tables* Part II, page 38.

Summary

The main aim of this chapter has been to examine the available data on the fertility level of the population of the state so as to arrive at a reasonably good estimate of the fertility component of the population change involved.

Registration data on births do not tell anything accurately about the birth rate of the population even in recent years not to speak of the remote past. According to an estimate published by the Bureau of Economics and Statistics of the Government of Kerala, about 45 per cent of the births escaped registration in 1964. Assuming that that estimate is applicable to the registration data of the year 1961 and thereabout, one can arrive at a corrected birth rate from the registration figures. We obtained a figure of 45 births per 1000 population in that fashion for 1961. The figure obviously is much higher than what is usually taken to be the level of fertility in the state around 1961. For example, according to the calculations of S. P. Jain, the crude birth rate of Kerala for 1961 was 38.9 births per 1000 population. Our examination of the available data on fertility of Keralites led us to the inference that prior to 1941, the crude birth rate of the population was of the order of 45 births per 1000 population and that during the period, 1941-61, a slight decline in the birth rate might have taken place; but it is unlikely that the rate had gone below 40 per 1000 population by 1961.

Data collected in connection with the 1951 Census and also in connection with the family planning studies conducted by the Bureau of Economics and Statistics showed no significant differentials by socio-economic status. That is understandable because socio-economic differentials in fertility usually emerge in the incipient stage of fertility decline, a stage yet to be entered by the population of Kerala.

CHAPTER V

COMPONENTS OF POPULATION CHANGE : MIGRATION

Introduction

This chapter is concerned with the third component of population change, namely, migration. It is widely believed that the people of Kerala are highly migratory in character and that 'Keralites' move out in large numbers in pursuit of jobs to all parts of India and to many parts of Asia. But the available figures indicate that this belief is rather exaggerated. We shall examine below how far migration has affected the size of Kerala's population and what has been the trend in this respect over the first six decades of this century.

Data and method

An important source of information on migration in India is data on place of birth. By comparing place of birth of a person with his place of enumeration at a particular census one can classify that person as a life-time migrant or non-migrant.[1] Every census in India from 1881 onwards has collected for each person enumerated, if Indian by nationality, data on place of birth and for non-nationals data on nationality. Zachariah's study[2] has revealed that much can reasonably be learned regarding internal migration in India from the data on place of birth. It is not necessary here to go into the technicalities of migration estimation from place of birth data. However, a few remarks about the inaccuracies of the data, their inadequacies, and some of the sources of uncertainties in the estimates derived from them may not be out of place here.

Data on place of birth are not necessarily accurate. To be sure, the question on place of birth is much more easily understood than are many of the other questions on census schedules. But there are many circumstances that lead to inaccurate reporting of place of birth. If a person resides at a given place for a very long time, there may be a tendency for him to report that as his place of birth. Ignorance on the part of the census informant regarding the place of birth of some of the members of his household is another source of error. The census taker usually obtains information about the members of a household from one responsible member rather than by interviewing each person separately. One person may know where he or his immediate relatives were born, but not necessarily the place of birth of all members of his household. Head of a household may know where his sons were born, but may be ignorant of the place of birth of his daughters-in-law. Inaccurate reporting of place of birth in such circumstances is thus quite likely. The numerous changes in the boundaries of political units are another set of factors affecting the accuracy of place-of-birth data; several of those who were born in areas subsequently transferred to another district (or State) might report their place of birth as though no such transfer took place.

The question of accuracy aside, one might wonder whether migration estimates obtained from place-of-birth data truly portray the driving force behind the process of population redistribution. Population redistribution is patterned generally in such a manner that a balance is maintained between number of persons and opportunities available for living in the different spatial communities. "The driving force behind this process is.... the many hundreds of thousands of human minds that are constantly evaluating and reexamining their situation and striving to improve their lot in life."[3] The inadequacy in this respect of migration data derived from place of birth data stems from the fact that place of birth often happens to be an accidental affair. A person may be born in a community having little to do with those where the parents make a living at the time of birth of the baby. Certain customs followed all over India make for such a situation. For example, first confinements, and even the subsequent ones, tend to take place in the woman's parental home rather than at her husband's residence. Another circumstance which makes the place-of-birth data rather

[1] A person who is enumerated in a given area at a particular census whose place of birth is outside that area but within the national boundaries of India is a life-time in-migrant to that area. Similarly, a person who is born in a given area and enumerated at a particular census outside that area but within the national boundaries of the country is called a life-time out-migrant. See K. C. Zachariah, *A Historical Study of Internal Migration in the Indian Sub-continent*, 1901-1931, Bombay: Asia Publishing House, 1964, p. 9.

[2] *Ibid.*

[3] Donald J. Bogue and P. M. Hauser, "Population Distribution, Urbanism and Internal Migration", Background paper (No. 473), World Population Conference, Belgrade, 1965, p. 3.

inadequate for migration analysis has to do with the fact that prior to 1941, the censuses were done on a *de facto* basis, as a consequence of which the comparison of place of birth with place of enumeration leads to the inclusion of a good proportion of casual movements as migration and to the classification of some of the "real" cases of migration as non-migrant cases.

Inaccuracies and inadequacies of place-of-birth statistics alone are not the only imperfections one should be concerned with in this connection. A source of error which needs special mention in this connection has to do with the non-availability of satisfactory estimates of mortality conditions prevailing in the different parts of the country at different points in time. How this affects migration estimates obtained from place-of-birth data will be evident when we discuss the method of estimation usually employed. We shall describe the method of estimation only briefly. For a detailed discussion, reference may be made to Zachariah's study.

For each of the censuses the data on place of birth and place of enumeration can be put in the following form:

State of birth		State of enumeration			
		Kerala	Madras	Mysore	..
Kerala	Male . . .	..	..	..	..
	Female . . .	..	..	..	..
Madras	Male . . .	..	..	..	..
	Female . . .	..	..	..	..
Mysore	Male . . .	..	..	..	..
	Female . . .	..	..	..	..

From the data in the above form, a 2×2 table can be compiled for males and females separately as follows:—

Birth place	Place of enumeration	
	Kerala	Outside Kerala but within India
Kerala	..	O
Outside Kerala but within India	I	..

In the above Table "I" stands for the number of persons enumerated in Kerala among those born elsewhere in India, and "O" for the number of persons enumerated elsewhere in the country among those born in Kerala. "I" gives the life-time in-migrants to Kerala from outside Kerala and "O" gives the life-time out-migrants from Kerala to other States in India. Obviously these symbols have meaning only in terms of a point in time (for example, the census year). Let us, therefore, add a suffix to these symbols specifying the census year to which they refer. Thus I_{1901} will refer to the life-time in-migrants to Kerala from other States in India as ascertained in the 1901 census and similarly O_{1901} the life-time out-migrants from Kerala counted in that year. The difference $M_{1901}=I_{1901}-O_{1901}$, gives the life-time net migrants as of 1901. From the above description, it should be clear that the main defect of M as an estimate of net migration is that it does not refer to any specific time *interval*. But procedures have been developed to obtain estimates of the amount of net migration during intercensal periods from I and O values for different census dates. Suppose, for instance, we want to estimate the amount of net migration to Kerala during 1901—1911. It would be helpful if we take a decision on the following questions concerning our specific objective: Do we want to know what proportion of the population of Kerala in 1911 is ascribed to net increase due to migration, or do we want to know the net flow of population between Kerala and the rest of India during 1901 and 1911? The first question is answered by the following formula:

$$(1)\quad M_{1901\text{-}1911}=I_{1911}-O_{1911} - S_{I_{1901}} I_{1901} + S_{O_{1901}} O_{1901}$$

where $S_{I_{1901}}$ and $S_{I_{1901}}$ represents respectively the proportion of I_{1901} and O_{1901} who survive to 1911. Usually $M_{1901\text{-}1911}$ is taken as an answer to the second question mentioned above, *i.e.*, as showing the net

flow of population during the period 1901-1911. An obvious error in doing this is that it fails to make adjustments for the deaths among persons who had outmigrated from, and, among those who had in-migrated to the State during the period, 1901-1911. If d_O and d_I respectively stand for the deaths in these two categories of migrants, the correct estimate of net volume of migration during 1901-1911 is obtained by adding $d_I - d_O$ to $M_{1901-1911}$. But there is no way of getting satisfactory estimates of $d_I - d_O$ from the census data. Hence the error cannot be rectified satisfactorily. Further, the value of $M_{1901-1911}$ itself will be affected by inaccuracies in the estimates used for S_I and S_O in the formula (1).

Despite these shortcomings, it is held by experts that estimates on internal migration obtained from place-of-births data are accurate enough to get a general picture of the population turn over in India.

Impact of migration on population change

Estimates of intercensal migration for Travancore-Cochin during the first five decades of the century and of Kerala for 1951—1961 are shown in Table 1, and the corresponding migration rates in Table 2. As can be seen from these figures, migration did not affect very much the population change in Travancore-Cochin State during the first five decades of this century; the migration rate virtually remained between 0 and 1 per cent of the mid-decade population. It seems to be a fair assumption that the same thing can be said about the population of Kerala as a whole.

In the beginning of 1901—1951 period, Travancore-Cochin State was a gaining State with respect to migration but towards the end of that period, the State became a losing State. The figures of Kerala for 1951—1961 decade are consistent with the trend shown by the figures for Travancore-Cochin State for earlier decades. Kerala experienced a net loss during 1951—1961 period due to migration. But the impact of the loss on the population change was not substantial. Had there been no net loss due to migration, the 1961 male population would have been 24·99 per cent higher than the 1951—1961 average population whereas the actual increase observed in the male population was 22.34 per cent of the mid-decade population. The effect on females was even less; the increase in the female population arising from the balance of births and deaths would have been 22.84 per cent of the mid-decade figure while the observed increase fell short of that by 1.11 percentage point.

Table 1

Volume of Migration: Travancore-Cochin, 1901-'11, 1911-'21, 1921-'31, 1931-'41 *and* 1941-'51 *and Kerala*, 1951-'61

(Estimated net migration in '000)

State and decade	Males	Females
Travancore-Cochin		
1901—1911	3	7
1911—1921	7	12
1921—1931	33	35
1931—1941	—8	3
1941—1951	—60	—31
Kerala		
1951—1961	—200	—86

Source: K. C. Zachariah, "Migration and Population Growth in Kerala," in R. S. Kurup & K. A. George (Eds.) *Population Growth in Kerala*, 1966, Table 2, p. 95.

Table 2

Rate of Natural Increase (Balance of Births and Deaths) and Rate of Net Migration as Per Cent of Mid-Decade Population Travancore-Cochin, 1901-1951 *and Kerala* 1951-1961

State and decade	Males		Females	
	Rate of natural increase	Rate of net migration	Rate of natural increase	Rate of net migration
Travancore-Cochin				
1901—1911	14.21	0.16	14.01	0.37
1911—1921	13.58	0.30	12.93	0.51
1921—1931	21.37	1.17	22.84	1.24
1931—1941	17.26	—0.24	17.43	0.09
1941—1951	22.36	—1.43	22.24	—0.77
Kerala				
1951—1961	24.99	—2.65	22.84	—1.11

Source: Zachariah, *op. cit.* Table 2, p. 95.

Origin and destination of migrants

It has been widely observed that a large proportion of migrants travel only short distances and that the volume of migration diminishes as distance increases. This general tendency seems to have been true in the case of migrants to and from Kerala. Most of the migration to and from Travancore-Cochin State were found to be from and to the neighbouring States. However, a growing tendency as time progressed for the out-migrants to go farther out is discernible from the figures given in Table 3. Madras's share of migrants from Travancore-Cochin diminished consistently over the period 1901-1951, in 1901 Madras claimed 99 per cent of the life-time male migrants from Kerala, the corresponding proportion for 1911 fell down to 93 and in 1921 to 86, in 1931 to 83 and in 1951 to 78. The corresponding 1961 figures for Kerala (.40 per cent) was far below the 1951 figure for Travancore-Cochin (78 per cent). More or less the same pattern was maintained by the female migrants from Kerala to Madras State. In 1961, it was found that Madras, Mysore, and Maharashtra together claimed 81 per cent among male and 87 per cent among female out-migrants. (See Table 3). Thus the tendency for the out-migrants to be concentrated in the neighbouring States continues to be present even now although over time the outward spread has become slightly wider. As regards in-migration, Madras continues to be the main source accounting for more than four-fifths of the supply.

Table 3

Life-Time In-Migrants to Travancore-Cochin (Kerala) from Madras and Life-Time Out-Migrants from Travancore-Cochin (Kerala) to Madras as Per Cent of the Respective Total Figures

State and Census year	Life-time in-migrants from Madras as per cent of total life-time in-migrants		Life-time out-migrants to Madras as per cent of total life-time out-migrants	
	Males	Females	Males	Females
Travancore-Cochin				
1901	88	94	99	99
1911	97	98	93	96
1921	97	98	86	92
1931	98	99	83	70
1941	98	99	..	..
1951	96	98	78	89
Kerala				
1961	82	83	40	53

Source: Calculated from Zachariah, *op. cit.* p. 99 (Table 5).

Table 4

Life-Time In-Migrants to Kerala from Neighbouring States of Madras, Mysore and Maharashtra as Per Cent of Total Life-Time In-Migrants and Corresponding Percentages for Out-Migrants to These States, 1961

State	In-migrants		Out-migrants	
	Males	Females	Males	Females
Madras	82	83	40	53
Mysore	8	11	23	21
Maharashtra	3	2	18	12
Others	7	4	19	14
total	100	100	100	100

One of the questions that is pertaining in a discussion of source and destination of migrants is whether there is any rural-urban pattern in that respect. Table 4 shows the percentage distribution of in-migrants to Kerala (1961) according to rural and urban areas at the source and destination. Rural-to-rural movement was dominated by Madras; out of the total in-migrants from rural areas of other States in India to rural areas of Kerala, 92 per cent of males and 89 per cent of females came from Madras, 6 per cent of males and 9 per cent of females from Mysore and the rest from other States. But all the other kinds of movements, rural-to-urban, urban-to-rural, and urban-to-urban, were of a different spatial character, in that the shares of distant States were in all these cases quite marked. For example, of the urban-to-rural movement, 17 per cent among males and 19 per cent among females were accounted for by States other than Madras and Mysore, and in the case of urban-to-urban movement, 30 per cent among males and 19 per cent among females came from States beyond Madras and Mysore. Between Madras and Mysore, the former was the dominant supplier in the case of all the four different kinds of movements.

The spatial pattern of out-migrants was different from that of in-migrants in several respects. Table 5 presents the relevant data. Rural-to-rural (*i.e.*, movement from rural areas of Kerala to rural areas of other States) was mostly a Kerala-Madras and Kerala-Mysore affair; of the total movement of that type almost nine-tenths were accounted for by these two streams. More or less similar was the case of movement from rural Kerala to urban parts of other States. But States other than Mysore and Madras played very marked roles with respect to urban-to-rural and urban-to-urban movements. Out of the total volume of urban-to-rural movement outside Kerala, 45 per cent among males and 32 per cent among females were accounted for by the stream, Kerala to States other than Madras and Mysore; Kerala-Madras stream accounted for only 41 per cent among males and 56 per cent among females of this flow while the share of Kerala-Mysore stream was 13 per cent among males and 12 per cent among females. The pattern was more or less similar in the case of the flow from urban areas of Kerala to urban areas of other States. A comparison of the figures in Tables 5 and 6 reveals that it is the outward movement from urban areas of Kerala that has become lately wider in spatial spread. Perhaps such movements are accompanied by counter movements and return movements of the same kind. That may be the explanation for the relative predominance of distant States in the urban-to-urban stream in in-migration.

Table 5

Streams of In-Migration to Kerala Classified by Source, Kerala, 1961

Source	In-migration Streams to Kerala							
	Rural-to-Rural		Rural-to-Urban		Urban-to-Rural		Urban-to-Urban	
	Males	Females	Males	Females	Males	Females	Males	Females
Madras . .	92	89	74	83	73	68	57	65
Mysore . .	6	9	7	9	10	13	13	16
Others . . .	2	2	20	7	17	19	30	19
Total .	100	100	100	100	100	100	100	100

Table 6

Streams of Out-Migration from Kerala Classified by Destination, Kerala, 1961

Destination	Out-migration streams from Kerala							
	Rural-to-Rural		Rural-to-Urban		Urban-to-Rural		Urban-to-Urban	
	Males	Females	Males	Females	Males	Females	Males	Females
Madras . .	35	43	41	56	48	62	41	53
Mysore . . .	51	47	13	12	32	23	15	13
Others . . .	14	10	45	32	20	15	44	34
Total .	100	100	100	100	100	100	100	100

Selectivity in migration

Voluntary migration is known to be highly selective of particular types of individuals. Unfortunately data on characteristics of migrants are scanty in India. The place-of-birth data furnish information on sex selectivity. These data do not tell about the age groups that are more migratory and those less migratory. Data on industrial composition of migrants are available for the recent census. But little is known regarding the marital status, educational status, occupation, religion, or other similar characteristics.

Table 7 gives the sex ratio (males per 100 females) among in-migrants to and out-migrants from Travancore-Cochin for 1901-1951 and Kerala for 1961. Male-predominance is much more pronounced in the case of out-migrants than among in-migrants. In fact among in-migrants there was even slight female-predominance in certain years.

The age pattern of migration can be obtained by the method of census survival ratio method. The method is briefly as follows: From the age data for the area in question (Kerala, for instance) for the census year, say, T, the estimated numbers of deaths are subtracted age-by-age and the differences thus obtained are then subtracted from the number of persons in the respective age groups enumerated at the next census (in the year T+10). The differences thus obtained show the change in the population due to migration. Inaccuracies in the age distribution and the uncertainties characteristic of mortality data for populations like that of India make the migration estimates obtained by the method of census survival method of unknown degree of inaccuracy. Zachariah obtained the following age pattern of net inter-censal migration during 1951-1961 for Kerala (See Table 8).

Table 7

Sex Ratio (Males per 100 Females) of Life-Time In-Migrants and Life-Time out-migrants, Travancore-Cochin, 1901-1951, and Kerala, 1961

State and census year		In-Migrants	Out-Migrants
Travancore-Cochin	1901	113	111
	1911	103	124
	1921	96	147
	1931	97	121
	1941	92	..
	1951	91	139
Kerala	1961	111	186

Source: **Zachariah**, *op. cit.* Table 6, p 100.

Table 8

Net Inter-Censal Migration to Kerala by Age and Sex 1951-1961
(Figures in thousands)

Age in 1961	Both sexes	Males	Females
0—4	—27	—14	—13
5—9	—152	—77	—75
10—14	+149	+29	+120
15—19	+162	+47	+115
20—24	—50	—28	—22
25—29	—267	—124	—143
30—34	—215	—108	—107
35—39	—24	—9	—15
40—44	+31	+21	+10
45—49	+20	+14	+6
50—54	+20	+11	+9
55—59	+16	+8	+8
60—64	+8	+6	+2
65—69	+10	+7	+3
70+	+35	+18	+17
All Ages	—284	—199	—85

Source: Zachariah, *Ibid.*, p. 101 (Table 7).

Despite the arbitrariness of the assumptions involved in the above estimates one may not be quite off the mark in inferring that except for the adolescent ages, the tendency had been for Kerala to lose young people (below 40 years of age) and that on a net basis there had been some gains due to migrations at older as well as school-going ages. This is consistent with the proposition that people leave the State in pursuit of jobs and later on return home to spend the evening part of their life and that Malayalees residing elsewhere in India tend to send their children to Kerala for their schooling.

Table 9 gives the industrial composition of workers among in-migrants and out-migrants (1961 Kerala). For ready comparison, the industrial composition of the general population is also shown in that Table. In examining the selectivity in migration in terms of industrial composition it is instructive to consider separately migrants to and from the neighbouring States and those to and from distant States. This was borne in mind in preparing Table 9. Andhra Pradesh, Madras, Maharashtra and Mysore were

considered to constitute the neighbouring States and the rest the distant States. From the figures in Table 9, it is clear that the industrial composition of migrants markedly differed from that of the general population. Among the in-migrant workers from the neighbouring states, those engaged in industrial class III (mining, quarrying, livestock, forestry, hunting, and plantations, orchards, and allied activities) constituted 45 per cent among males and 72 per cent among females. As all the activities other than those coming under 'plantations' in this category exist only to a relatively low degree in this State, the predominance of this category among the in-migrants is essentially a reflection of in-migration of plantation workers from the neighbouring states, especially from Madras. The industrial category which claimed the second largest proportion of in-migrants from the neighbouring states was "other services". Proportionately, it may be noted, "other services" claimed less of in-migrant workers from neighbouring states (19 per cent among males and 9 per cent among females) than of the workers in the general population (26 per cent among males and 23 per cent among females).

Table 9

Industrial Composition of Workers Among In-Migrants and Out-Migrants and General Population, Kerala, 1961

Industrial Class	In-migrants		Out-migrants		General Population
	From Andhra Pradesh, Madras, Maharashtra, and Mysore (Neighbouring States)	From other States	To Andhra Pradesh, Madras, Maharashtra and Mysore (Neighbouring States)	To other States	
Males					
Total	100.0	100.0	100.0	100.0	100.0
I. Cultivation	4.6	1.4	2.5	1.1	22.9
II. Agricultural Labour	4.0	0.4	1.8	0.2	13.1
III. Mining,.....Plantation	44.8	2.2	8.1	3.1	10.1
IV. Household Industry	1.5	1.0	2.7	0.8	4.8
V. Manufacturing other than Household Industry	7.8	6.0	21.4	22.5	10.0
VI. Construction.	5.2	0.5	4.7	6.1	1.7
VII. Trade and Commerce	8.4	11.6	12.3	6.0	7.5
VIII. Transport, Storage and Communication	4.7	39.6	6.7	5.1	3.7
IX. Other Services	19.0	37.3	39.8	55.1	26.2
Females					
Total	100.0	100.0	100.0	100.0	100.0
I. Cultivation	6.0	12.8	10.4	6.9	16.3
II. Agricultural Labour	5.8	8.0	8.3	1.1	27.4
III. Mining,.....Plantation	72.0	4.5	26.9	0.7	5.3
IV. Household Industry	3.0	14.2	6.1	1.9	17.8
V. Manufacturing other than Household Industry	1.7	2.1	5.1	3.7	8.1
VI. Construction	1.6	0.0	1.0	0.9	0.2
VII. Trade and Commerce	0.6	1.4	2.6	1.6	1.4
VIII. Transport, Storage & Communication	0.2	4.8	1.4	1.0	0.4
IX. Other services	9.1	52.2	38.1	82.2	23.1

The industrial composition of in-migrant workers from distant states differed markedly from that of in-migrant workers from the neighbouring states. The major difference was that while among the latter category, there was a clear concentration in plantation labour, in the former category the concentration was mainly in the industrial classes, trade and commerce, transport and communications, and "other services." These three industrial classes claimed 88 per cent of the male and 58 per cent of the female in-migrants from the distant states.

Out-migrant workers were found to be predominantly absorbed in "other services" and "manufacturing other than household industry". Out-migrants in distant states were much more concentrated in the "other services" category than was the case of out-migrants to neighbouring states, a tendency which was more pronounced among females than among males.

The concentration of out-migrants in the industrial category "other services" seems to be consistent with the contention that there has been a tendency for the state to be continuously drained off the cream of its human resources (the more educated and the better skilled). Zachariah's analysis led him to the inference that "the out-migrant workers from Kerala had high educational attainments compared to other migration streams in the country and as a result they had very high representation in the clerical and related occupations."[1]

From these evidences concerning the characteristics of migrants it seems safe to conjecture that young people with relatively higher education have tended to migrate from Kerala to other parts of India, to get absorbed in clerical and related jobs, and to return after retirement to Kerala to spend the remaining part of their lives in the place where they were born and brought up. A continuation of such a tendency amounts to taking away from Kerala disproportionately people with special skills; but it cannot be said that it has no salutary effect at least in the short run. People go from Kerala not because they get *better* opportunities elsewhere but because they do not get *any* opportunity here. If they remain here without any job to hold they will simply be adding to the burden of the state which is being pestered by the problem of educated unemployment to a considerable degree. Further, educational level in Kerala being higher than what it is elsewhere in India, it may be said that Kerala is much more able to perform the training function of Indian Society than are the other states in India. The people trained here are then absorbed in various parts of India according to the needs of the different regions. Kerala, in its turn, is getting people with low level of education to take care of its needs of labour in plantations and the like. Thus as Zachariah puts it the selectivity pattern of in-migration and out-migration seems to bring forth a more efficient utilization of the human resources available in the state.[2]

Summary

This chapter has presented some data on migration to and from Kerala State. The main source of data on migration is the information on place of birth recorded at each census. Data on place of birth are not necessarily accurate, nor are they entirely satisfactory from the point of view of presenting an accurate picture of the dynamics of migration. However, experts on migration are of the opinion that much can reasonably be learned by a careful analysis of the place-of-birth data supplemented, if possible, by a comparative analysis of the age-sex distribution of the population at consecutive censuses.

The materials for this chapter were, to a large extent, borrowed from a study by K. C. Zachariah. Estimates of inter-censal migration for Travancore-Cochin during the first five decades of the century and of Kerala for 1951-61 indicate that migration did not affect very much the population change in question during the above period. In the beginning of the 1901-51 period, Travancore-Cochin, and possibly the entire Kerala region, was a gaining area whereas towards the end of that period the area became a losing one. Kerala in 1951-61 was undoubtedly a losing state. In the early decades the population exchange had been a matter between Kerala and the neighbouring states, but lately it has become a matter involving more distant states as well.

Analysis of the characteristics of migrants reveal that migrants tend to be highly selective; for example, the out-migrants are better educated than the general population. Opinions differ as to the impact of such selectivity in migration on the economy of Kerala.

[1] Zachariah, *op. cit.*, p. 111.

[2] *Ibid.*

CHAPTER VI

POPULATION COMPOSITION

6.1 Introduction

In the preceding chapters of this monograph we have discussed the size and territorial distribution of Kerala's population, changes therein during the past six decades, and components of such changes, namely, fertility, mortality, and migration. In this chapter we shall deal with another important aspect of the population: its composition and changes in that respect over time. By composition of a population is meant distribution within a population of one or more individually carried traits or attributes[1]. The individual characteristics to which composition generally refers include, sex, age, marital status, occupation, labour force status, industry, and other such features.

6.2 Sex composition

Data on sex composition are generally thought of as free from errors of misclassification because the trait is easily observable. Errors due to omission or commission, however, are likely to affect data on sex composition, as they would affect compositinal data of any kind. Thus, if for any reason, females tend to be undercounted much more frequently than males, sex composition will be distorted to that extent.

Sex composition is conventionally expressed as the ratio of males per 100 females.[2] It can also be expressed as males per 100 population. Both these indices show the male content or masculinity of the aggregate. Table 1 gives the sex ratio for Kerala for the Census years *1901-1961*. The figures in Table 1 reveal that the masculinity of Kerala's population (males per 100 females or per 100 persons) has been steadily decreasing from 1901 to 1951 and that there has been a slight upturn in the trend during 1951-1961. It is of interest to compare the trend in sex ratio in Kerala with those of other states. Figure 6.1 shows the trends for the different States over the period 1901-1961. Kerala seems to have experienced a unique pattern over time in sex ratio: no other state in India except Punjab experienced a steady decline in masculinity over such a long period as did Kerala. Moreover, in 1961, no state in India had a lower masculinity than that obtained in Kerala. The masculinity of Orissa's population was below that of Keralites till 1941. Madras and Bihar also had a lower sex ratio than Kerala during the first few decades of this century. But the most recent tendency has been for all the states to maintain sex ratios higher than that of Kerala.

Why is masculinity in Kerala lower than in the other states of India? A clue to this may perhaps be found if we examine the general pattern observed in most populations unaffected by migration. "As a rule, the sex ratio at birth exceeds 100 and varies inversely with the frequency of pre-natal losses."[3] Where pre-natal losses are low the sex ratio at birth is usually around 105 to 106 and where pre-natal losses are high it is around 102. Thus in all populations, among babies born in a given year males predominate. If these babies are followed over time, it will be found that with each advance of age the predominance of males diminishes; between ages forty and fifty, depending upon the particular mortality schedule operating, the sex ratio among these cohort of babies reaches unity and thereafter it further declines.

Table 1

Sex Ratio (Number of Males Per 100 Females) Kerala: 1901-1961

Census year	Sex ratio (Males per 100 females)	Per cent males
1901	99·58	49·90
1911	99·20	49·80
1921	98·90	48·72
1931	97·89	49·47
1941	97·41	49·34
1951	97·30	49·32
1961	97·89	49·47

[1] Amos H. Hawley, "Population Composition", in Hauser, P. M. and Duncan, O. D. (eds.) *The Study of Population*, Chicago: University of Chicago Press, 1959, p. 361.

[2] *Ibid.*, p. 363, Indian census Publications, however, use the inverse (*i.e.*, number of females per 100 males) of this ratio.

[3] Hawley, *op. cit.*, p. 363.

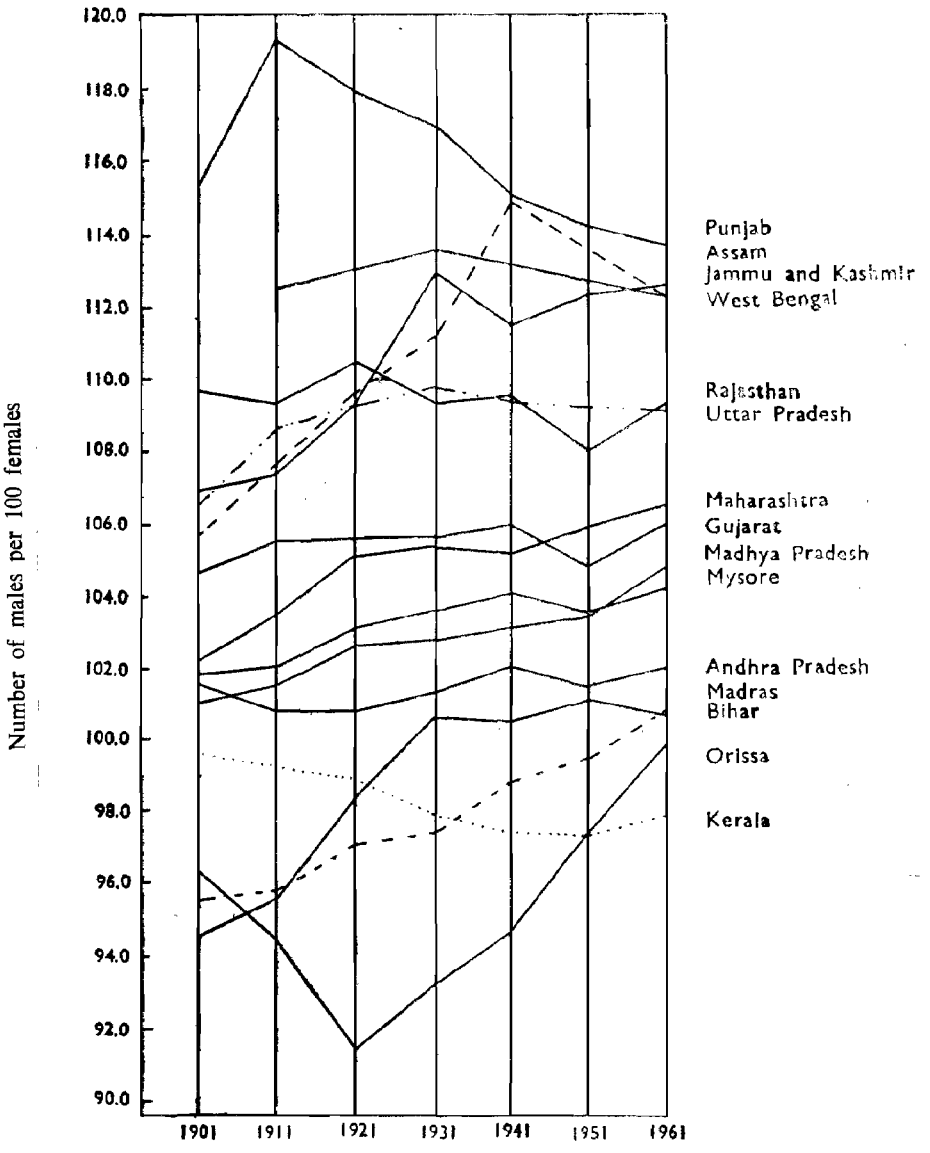


Figure 6.1 - Sex ratio (number of males per 100 females) of populations of different states in India, 1901 - 1961 (Source: Census of India, Paper No. 1 of 1962)

This age-pattern of sex ratio is ascribable to the sex differentials in mortality which normally favour females. If a given population is subjected to constant schedules of mortality and fertility for a sufficiently long period, and is kept unaffected by migration, the age-sex ratio just described would be exhibited by the age-sex distribution of that population in any one year.

The decreasing pattern of sex ratio with each advance in age starting with a value of 102-106 at age zero implicates an overall sex ratio of 94 to 97 for the total population. The principal exception to this pattern occurs when maternal mortality is high enough to offset the relatively low mortality of females in the non-reproductive ages.

From what has been said above it follows that we have to examine the following factors to find an explanation for the observed sex ratio of any population: (1) the sex ratio at birth, (2) the sex differentials in mortality, and (3) the effect of migration between the population and others.

As regards sex ratio at birth, it is generally believed that there is wide regional variation in India. But a recent study by Ramachandran and Deshpande came out with the opposite conclusion. They examined the hospital data on births and came to the conclusion that the sex ratio at birth in India can safely be assumed to be around 105 to 106 and that "differentials in the sex ratio at birth between regions is very narrow."[1] We have already seen that the mortality conditions in Kerala are relatively better than what obtains in the rest of the country. The conditions with respect to pre-natal losses are also likely to be slightly favourable to Kerala. Hence, it seems that we may not be quite off the mark if we were to assume that the sex ratio at birth in Kerala is around 105.

How about maternal mortality? It is difficult to get data on maternal mortality independent of the census age returns since the life tables have all been prepared by differencing the age distributions in successive censuses. Our analysis of the available data has shown that in Kerala, mortality risks experienced by females were less than those experienced by males at all ages except 15-40 years (See Table 5, Chapter III). The high risk of mortality experienced by females during the bulk of reproductive age-span, however, does not more-than offset the advantage females have over males at the other ages. It may be noted that in Western countries also we find life expectancy at birth for females higher than that for males.

Next let us consider the effect of migration. We have already remarked that migration had relatively very little effect on population change in Kerala. That migration did not affect the sex ratio of Kerala's population will be clear from the following calculations. In 1961 the total number of males enumerated in the State was 8,361,927 and females 8,541,788. If we subtract from these figures the life-time in-migrants and add the life-time out-migrants, we get a close approximation of the sex composition of the population devoid of migration effect. The sex ratio that we get in that fashion is 98.4 males per 100 females as compared with the figure 97.4 for the enumerated population in 1961. This clearly shows that migration was not responsible for any significant extent for the relatively low masculinity of Kerala's population.

The upshot seems to be that Kerala's sex composition is consistent with what one might expect given the mortality and fertility trends and migration pattern obtaining in this state. The reason why Kerala's sex ratio differs from that of other states in India may have, therefore, to be found in the factors responsible for the high masculinity in the reported figures for the other states. Since this particular aspect forms the subject of investigation in another monograph, it is not necessary to go into the question in detail here. Nonetheless, it may be worthwhile to point out one thing. In discussions of the reasons behind the abnormal sex ratio in India's population, the possible tendency to undercount females much more frequently than males is often emphasized. The low status attached to females in this society is considered as adding plausibility to this hypothesis. In the case of Kerala, it seems that such a tendency might not have operated to the same extent as in other states because a large proportion of the population has been brought up in families following female descent so that females are relatively less likely to be ignored when reporting family composition.

Before concluding this section, it may be interesting to examine a few differentials in sex ratio. Table 2 presents sex ratio by broad age groups for rural, non-city-urban and city areas of different districts in Kerala in 1961. By and large, we find that for age groups 0-14 and 15-64, masculinity was higher in urban areas than in rural areas.

[1]Ramachandran, K. V. and Deshpande, V. A., "The Sex Ratio at Birth in India by Regions," *Milbank Memorial Fund Quarterly*, XLII, 1964, 84-95.

For the age group 65 and over, however, invariably in each district urban areas had lower masculinity compared to rural areas. We also observe that masculinity in the productive age group, 15-64, was lower, with few exceptions, than in the younger age group.

Table 2

Sex Ratio (Number of Males Per 100 Females) by Age in Rural and Urban Areas of Different districts in Kerala, 1961

District	Age group	City	Non-city-urban	Rural
Kozhikode	Below 15	106	106	104
	15—64	103	95	95
	65+	79	89	90
Ernakulam	Below 15	103	103	103
	15—64	109	110	96
	65+	79	79	93
Alleppey	Below 15	103	102	103
	15—64	102	93	93
	65+	75	87	95
Trivandrum	Below 15	102	101	101
	15—64	107	98	97
	65+	76	88	92
Cannanore	Below 15	..	105	103
	15—64	..	96	91
	65+	..	87	97
Palghat	Below 15	..	103	101
	15—64	..	94	86
	65+	..	81	83
Trichur	Below 15	..	102	103
	15—64	..	90	84
	65+	..	78	85
Kottayam	Below 15	..	103	102
	15—64	..	105	106
	65+	..	96	102
Quilon	Below 15	..	103	102
	15—64	..	108	98
	65+	..	85	97

6.3 Age composition

In this section we are concerned with the distribution of Kerala's population showing how many persons there are at each age. Fertility, mortality, and migration trends affect the age composition of any population. Individuals enter a population by birth or immigration and they leave it by death or emigration. The age at birth is obviously zero, but the age at death or migration may be any thing from zero to 100 or more The dynamic aspect of the age composition of a population is also governed by the fact that each person surviving in the population becomes older year by year.

Knowledge about the absolute numbers at each age in a population is important because varying numbers of individuals in different age groups produce changing demands on educational facilities and public and private services of various kinds. The absolute numbers in different age groups also are among the determinants of labour supply, number of births, number of deaths, and the like. Given the age distribution of a population it is possible to make fairly dependable inference about the nature of the fertility and mortality trends to which the population had been exposed in the past. For example, a fairly stable age distribution (unchanging relative numbers in each age group) over several decades in a population implicates an unchanging fertility pattern in the past. Moderate declines in mortality may not produce drastic changes in the relative numbers in different age groups.

The accompanying figures (figures 6.2, 6.3, 6.4 and 6.5) indicate that the age distribution of Travancore and Cochin had not at all changed significantly over the period under reference. A slight tendency for the population to become younger over the period is, however, discernible; the proportions in the young age groups had increased and those in the old age groups decreased. This is what one should expect in a population with unchanging fertility pattern accompanied by a moderate decline in mortality.

From the figures it can be easily seen that about two-fifth of the population belonged to the age groups, under 15, and that a little over 50 per cent to 15-60. This pattern is characteristic of populations with sustained high fertility over a long period and high or moderately declining mortality. The 1961 age distribution for Kerala is consistent with the distributions for Travancore and Cochin for earlier years as can be seen from Table 3.

We have already seen that in relative terms the change in population had been rather small arising from exchange of population between Kerala and the rest of the country. Hence, it follows that migration between the other States in India produced only little impact on the age distribution of Kerala. But when the age distribution of population residing in various regions of Kerala is taken for consideration, migration effect on age composition assumes predominance. We do not have age data for different years for different regions. But some idea about the regional differences in age composition can be had from the figures presented in Table 4. Without exception, the percentage in young ages (0-14) was least in city areas and highest in rural areas of the different districts, with that in non-city-urban areas in-between. In districts where there are no cities urban rural differentials consistent with what has been just described obtained. The urban-rural pattern in proportions of the population in the working age group was opposite to that exhibited by the proportion in the young ages. In rural areas of the different districts, proportion of population (both sexes combined) belonging to working ages (15-64) was within the range 52-55 while the corresponding range for the non-city-urban areas was 54-57 and for city areas 55-59. The rural-urban difference in this proportion was minimum in Alleppey district and maximum in Trivandrum district. As regards the proportion of total population belonging to the old age group, 65 and over, not much rural-urban differential seems to exist. But the indication is that in 1961 people in old ages were more frequent in rural areas than in urban areas. Migration of people in the working age groups from rural areas to urban areas and return migration from urban to rural of retired and old aged might be responsible, at least partly, for the above differential in age composition.

Table 3

Age Distribution (Adjusted) of Kerala's Population: 1961

Age group	Both sexes	Males	Females
0—4	15·8	16·2	15·4
5—9	13·4	13·7	13·2
10—14	11·3	11·7	11·8
0—14	41·0	41·6	40·4
15—19	10·3	10·1	10·5
20—24	8·9	8·7	9·1
25—29	7·7	7·5	7·9
30—34	6·6	6·5	6·7
35—39	5·7	5·7	5·6
40—44	4·7	4·8	4·6
45—49	3·9	4·0	3·9
50—54	3·3	3·3	3·2
55—59	2·6	2·6	2·7
15—59	53·7	53·2	54·2
60—64	2·0	2·0	2·0
65—69	1·5	1·4	1·6
70 and over	1·8	1·8	1·8

Source: Census of India, Paper No. 2 of 1963, *Age Tables*, Table 6, p. 101.

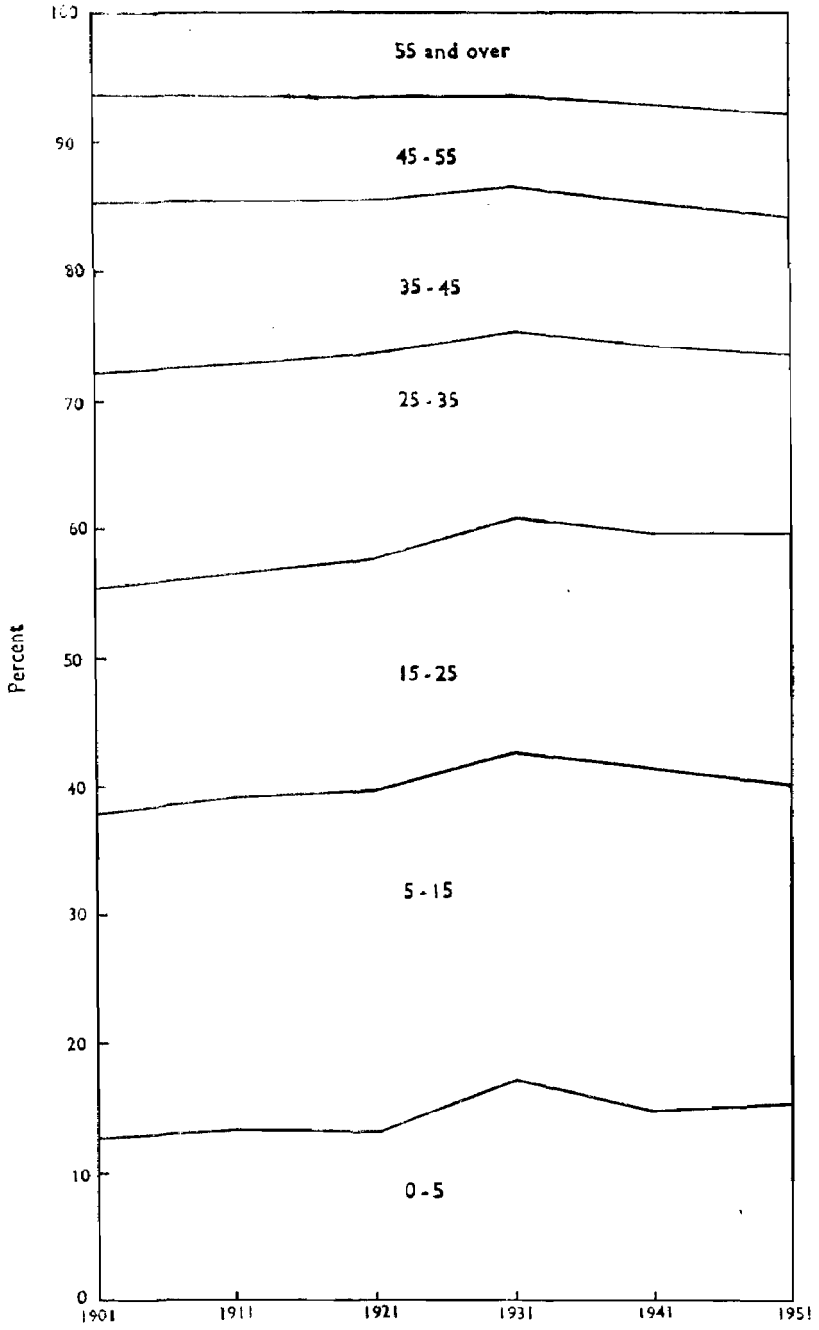


Figure 6.2 - Percent below specified ages: Travancore, Males, 1901 - 1951

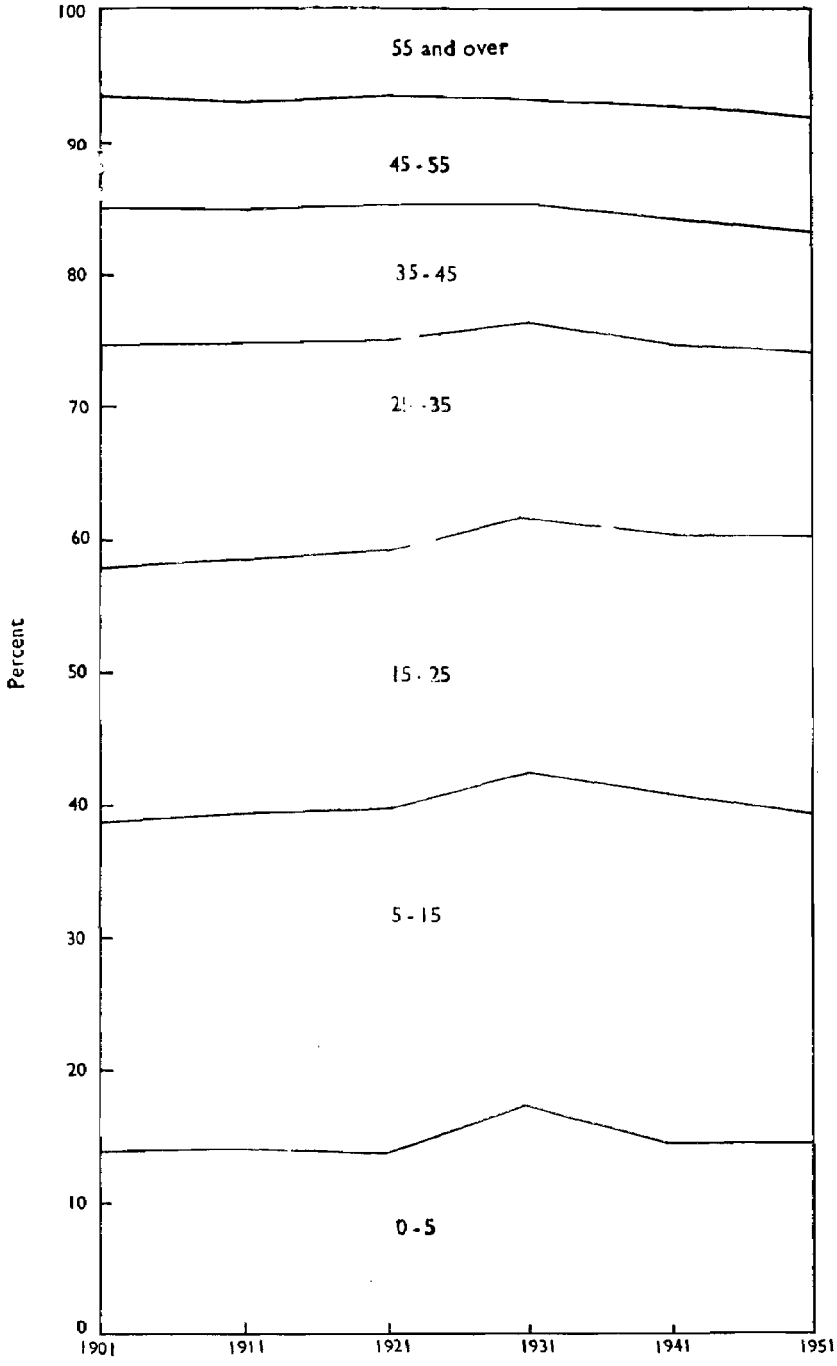


Figure 6.3 - Percent below specified ages: Travancore, Females, 1901 - 1951

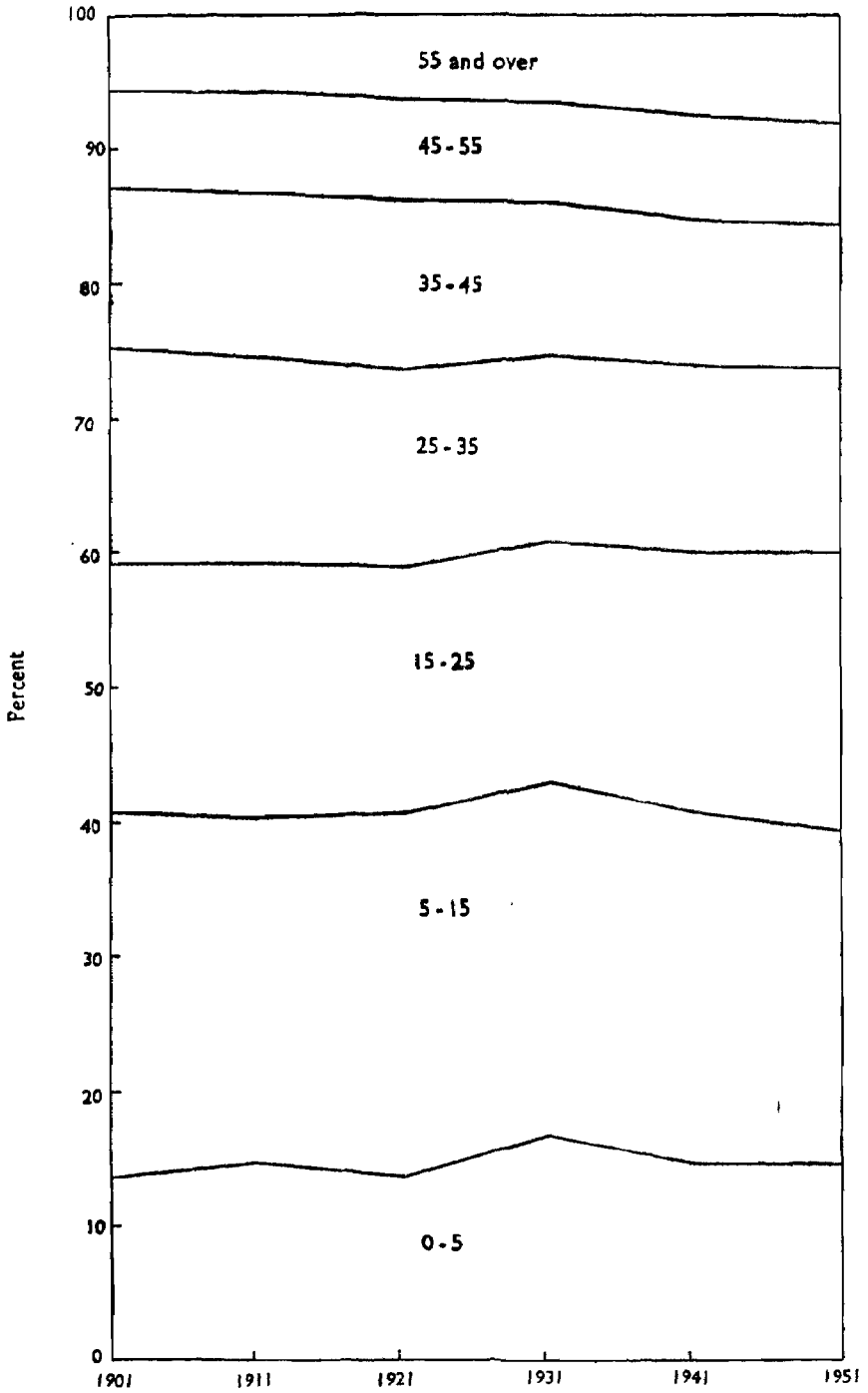


Figure 6.4 - Percent below specified ages; Cochin, Males, 1901 - 1951

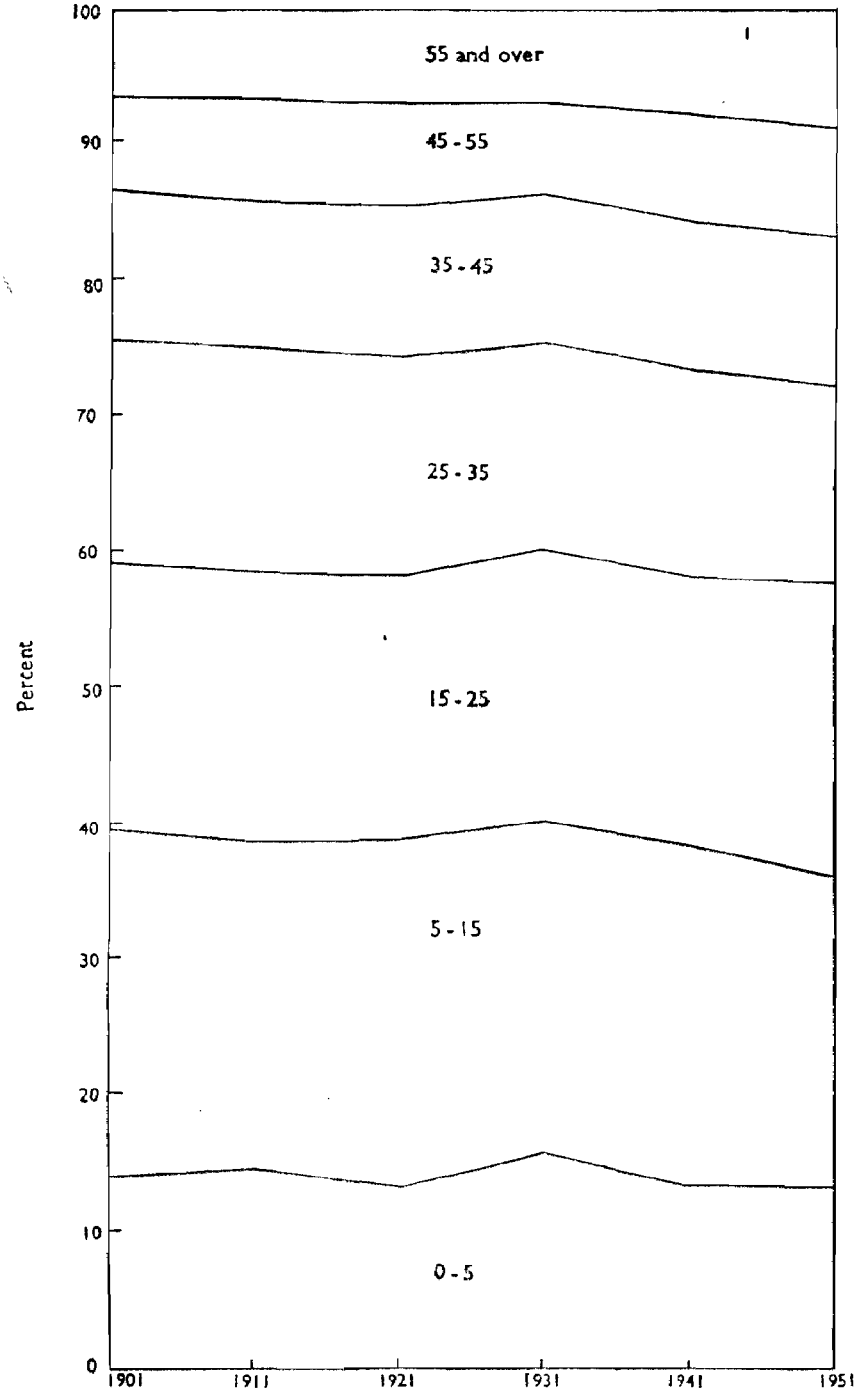


Figure 6.5 - Percent below specified ages: Cochin, Females, 1901 - 1951

Table 4

Per Cent Distribution of Persons, Males and Females, in Rural and Urban Areas of Different Districts in Kerala, by Broad Age Group (1961)

District	Age group	Both sexes			Males			Females		
		City	Non-city urban	Rural	City	Non-city urban	Rural	City	Non-city urban	Rural
Kozhikode	0—14	39	41	43	40	43	44	39	40	42
	15—64	58	55	53	57	54	53	58	56	54
	65+	3	4	4	3	3	3	3	4	4
Ernakulam	0—14	39	40	43	39	40	44	40	41	42
	15—64	58	57	53	59	57	52	57	56	54
	65+	3	3	4	2	3	4	3	3	4
Alleppey	0—14	42	42	42	42	43	43	41	41	41
	15—64	55	54	54	55	53	53	55	55	55
	65+	3	4	4	3	4	4	4	4	4
Trivandrum	0—14	38	43	45	38	44	45	39	43	44
	15—64	59	54	52	60	53	52	58	54	53
	65+	3	3	3	2	3	3	3	3	3
Cannanore	0—14	..	40	43	..	41	44	..	38	42
	15—64	..	56	53	..	56	52	..	58	54
	65+	..	4	4	..	3	4	..	4	4
Palghat	0—14	..	39	41	..	40	43	..	38	39
	15—64	..	57	55	..	56	53	..	58	57
	65+	..	4	4	..	4	4	..	4	4
Trichur	0—14	..	40	42	..	41	45	..	38	40
	15—64	..	56	54	..	55	51	..	58	56
	65+	..	4	4	..	4	4	..	4	4
Kottayam	0—14	..	41	43	..	41	43	..	41	44
	15—64	..	55	54	..	56	54	..	55	53
	65+	..	4	3	..	3	3	..	4	3
Quilon	0—14	..	42	44	..	42	45	..	43	44
	15—64	..	55	53	..	56	52	..	54	53
	65+	..	3	3	..	2	3	..	3	3

6.4 Education

That education is an important element in the composition of a population needs no exposition. As far as individuals are concerned, educational attainment is an index of socio-economic status and for the society as a whole, educational composition of its population furnishes an inventory of its human resources. Further, the receptivity of a population to organized attempts at social change, such as attempts to popularize small-family-mindedness in a population through mass education programmes, is partly determined by the educational composition of the population. Almost all censuses, therefore, record information concerning educational attainment of the persons enumerated.

The simplest measure of the level of education of the population is the proportion of the people classified as literate. Table 5 gives per cent literate by sex and broad age groups in Travancore Cochin and Malabar for the earlier censuses in this century, and for Travancore-Cochin for 1951. It can be easily seen from these figures that literacy among males exceeded that among females in all the areas throughout the period, that being true for all

age groups. There had been steady increase in the literacy level of the populations in the different regions over the decades. In Travancore, per cent literate among males in 1901 was 21.5 which went up to 58.1 by 1941. In Cochin, during the corresponding period, there was an increase from 22.4 per cent to 52.0 per cent in literacy among males. The corresponding increase among females was from 3.1 per cent in 1901 to 36.0 per cent in 1941 in Travancore and from 4.5 per cent to 30.6 per cent in Cochin. The literacy rate in Malabar had been always lower than that in the other parts of the State.

If the desire to become literate remains unchanged from one cohort to another and if the facilities to become literate also remain unchanged over time, literacy rate might be expected to rise by age, since the interval available to make the transition from illiterate status to literate status increases with each advance in age. But if younger cohorts get more facilities for education or if changes in school facilities and legislation concerning compulsory education and the like come into force, the age pattern of literacy might change from linear to curvelinear during the transition period. This is what we find in Table 5.

How does the literacy level of Kerala compare with that of other regions in India? Some comparative figures for 1961 are presented in Table 6. From that Table it can be seen that literacy level in Kerala was highest among the States and Union Territories except Delhi. Delhi's superiority over Kerala in this respect obtained only in the urban areas; rural Delhi had a lower literacy level in 1961 than rural Kerala, 25.1 per cent as compared to 45.2 per cent. Till 1951 Kerala ranked first in overall literacy rate, but in 1961 her rank fell down to two.

From the figures in Table 6, it can also be seen that among the States and union territories, urban-rural differential in literacy was lowest in Kerala. Also, Kerala had the lowest sex differential in literacy excluding Jammu and Kashmir where the sex differential was smaller than that in Kerala, the reason being that in the former the overall literacy level among males as well as females was much lower making for a small sex differential.

Table 5

Literacy in Travancore (1901-1941), *Cochin* (1901-1941), *Malabar* (1901-1931) *and Travancore-Cochin* (1951)

Age group	Literacy among males					Literacy among females				
	1901	1911	1921	1931	1941	1901	1911	1921	1931	1941
Travancore										
All ages	21.5	24.8	33.1	33.8	58.1	3.1	5.0	15.0	13.9	36.0
0—9	1.7	2.3	6.8	..	..	0.7	1.1	7.5	..	..
5—9*	3.4	4.5	13.5	16.6	55.6	1.5	2.2	14.9	11.3	46.3
10—14	13.6	16.9	35.7	31.4	76.3	4.3	7.1	21.0	20.0	60.8
15—19	26.4	31.8	43.7	53.0	79.3	5.8	9.7	22.6	27.4	58.6
20 and over	32.0	36.9	44.0	47.5	66.8	3.5	5.6	16.0	15.3	32.5
Cochin										
All ages	22.4	24.3	27.4	38.3	52.0	4.5	6.1	9.9	18.5	30.6
0—9	1.7	1.9	3.5	11.8	..	0.7	1.1	2.2	8.5	..
5—9*	3.4	4.1	6.9	26.7	22.3	1.3	2.4	4.5	19.4	18.7
10—14	16.8	19.7	25.1	43.9	53.5	5.0	8.6	15.0	30.3	43.4
15—19	28.2	30.3	35.9	57.5	67.4	7.7	10.4	17.4	32.1	49.3
20 and over	34.2	36.7	39.7	49.8	56.6	5.6	7.3	11.3	18.7	26.6
Malabar										
All ages	17.2	19.0	20.9	22.9	..	3.0	3.5	4.9	6.4	.
0—9	1.6	1.4	1.8	..	..	0.6	0.6	1.0	..	..
5—9*	3.2	2.9	3.7	9.7	..	1.1	1.2	2.0	5.2	..
10—14	12.4	14.0	16.3	18.0	..	3.8	4.7	7.1	8.8	..
15—19	21.0	22.5	26.4	31.9	..	5.2	5.7	8.3	11.1	..
20 and over	26.7	29.2	31.2	33.7	..	3.7	4.2	5.7	7.0	..

Table 5—*contd.*

Literacy in Travancore (1901-1941), *Cochin* (1901-1941), *Malabar* (1901-1931) *and Travancore-Cochin* (1951)

Age group	Males	Females
Travancore-Cochin (1951)		
All ages	..	..
5—9	27.5	25.9
10—14	72.4	63.0
15—24	75.0	58.8
25 and over	68.1	34.3

*The literacy rates for the age group 5-9 were estimated by dividing literates under age 10 by the population aged 5-9.

Table 6

Per Cent Literate among Persons in Rural and Urban Areas of All-India, States and Union Territories, 1961

State/Union Territory	Per cent Literate: Total Population			Per cent Literate: Urban			Per cent Literate: Rural		
	Both sexes	Males	Females	Both sexes	Males	Females	Both sexes	Males	Females
All-India	23.9	34.3	12.9	46.9	57.5	34.5	18.9	29.0	8.9
States									
Andhra Pradesh	21.1	30.1	12.0	41.8	53.6	29.3	16.8	25.1	8.5
Assam	27.3	37.3	15.9	57.1	64.1	47.0	24.9	34.8	13.7
Bihar	18.4	29.8	6.9	43.1	55.5	27.9	16.1	27.2	5.1
Gujarat	30.4	41.1	19.0	48.7	59.5	36.6	24.0	34.6	13.2
Jammu and Kashmir	11.0	16.9	4.2	28.2	36.7	18.1	7.5	12.9	1.8
Kerala	46.8	54.9	38.9	54.9	62.7	47.0	45.2	53.5	37.5
Madhya Pradesh	17.1	27.0	6.7	43.7	56.5	28.3	12.7	21.1	3.3
Madras	31.4	44.5	18.0	49.9	60.4	36.6	24.6	37.8	11.5
Maharashtra	29.8	42.0	16.7	51.0	61.6	37.9	21.4	33.5	9.3
Mysore	25.4	36.1	14.1	44.2	55.2	32.1	19.9	30.4	9.1
Orissa	21.6	34.6	8.6	44.1	57.5	27.6	20.1	32.9	7.5
Punjab	24.2	32.9	14.0	47.4	56.4	36.3	36.3	26.8	8.7
Rajasthan	15.2	23.7	5.8	37.6	50.9	22.5	10.8	18.3	2.5
Uttar Pradesh	17.6	27.2	7.0	40.0	49.8	27.8	14.3	23.7	4.1
West Bengal	29.2	40.7	16.9	52.8	59.5	43.3	21.6	32.8	9.7
Union Territories									
Andaman and Nicobar Islands	33.6	42.4	19.4	50.1	58.4	35.6	28.5	37.7	15.0
Delhi	52.7	60.7	42.5	56.2	63.4	46.9	25.1	38.3	9.4
Himachal Pradesh	17.1	27.2	6.2	53.5	63.4	43.7	15.2	25.1	4.6
L. M. and A. Islands	23.2	35.8	10.9	..	..	..	23.2	35.8	10.9
Manipur	30.4	45.1	15.9	50.7	70.5	30.8	28.5	42.6	14.9
Tripura	20.2	29.6	10.1	52.1	61.4	41.7	17.0	26.2	7.1
NEFA	7.2	11.7	1.4	..	..	..	7.2	11.7	1.4
Nagaland	17.9	24.0	11.3	56.1	64.2	43.1	15.8	21.4	10.0
Pondicherry	37.4	50.3	24.6	56.6	66.2	46.0	31.3	45.0	17.6
Sikkim	12.3	19.6	4.2	28.9	48.2	30.3	11.0	18.2	3.2

Among the factors responsible for the somewhat unique position Kerala enjoys now in respect to literacy level may be mentioned: (1) the devoted efforts of Christian missionaries to spread literacy in the State, and (2) the earlier starting of schools and colleges under the active patronage of private agencies and the State. In this connection it may be pertinent to remark that among the major religious groups in the State, literacy had been highest among Christians consistently throughout the period under review and that progress in literacy had also been faster among that group during the period. This is partially evidenced by the figures in Table 7 for Travancore. The same was true for Cochin also.

Per cent literate, of course, is a crude index of educational level of a population, except where relatively little formal schooling is available. Wherever facilities for formal schooling exist, educational level is better studied in terms of distribution of persons by number of years of schooling completed and number of children enrolled in schools by age. The data presented in Table 8 depict the situation in this respect in Kerala in 1961.

Table 7

Per Cent Literate Among Persons Aged 15-19 in Major Religious Groups By Sex, Travancore, 1901—1941

Sex	Religious Groups	1901	1911	1921	1931	1941
Males	All	26.4	31.8	43.7	53.0	79.3
	Hindus	25.4	30.5	42.3	51.5	79.6
	Christians	33.3	38.2	51.8	60.6	84.9
	Muslims	15.3	19.6	22.7	31.8	64.8
Females	All	5.8	9.7	22.6	27.4	58.6
	Hindus	5.0	8.2	19.4	23.7	56.0
	Christians	9.5	15.7	33.7	39.7	74.0
	Muslims	1.6	2.0	4.9	4.5	25.4

Source: Census of India, 1941 *Vol. XXV, Travancore*, Part 1, Report, p. 163.

Table 8

Per Cent Distribution of Persons in Different Age Groups in Rural and Urban Areas by Educational Attainment, Kerala, 1961

Age group	Urban				Rural			
	All	Illiterate	Literate but below Matriculation	Matriculation or above	All	Illiterate	Literate but below Matriculation	Matriculation or above
Males								
10—14	100	16	84	..	100	22	78	..
15—19	100	14	68	18	100	21	73	6
20—24	100	16	58	26	100	24	64	12
25—29	100	19	60	21	100	28	63	9
30—34	100	18	65	17	100	27	67	6
35—39	100	22	65	13	100	32	65	3
40—59	100	28	60	12	100	39	58	3
60+	100	39	52	9	100	49	50	1
All	100	37	53	10	100	46	51	3

Table 8

Per cent Distribution of Persons in Different Age Groups in Rural and Urban Areas by Educational Attainment, Kerala, 1961

Age group	Urban				Rural			
	All	Illiterate	Literate but below Matriculation	Matriculation or above	All	Illiterate	Literate but below Matriculation	Matriculation or above
Females								
10—14 . .	100	23	77	..	100	31	69	..
15—19 . .	100	25	62	13	100	35	71	4
20—24 . .	100	33	51	16	100	44	50	6
25—29 . .	100	40	50	10	100	52	45	3
30—34 . .	100	43	50	7	100	54	44	2
35—39 . .	100	52	44	4	100	62	37	1
40—59 . .	100	64	34	2	100	75	25	..
60+ . .	100	76	23	1	100	85	15	..
All . .	100	53	42	5	100	63	36	1

Source: G.K. Mehrotra, "Effect of Education on Fertility in Kerala," in R. S. Kurup and K.A. George (eds.), Population growth in Kerala, Trivanrdum : Government Press, 1966, p. 167.

6.5 Marital status

Marital status is another important element in the composition of a population. So long as births outside wedlock are socially stigmatized, the number of persons entering and continuing in marital union becomes a major determinant of birth rates. Distribution of persons in each age group by marital status when compared over time reveal whether or not there is any tendency for postponement of marriage in the population. Such a distribution also will give information on formation and dissolution of marital union.

Figure 6.6 shows the trend in proportion ever married by age and also proportion widowed or divorced (dissolution of marriage) by age. Clearly, the proportion remaining single throughout life had always been insignificant. Per cent of women aged 35 or over remaining single was below 5 in 1911 as well as in 1961. There was, however, a slight tendency for postponement of marriage as is evident from the fact that the graph for 1961 lies below that for 1911. But it should be emphasized that the difference between the two graphs is only slight. A somewhat more clear tendency is apparent in the proportion widowed or divorced to decline over time. This is only to be expected in view of the decline in mortality experienced by the State during the recent years.

There was only very little change in marital status composition by age for males (See Figure 6.7). As in the case of females, the tendency for the proportion of widowed or divorced to decline is quite marked among males also. (See Figure 6.7).

Wide disparity existed between males and females in marital status composition in the upper age groups. The chance of entering widowhood or becoming a divorcee was much higher among women at upper ages in 1901 than was the case among males. The differential in this respect continues to be marked even today (See Tables 9 and 10). Divorce being an insignificant phenomenon, bulk of the above differential is attributable to the sex differential in mortality. Mortality schedule favours females especially outside reproductive period and consequently the chance of a woman entering widowhood is higher than that of a man.

Relatively high frequency of men and women who remain single at given ages has been characteristic of urban than rural areas. This was found to be true for all districts of Kerala in 1961 (See Table 11). In the rural, non-city urban, and city areas of Kozhikode district the proportions never married among males aged 15 years or over in 1961 were respectively 29, 36 and 38 per cent. A similar pattern was shown by females also. The city versus rural difference in this respect was highest in Ernakulam and lowest in Alleppey. Among the

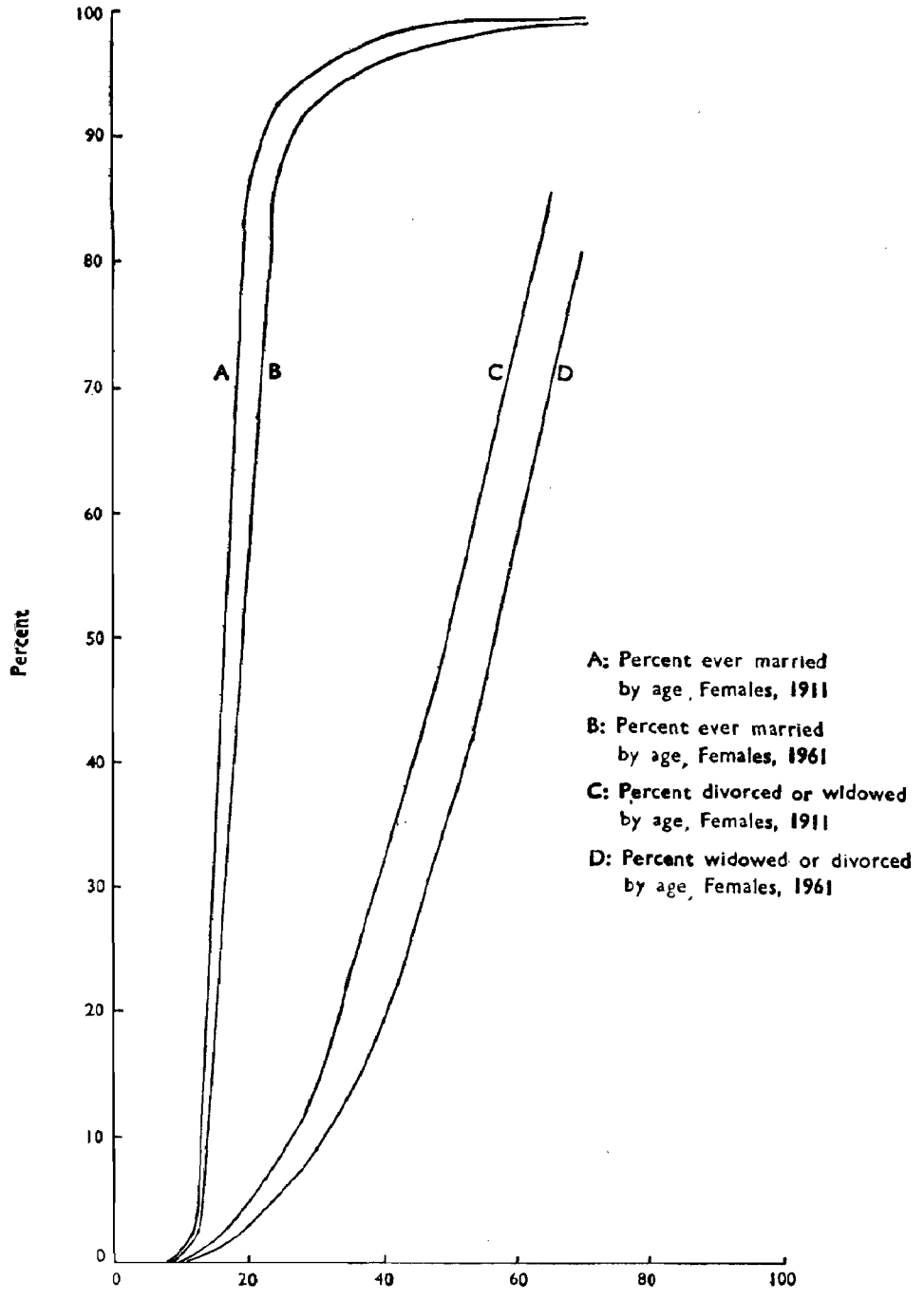


Figure 6.6-Percent married and Percent widowed or divorced by age, Females, 1911 and 1961

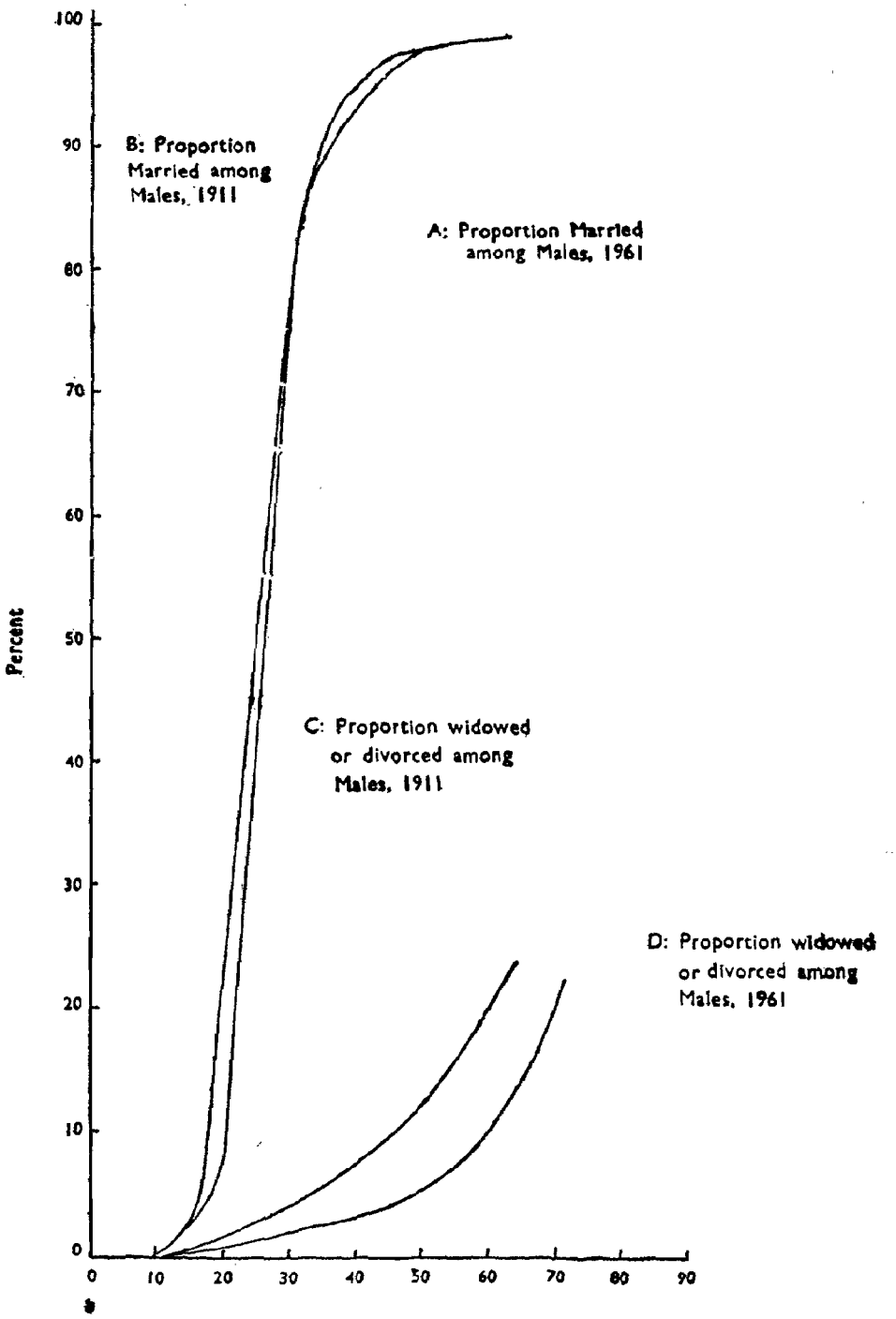


Figure 6.7 - Percent married and Percent divorced or widowed by age, Males, 1911 and 1961

five districts containing no city, the rural-urban difference was highest in Kottayam. By and large, the rural-urban difference in proportion remaining single above age 14 was smaller among females than among males.

We have already commented upon the finding that mean age at marriage is considerably higher in Kerala than in the other States in India (See Chapter IV). The proportion of never married women in the young fertile age group 15-24 was found to be higher in Kerala than in other states. The implications of this on the fertility level of the population was also discussed in Chapter IV. It was pointed out in that connection that to some extent the impact on fertility of the high proportion of never married at younger ages is offset by the low proportion of widows at the upper ages.

Table 9

Per Cent Distribution of Males and Females in Each Age Group by Marital Status: Kerala 1911

Marital Status	Age						
	0—4	5—9	10—14	15—19	20—39	40—59	60 and over
Males							
Single	100	100	99	89	24	2	1
Married	..	..	1	10	72	88	71
Divorced or widowed	..	..	..	1	4	10	28
All	100	100	100	100	100	100	100
Females							
Single	100	100	90	39	6	1	1
Married	..	..	9	57	80	48	13
Divorced or widowed	..	..	1	4	14	51	86
All	100	100	100	100	100	100	100

*The figures were obtained by combining those for Travancore, Cochin and Malabar.

Table 10

Per Cent Distribution of Males and Females in Each Age Group by Marital Status: Kerala 1961

Marital Status	Age						
	0—14	15—24	25—34	35—44	45—54	55—64	65 and over
Males							
Single	100	89	26	5	3	2	2
Married	..	11	72	92	92	88	75
Divorced or widowed	..	..	2	3	5	10	23
All	100	100	100	100	100	100	100
Females							
Single	100	46	7	3	2	1	1
Married	..	51	84	78	62	41	18
Divorced or widowed	..	3	9	19	36	58	81
All	100	100	100	100	100	100	100

Table 11

Per Cent Never Married Above Age 14 *by Sex and Rural Urban Residence : Kerala* 1961

District	Males			Females		
	City	Non-city-urban	Rural	City	Non-city-urban	Rural
Kozhikode	38	36	29	18	14	10
Ernakulam	42	39	32	24	19	19
Alleppey	37	37	34	18	20	19
Trivandrum	43	38	38	24	19	18
Cannanore	..	40	32	..	17	10
Palghat	..	38	30	..	18	13
Trichur	..	39	33	..	26	20
Kottayam	..	40	31	..	24	18
Quilon	..	40	34	..	20	17

6.6 Urban and rural residence

According to the 1961 Census, 18 per cent of India's population was living in urban areas and the rest in rural areas. The corresponding figures for Kerala were 15 and 35 respectively. Judging from thesefigu res one might say that Kerala is less urbanized than India as a whole.

In 1901, the State had only 21 urban places satisfying the criteria adopted by the 1961 Census, but by 1961 the number of such places increased to 92. Throughout the period 1901—61 the urban population in the state grew more rapidly than did the rural population. Between 1901 and 1961, the total population of the State increased 2.6 times while the urban population increased 5.6 times. The decennial growth rate of urban places between 1901—1911 was 15 per cent while that of rural population was 12 per cent ; the difference between the decennial growth rate of urban and rural populations was not large in that decade. But decade by decade that difference increased steadily and by 1951—1961, the urban growth rate became three times that of rural growth rate. (See Table 12).

Table 12

Urban and Rural Population : Kerala 1901-1961

Year	Total Population in '000	Urban population		Rural Population in '000	Per cent increase over preceding decade			Per cent of total	
		Number of place	Population in '000		Total	Urban	Rural	Urban	Rural
1901	6,396	21	454	5,942	..	..	..	7·1	92·9
1911	7,148	27	525	6,623	11·8	15·4	11·5	7·3	92·7
1921	7,802	37	646	7,156	9·2	23·2	8·0	8·3	91·7
1931	9,507	44	867	8,640	21·8	34·1	20·7	9·1	90·9
1941	11,032	52	1,128	9,903	16·0	30·2	14·6	10·2	89·8
1951	13,549	58	1,591	11,958	22·8	41·0	20·8	11·7	88·3
1961	16,904	92	2,554	14,350	24·8	60·5	20·0	15·1	84·9

Table 13

Number of Towns in Each Size Class : Kerala 1901-1961

Size class of town	1961	1951	1941	1931	1921	1911	1901
100,000 or more	4	4	3	2	..	..	..
50,000—99,999	4	3	3	1	3	3	3
20,000—49,999	25	11	5	8	6	5	4
10,000—19,999	31	27	19	14	9	6	7
5,000—9,999	15	26	18	15	13	8	5
Below 5,000	..	17	9	8	8	1	..

Urban population in a state may grow, (1) because the number of places classified as urban increases, (2) because outlying territories are annexed to existing urban places, (3) because of natural increase in the urban places, or (4) because of rural-urban migration. We have seen that the number of urban places in Kerala grew rather rapidly during 1901—1961. What can we say about the growth in urban population attributable to rural-urban migration and annexation? If we consider the 92 places classified as urban in 1961, it will be found that they together experienced a population growth of 671 thousand during 1951—1961 and 498 thousand in 1941-1951. Assuming that the natural increase in these towns occurred at the same rate as in the state as a whole, it has been estimated that only about 140 thousand of the 1951-1961 growth and about 134 thousand of the 1941-1951 growth can be ascribed to net gain due to migration and annexation.[1] On the basis of similar analysis for the different districts, Zachariah came to the conclusion that "migration to towns in Kerala was not very extensive either during 1941—1951 or 1951—1961. There was little acceleration in the rural-urban migration during the last 20 years. Several urban centres in the state did not receive any significant number of rural migrants and quite a few actually lost population through migration. Towns in the northern part of the state, Cannanore and Palghat districts in particular, seem to have experienced fairly significant out-migration during the last 10 years."[2]

The frequency distribution of urban places by population size displays important characteristics of urbanization. Urban centres are supposedly focal points of integration of territorial division of labour. Other things equal, then, larger the size of the urban centres the greater the scope of the territorial interdependence. Greater interdependence between widely scattered territorial units is a sign of developed economy, for when that kind of interdependence obtains we find self-sufficiency and isolation replaced by interdependence and exchange relationships. Table 13 shows the distribution of towns in different size classes at different census periods. The pattern exhibited is one of increasing numbers in each size class as time went by. Notable exceptions to the above patterns are the following : (1) Towns in the lowest size class, namely below 5,000 increased in number until 1951, but in 1961 we do not find any town in this class. (2) Similarly in the size class 5,000—9,999, the number of towns increased steadily until 1951 and then declined to the 1931 level in 1961. (3) Another important feature is that until 1931 there were no urban places with a population of 100,000 or more in the State; in 1931, there were two, in 1941 three and in 1951 and 1961 four. The decrease in the number of urban places in the size class, 50,000-99,999 from 3 in 1921 to 1 in 1931 was due to the fact that two of these places jumped to the next higher size class by 1931.

From Table 14 we can see the place at which larger urban places have increased their share of the population in the state. In 1901, all urban places with 5,000 or more population accounted for only 7.1 per cent of the total population. Sixty years later nearly that much per cent of the total population was accounted for by urban places with population size 50,000 or more. Between

[1]Zachariah in Kurup & George (eds.) *op. cit.*, pp. 95-96.

[2]*Ibid.*, p. 97.

1941 and 1961 the share of the total population falling on cities with 100,000 or more population almost doubled.

The proportion of the total population residing in urban places above any specified size consistently increased from one census to the other. Thus population living in urban places of 10,000 or more increased from 6.55 per cent in 1901 to 14.34 per cent in 1961. The corresponding increase for urban places of size 5,000 or more was from 7.10 per cent in 1901 to 15.08 in 1961. A minor exception to the general trend is observed in the case of urban places with 50,000 or more population. In 1901, 2.11 per cent of the State's population was accounted for by the urban places belonging to this size class whereas in 1911 the proportion fell down slightly to resume increasing trend then on.

As cities become larger and larger their economic and social influence tend to go far beyond their political boundaries. People move from the city to the adjoining areas and they and others living in the adjoining areas maintain economic and social ties with the city. Large cities tend to have less closely built up areas outside the city limits which are closely linked to the city. For many purposes all of the population which are closely related to the city need to be taken as a single aggregate. Very little has been done in this direction in India till 1961 Census, although the concepts like greater Calcutta and Greater Bombay were introduced in 1951. In 1961 a new concept, town group, was introduced. The idea was to treat as a single aggregate the populations of principal city and the towns closely linked to the city. In Kerala four town groups were formed. The structure of these town groups can be seen from Table 15.

Table 14

Cumulative Per Cent of Total Population of Kerala by Size of Places (Towns and Cities): 1901-1911

Size of cities and towns	1961	1951	1941	1931	1921	1911	1901
100,000 or above	4·08	3·39	2·31	..	..	..	..
50,000 or above	6·31	5·89	4·32	2·05	1·99	1·97	2·11
20,000 or above	11·55	8·51	6·63	6·10	5·25	4·98	4·72
10,000 or above	14·34	10·90	8·83	8·01	6·89	6·24	6·55
5,000 or above	15·08	11·59	10·06	8·94	7·94	7·11	7·10
Below 5,000	15·10	11·70	10·20	9·10	8·30	7·30	..

Table 15

Per Cent Distribution of Population Within Town Groups : 1961

Type of area	Town group			
	Trivandrum	Cochin-Ernakulam-Alwaye	Calicut	Cannanore
Total	100	100	100	100
Principal city	79	37	77	94
Other towns	21	63	23	6

6.7 Working force

"The subject of the working force might be defined as a study of the manner in which people earn their living, *i.e.*, obtain goods and purchasable services necessary to maintain the entire population."[1] Obviously while the entire population consumes goods and purchasable services, these are produced by a section of the population. Therefore, in a study of working force the first step is to separate the total population into two groups : (1) those in the working force, and (2) those outside it.[2]

Data on economic activity (*i.e.*, how people earn their livelihood) have been collected by all censuses in India. But the concepts and definitions and the procedures employed for collection and tabulation have drastically changed over time. The concepts of "worker" and "non-worker" were introduced for the first time in 1961. In earlier censuses the major distinction was between earners and their dependents though in some years a third category of earning dependents was also used. More or less satisfactory formulae have, however, been worked out to reclassify the data reported in earlier censuses so as to get the total populations classified into "workers" and "non-workers" as conceived in 1961.[3] The overall participation rates (workers per 100 population) thus obtained for the various census years are presented in Table 16.

It is clearly seen that participation rate in Kerala has been lower than in India as a whole throughout the period. The participation rate for both sexes combined for all-India exceeded the Kerala figure by 2.1 percentage points in 1901, by 6.8 in 1911, by 9.0 in 1921, by 0.4 in 1931, by 6.8 in 1951 and by 9.7 in 1961. These figures suggest that the gap between Kerala and all-India average has been widening over the period although the figures for 1931 and 1951 are exceptions to the general trend. Some peculiarities associated with the data collection procedure in 1931 seem to have resulted in classifying an unbelievably large proportion of the female population in the industrial category, "other services," and that seems to account for the deviation of the 1931 figure (See section 6.8). Interestingly enough, while the participation rate in Kerala has been lower than the corresponding figure for all-India throughout the period 1901-1961, the 1961 data reveal that in Kerala participation rates among males was lower than that in all other states while among females only one State, West Bengal, had a lower participation rate than had Kerala (See Table 17).

Table 16

Participation Rates by Sex for Kerala and All-India : 1901-1961

Year	Both sexes	Males	Females
Kerala			
1901	44·5	56·3	32·7
1911	41·3	53·8	28·9
1921	37·9	51·1	24·9
1931	42·9	50·0	35·9
1941*	..	..	..
1951	32·3	46·7	18·3
1961	33·3	47·2	19·7
All-India			
1901	46·6	61·1	31·7
1911	48·1	61·9	33·7
1921	46·9	60·5	32·7
1931	43·3	58·3	27·6
1941*	..	..	..
1951	39·1	54·1	23·3
1961	43·0	57·1	28·0

*Figures were not available for 1941.

[1]A. J. Jaffe, "Working Force", in P. M. Hauser and O.D. Duncan, (eds.), *The Study of Population op cit.*, p. 604.

[2]Jaffe in *ibid* points out that "most societies (with the exception of the economically most primitive) recognise that some parts of the population do not participate in the working force, however it may be defined."

[3]*See* Census of India, Paper No. 1 of 1961, Appendix 1.

Table 17

Working Force Participation Rates by Age and Sex

State	Males					Females				
	All ages	0—14	15—34	35—59	60+	All ages	0—14	15—34	35—59	60+
Andhra Pradesh	62·2	15·7	92·1	97·3	77·8	41·3	11·2	63·5	66·3	31·1
Assam	54·1	7·8	85·8	96·0	74·9	30·9	6·4	55·8	54·8	21·5
Bihar	55·6	9·6	87·6	97·4	82·3	27·1	5·9	41·4	48·3	23·1
Gujarat	53·5	7·3	86·9	96·3	66·3	27·9	6·6	46·4	46·4	17·1
Jammu & Kashmir	57·8	9·6	88·3	95·3	73·8	25·6	6·3	42·6	39·7	17·8
Kerala	47·2	2·2	76·5	94·4	65·6	19·7	1·9	32·6	37·3	14·8
Madhya Pradesh	60·2	11·8	93·1	97·7	80·5	44·0	10·8	68·6	72·5	36·0
Madras	59·7	9·3	75·2	96·6	73·4	31·3	6·7	45·7	51·4	25·8
Maharashtra	57·1	8·6	87·5	96·9	72·8	38·1	8·8	60·9	63·7	26·3
Mysore	58·4	11·9	90·1	97·0	76·4	32·0	8·2	50·8	55·9	24·7
Orissa	60.8	12·3	91·2	96·6	78·8	26·6	6·6	40·3	43·4	19·4
Punjab	52·9	7·9	85·0	95·5	70·9	14·2	3·8	23·4	24·6	10·5
Rajasthan	58·1	13·6	91·0	96·5	71·9	35·9	12·1	57·2	56·0	23·4
Uttar Pradesh	58·2	8·6	89·4	97·9	85·5	18·1	4·1	26·1	32·3	20·0
West Bengal	54·0	5·0	82·4	94·0	67·9	9·4	1·2	15·3	18·3	7·9

Why has the participation rate in Kerala been this low ? Doubtlessly a satisfactory explanation for the relatively low rate will be obtained only by disentangling the casual nexus of labour force participation rate. Perhaps some idea can be gained by examining the correlates of participation rates. With this mind we have done some analysis on the basis of the 1961 data. We shall now present the results of that investigation.

Rural-urban difference in participation rate is well established in almost all populations in the world. As urbanization progresses, the proportion of workers engaged in agriculture declines and the new occupations of the main earner in the household becomes non-home centred. Separation of work place from home affects the female participation rate because in that situation, there tends to occur an increase in the incompatibility between participation in working force and domestic duties. This happens because participation in work force by women involves accepting paid employment not only located outside home but most likely to be unrelated to what the other members of the household are doing. Change in socio-economic organization has also repercussions for participation rate at very young and very old ages. The period of training required to acquire skills increases as technology advances. With monetization of the economy, minimum age restrictions concerning entry into labour force becomes strictly enforcible. Modernization also brings in legislation making a certain minimum of education compulsory. As these and similar factors affect the participation rate at young ages, somewhat the same thing happens at old ages though due to entirely different reasons. With technological advance, it becomes difficult for old people to be productive at rates comparable to what others are capable of and consequently are forced to leave working force. These are some of the factors associated with economic development that tend to lower the participation rate at the beginning and end of working life span.

That participation rate at younger and old ages diminish with economic development is evidenced by the figures in Table 6.18 obtained from the United Nations' Report No. 1 on Demographic aspects of manpower. But comparing countries at different stages of economic development is one thing and contrasting different regions within the same nation is another matter. While the aforementioned factors associated with

economic development might clearly differentiate nations at different stages of economic development much less differences are to be expected between regions of the same nation especially a developing nation. Nonetheless, urban regions of all nations are likely to have an entirely different economic base compared to rural regions. To that extent we might expect differences in propensity to participate in working force in different age-sex groups.

In Table 19 are presented the participation rates by age and sex for rural and urban areas of the different districts in Kerala (1961). The figures in Table 19 reveal marked differences in participation rates by rural-urban residence.

Since there is significant rural-urban difference in participation rate, it is useful to analyse the factors affecting participation rates separately for rural and urban areas. We shall examine factors affecting participation rates for rural areas of Kerala (1961) only.

Table 18

Participation Rate (Males) by Age as Related to Economic Development

Type of countries	Number of countries	Age				
		10—14	15—19	20—54	55—64	65+
Agricultural[1]	21	24	78	96	92	70
Industrialized[2]	21	4	72	96	86	38

[1]With more than 60 per cent of workers engaged in agriculture.

[2]Countries with less than 35 per cent of workers engaged in agriculture.

Source : C. M. Stewart, "Degree of Urbanization and Patterns of Labour Force Participation," (paper 227), U.N. World Population Conference, Belgrade, 1965.

Table 19

Participation Rate by Rural-Urban Residence Sex and Age : Districts in Kerala : 1961

District	Age group	Males			Females		
		City	Non-city-urban	Rural	City	Non-city-urban	Rural
Kozhikode	All ages	47	46	47	9	10	15
	0—14	2	3	2	1	1	2
	15—34	71	75	80	12	15	25
	35—59	91	92	93	17	21	30
	60+	48	53	63	7	9	12
Ernakulam	All ages	45	47	47	10	10	22
	0—14	2	1	2	2	1	2
	15—34	66	72	78	14	15	37
	35—59	92	92	95	19	22	41
	60+	40	49	64	8	8	13
Alleppey	All ages	44	43	46	12	18	23
	0—14	1	1	1	1	2	2
	15—34	66	66	71	17	29	38
	35—59	89	93	95	26	34	43
	60+	48	61	72	10	15	20
Trivandrum	All ages	45	46	46	12	14	17
	0—14	2	2	2	2	2	2
	15—34	63	73	76	17	22	27
	35—59	89	95	97	22	29	35
	60+	39	65	75	9	16	19

Table 19

Participation Rate by Rural-Urban Residence Sex and Age : Districts in Kerala : 1961—(contd.)

District	Age group	Males			Females		
		City	Non-city-urban	Rural	City	Non-city-urban	Rural
Cannanore	All ages	..	49	48	..	14	25
	0—14	..	5	3	..	2	2
	15—34	..	77	82	..	21	43
	35—59	..	90	94	..	26	46
	60+	..	53	65	..	11	17
Palghat	All ages	..	48	52	..	17	28
	0—14	..	3	6	..	2	3
	15—34	..	74	86	..	26	45
	35—59	..	92	95	..	31	51
	60+	..	51	66	..	13	19
Trichur	All ages	..	44	46	..	15	23
	0—14	..	2	2	..	2	2
	15—34	..	67	76	..	24	37
	35—59	..	90	93	..	29	42
	60+	..	52	61	..	10	14
Kottayam	All ages	..	45	49	..	11	17
	0—14	..	1	1	..	2	1
	15—34	..	68	79	..	17	30
	35—59	..	93	97	..	22	32
	60+	..	55	70	..	9	10
Quilon	All ages	..	45	46	..	17	19
	0—14	..	2	1	..	2	2
	15—34	..	67	73	..	30	35
	35—59	..	93	96	..	29	36
	60+	..	57	76	..	9	16

Treating village as the unit of analysis, we have examined the relationship between several population characteristics on participation rates in Kerala. Analysis of variance involving factorial arrangement was employed for this purpose. First we calculated for each village the following characteristics.

A—Density (population per unit area),

B—Sex ratio (males per 100 females),

C—Literacy rate (separately for males and females—per cent literate),

D—Proportion of workers (separately for males and females) engaged in primary sector (industrial Classes I, II and III of 1961),

E—Proportion of workers (separately for males and females) engaged in secondary sector (industrial categories, IV, V and VI).

F—Proportion of workers (separately for males and females) engaged in tertiary sector (industrial categories, VI, VII and IX).

For each village, participation rate (per cent of workers to total population) was also calculated, separately for males and females. Then the villages were classified as "high" or "low" on the "factors" A, B, C, D, E and F described above. The cut off point was taken as the all-Kerala rural value on the respective characteristics. Thus, for example, all villages with density lower than all-Kerala rural density were put in the "low" category on density and others in the "high" category. There being six factors in all, dichotomizing all the factors resulted in 64 subclasses.[1] However, some of the subclasses so defined did not contain any village. For

[1]For the analysis of male participation rates we used only the classifications in terms of values for males for factors C, D, E and F. Similarly for the analysis of female participation rates, only the values for females on these four factors were used.

example, there were no villages simultaneously high on D, E and F (taking proportions for males only). In all, there were 17 empty subclasses. For all subclasses containing one observation or more, mean participation rates were calculated. The results for males are presented in Table 20 and for females in Table 23. In these Tables the figures within brackets indicate the number of observations based on which the means were calculated.

From the figures in Table 20 it can be seen how each of the six factors affect participation rate when the influences of all the other factors are eliminated. Thus for example a comparison of the first two figures in the second row of the main body of Table 20 tells how an increase in the level of literacy decreases participation rate among males when the level of the other five factors remain 'fixed' as follows : "low" density, "low" sex ratio, "low" level of proportion of workers in primary sector, "low" level of proportion of workers in secondary sector, and "high" level of proportion of workers in tertiary sector. As regards the effect of literacy, 22 such comparisons are possible from the figures in Table 20. These comparisons are enumerated for purposes of illustration in Table 21.

Table 20

Mean Participation Rates (Males) in Villages of Kerala, 1961, Classified According as They are "High" or "Low" on a Variety of Population Characteristics

Proportion of male workers engaged in primary industries	Proportion of male workers engaged in secondary industries	Proportion of male workers engaged in tertiary industries	Density : Low				Density : High			
			Sex ratio : low		Sex ratio : high		Sex ratio : low		Sex ratio : high	
			Male literacy		Male literacy		Male literacy		Male literacy	
			Low	High	Low	High	Low	High	Low	High
low	low	low	..	..	..	..	49·4	..	..	..
			..	..	..	..	(2)	..	..	..
		high	49·1	45·8	49·7	45·6	46·2	44·3	46·1	45·0
			(26)	(6)	(28)	(9)	(137)	(74)	(53)	(72)
	high	low	51·5	..	54·9	48·3	49·9	47·7	50·2	44·8
			(2)	..	(1)	(1)	(36)	(19)	(7)	(13)
		high	47·3	48·5	61·2	46·3	46·9	44·9	47·9	45·0
			(6)	(6)	(2)	(4)	(97)	(150)	(28)	(67)
high	low	low	52·7	46·6	53·8	49·8	49·8	47·4	48·3	47·0
			(75)	(7)	(116)	(22)	(105)	(45)	(62)	(100)
		high	49·9	45·6	49·7	46·9	48·3	45·3	47·8	47·0
			(19)	(1)	(26)	(1)	(25)	(7)	(13)	(6)
	high	low	52·0	..	56·4	49·5	51.0	47·9	47·1	46·3
			(20)	..	(5)	(1)	(44)	(9)	(6)	(11)
		high	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..

Table 21

Effect of Male Literacy on Male Participation Rate When the Effects of the Other Factors are Eliminated : Kerala Villages: 1961

Serial number of comparison	Mean male participation rate when literacy is low (number of observations)	Mean male participation rate when literacy is high (number of observations)	Difference (Col. 2)—(Col.3)
1	2	3	4
1	49·1 (26)	45·8 (6)	3·3
2	47·3 (6)	48·5 (6)	—1·2
3	52·7 (75)	46·6 (7)	6·1
4	49·9 (19)	45·6 (1)	4·3
5	49·7 (28)	45·6 (9)	4·1
6	54·9 (1)	48·3 (1)	6·6
7	61·2 (2)	46·3 (4)	14·9
8	53·8 (116)	49·8 (22)	4·0
9	49·7 (26)	46·9 (1)	2·8
10	56·4 (5)	49·5 (1)	6·9
11	46·2 (137)	44·3 (74)	1·9
12	49·9 (36)	47·7 (19)	2·2
13	46·9 (97)	44·9 (150)	2·0
14	49·8 (105)	47·4 (45)	2·4
15	48·3 (25)	45·3 (7)	3·0
16	51·0 (44)	47·9 (9)	3·1
17	46·1 (53)	45·0 (72)	1·1
18	50·2 (7)	44·8 (13)	5·4
19	47·9 (28)	45·0 (67)	2·9
20	48·3 (62)	47·0 (100)	1·3
21	47·8 (13)	47·0 (6)	0·8
22	47·1 (6)	46·3 (11)	0·8

Source : Table 20.

From Table 21 we find that all comparisons except one indicate that an increase in the level of literacy goes with a decrease in participation rate. A negative association between literacy level and participation rate is perhaps what one would expect in view of the fact that high literacy in a population means (though not necessarily) that a large proportion of young people in the age group below 15 are enrolled in schools and consequently are outside labour force. In this connection it may be interesting to note that Kerala with the highest literacy in rural areas among the rural areas of different States and Union Territories in India is also having the least participation rate among persons aged 0-14 (See Table 22). Now coming back to Table 21 we notice that the estimated effect of literacy (column 4) shows considerable variation from comparison to comparison. What can then be inferred as to the overall effect of literacy rate ? Before taking up that question one should settle another one. Is it meaningful to talk about an overall

effect ? If the estimates of the literacy effect obtained in column 4 of Table 21 do not differ significantly among themselves, then and then only it is meaningful to talk about an overall effect of literacy. In the language of analysis of variance this means that only if 'interactions' between literacy and other factors (density, sex ratio, etc.) are not statistically significant should one think about estimating and interpreting an overall literacy effect exhibited in Table 21. We shall postpone the discussion of 'interactions' for some time. Let us for the present proceed as though the interactions are not significant. Under those circumstances the 'main effect' of literacy (*i.e.*, the overall effect of literacy eliminating the influence of other factors) can be estimated by taking a weighted average of the figures obtained in column 4 of Table 21. According to the principles of analysis of variance the weights to be applied to each of the figures in column 4 of Table 21 should be the reciprocal of the sum of the reciprocals of the numbers shown in brackets in columns 2 and 3 of Table 21. Thus for example, the weight to be applied to the first figure, 3.3, is $(26\times6)/(26+6)$, that for —1.2, $(6\times6)/(6+6)$, and so on. The weighted average obtained in this fashion from Table 21 was 2.3. If, interaction is not significant, we may take this figure to mean that as literacy changes from 'low' to 'high' level, participation rate (males) decreases by 2.3 percentage points. This decreasing effect is attributable to literacy alone since the effect of all the other five factors have been eliminated in the process of getting the estimates in column 4 of the Table 21. However, the above interpretation is not valid if the interactions between literacy and the other factors are significant.

Table 22

Participation Rate for Age group 0-14 *by Sex for Rural Areas of Different States in India* : 1961

State	Both sexes	Males	Females
Andhra Pradesh	15·3	17·7	12·8
Assam	7·5	8·2	6·8
Bihar	8·3	10·1	6·3
Gujarat	8·7	9·0	8·4
Jammu & Kashmir	9·0	10·6	7·3
Kerala	2·1	2·2	2·0
Madhya Pradesh	12·8	13·3	12·2
Madras	9·6	11·1	8·2
Maharashtra	11·0	10·7	11·3
Mysore	11·6	13·6	9·7
Orissa	9·8	12·7	6·9
Punjab	7·0	9·1	4·6
Rajasthan	14·9	15·6	14·1
Uttar Pradesh	7·1	9·3	4·6
West Bengal	3·7	5·8	1·5
All-India	9·2	10·6	7·6

Source : P. S. Sharma, "Some Agro-economic Implications of Growth and Structure of Rural population of Kerala", in Kurup & George (eds.), *op. cit.*, p. 237.

How to test the significance of interactions ? This can be illustrated by taking the interaction between literacy and sex ratio. From the second row of the main body of Table 20 we find that 49.1—45.8 gives the effect of literacy on participation rate when the level of sex ratio is low while 49.7—45.6 gives the effect of literacy when the level of sex ratio is high, both these comparisons having the remaining factors fixed at common levels (namely, "low" density ; "low" proportion in primary sector; "low" proportion in secondary sector ; and "high" proportion in tertiary sector). Now, the fact that the above differences are not of the same magnitude constitute interaction between literacy and sex ratio. We have the difference of the above two differences amounting to —0.8. From Table 20 we can get ten such differences of differences each estimating the interaction between literacy and sex ratio. A weighted average of these differences of differences gives an overall estimate of the interaction between the two factors. The weights for each value will be the reciprocal of the sum of the reciprocals of the four observations involved. Thus the weight for the difference —0.8 obtained above will be $1 \div \left[\frac{1}{26}+\frac{1}{6}+\frac{1}{28}+\frac{1}{9}\right]$. Whether the average so obtained is significantly different from zero can be tested using the mean error sum of squares in the analysis of variance.

In our analysis of female participation rates it was found that some of the interactions were statistically significant. Hence it was decided to analyse the data separately for the following four categories both for males and females :

Group I—Sex ratio, low; density, high.

Group II—Sex ratio, low ; density, low.

Group III—Sex ratio, high ; density, low.

Group IV—Sex ratio, high ; density, high.

Table 23

Mean Participation Rates (Females) in Villages of Kerala, 1961, Classified According as They are "high" or "low" on a Variety of Population Characteristics

Proportion of female workers engaged in primary industries	Proportion of female workers engaged in secondary industries	Proportion of female workers engaged in tertiary industries	Density : low				Density : high			
			Sex ratio low		Sex ratio high		Sex ratio low		Sex ratio high	
			Female literacy		Female literacy		Female literacy		Female literacy	
			low	high	low	high	low	high	low	high
low	low	low	..	..	..	..	..	..	..	9·1
			..	..	..	..	..	..	..	(1)
		high	21·9	18·7	18·1	12·9	17·1	19·0	12·1	11·1
			(25)	(3)	(21)	(8)	(119)	(94)	(63)	(52)
	high	low	33·2	33·7	..	..	23·7	27·6	22·8	24·7
			(1)	(1)	..	..	(63)	(46)	(30)	(46)
		high	..	..	..	13·1	17·5	16·2	13·9	13·9
			..	..	..	(1)	(22)	(45)	(21)	(35)
high	low	low	34·2	25·0	31·0	21·2	29·5	23·4	23·7	17·9
			(90)	(7)	(7)	(15)	(152)	(60)	(39)	(53)
		high	26·8	23·9	27·3	14·5	21·9	21·6	15·2	13·0
			(37)	(3)	(49)	(11)	(84)	(55)	(44)	(47)
	high	low	..	..	34·2	..	29·5	17·7	21·8	13·3
			..	..	(1)	..	(7)	(3)	(6)	(2)
		high	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..

The interactions were not significant except in one case in which one second order interaction was significant at 5 per cent level. We, however, proceeded to estimate the main effects as though none of the interactions was significant. The estimated main effects are shown in Table 24.

Before examining the findings of Table 24, it is useful to note that literacy level and industrial composition furnish two of the many ways in which populations could be classified according to the degree of departure from one with an agrarian and rural base. Higher the literacy level of a population the greater the departure of its economy from one characteristically agrarian and rural. Similarly, lower the proportion of the labour force employed in primary industries or the higher the proportion of the labour force engaged in secondary and tertiary sectors, the greater the departure of the economy from one with an agrarian and rural base. In most populations the transformation of the economy from agrarian and rural to one characteristically industrialized and urbanized had been followed by a reduction in labour force participation rate among males (see the discussion on page 87), but the effect of such a transformation on female participation rate is not that clear. In some populations, female propensity to participate has been found to increase with economic development[1] (measured by shift in industrial composition of the labour force) while in others the opposite tendency has been found.[2] Perhaps, it is true that the present state of our knowledge about the dynamics of female labour force participation is such that "it would be impossible to discover a single statistical pattern to fit the past experience of all countries and have a reasonable chance of correctly forecasting the future in any. There are considerable differences between one country and another, for example, in the scope for carrying on handicrafts or small-scale manufacturing in or near the home, and there are widely differing attitude to the employment of women outside the home."[3]

Table 24

Main Effects (Overall Effect on Participation Rate When the Level of a Given Factor Changes from Low to High) of Each of the Factors When Density and Sex Ratio are Introduced as Controls

Factor	Group I (Density : low Sex Ratio : high)	Group II (Density : low Sex ratio : low)	Group III (Density : high Sex ratio : low)	Group IV (Density : high Sex ratio : high)
Male				
Literacy	—4·6**	—3·7**	—2·1**	—1·7**
Proportion in primary sector	0·2	0·8	1·4**	1·0
Proportion in secondary sector	3·4*	0·0	0·8**	0·3
Proportion in tertiary sector	—3·7**	—2·8**	—2·5**	0·5
Female				
Literacy	—9·8**	—6·1*	—6·6**	—2·0*
Proportion in primary sector	7·4**	4·9*	3·6**	1·9*
Proportion in secondary sector	1·8*	*a*	—1·6	1·9
Proportion in tertiary sector	—4·2**	—6·9**	—6·8**	—7·9**

*Significant at 5% level.

**Significant at 1% level.

a not estimable for lack of observations.

[1]Conrad Taeuber and Irene B. Taeuber, *The Changing Population of the United States*, New York : John Willy & Sons, Inc., 1958, p. 219.

[2]J. N. Sinha, "Dynamics of Female Participation in Economic Activity in a Developing Economy," Paper No. 285, United Nations, World Population Conference, 1965, p. 5.

[3]C. M. Stewart, "Degree of Urbanization and Patterns of Labour Force Participation", Paper No. 227, Op. Cit., p. 5.

Our findings from Table 24 indicate that both male and female participation rates decrease with increase in literacy rate, with increase in proportion of workers engaged in tertiary sector, and with decrease in proportion of workers in primary sector. However, in several of the village groups the findings with respect to male participation rate did not turn out to be statistically significant. Notable among such exceptions are the following : (1) in the group of villages with high sex ratio and high density, the relationships of male participation rate with change in industrial composition of workers were found to be statistically not significant, and (2) the direct relationship between proportion of workers engaged in primary sector and male participation rate was not found to be statistically significant except in one group of villages, namely, those with low sex ratio and high density.

The shift in industrial composition of workers and literacy rate were found to be much more strongly related to female participation rate than to male participation rate.

Can we take the above findings to mean that economic development brings forth at least initially reduction in participation rate. It seems so provided higher literacy and higher proportion of working force engaged in secondary and tertiary sectors indicate higher technology and economic organization (we will have something to say on the validity of this assumption later on). But a more pertinent question here seems to be the following: is it all right to interpret the above findings as indicating that the overall participation rate in Kerala is much lower than the all-India figure because: (1) literacy rate in Kerala is higher than elsewhere in India, (2) proportion of workers in primary sector is lower in Kerala than in India as a whole, and (3) proportion of workers in tertiary sector in Kerala is higher than in India as a whole ? It is not possible to answer this question definitively until analysis similar to what has been reported above is done for India as a whole. It has not been possible to analyse data for India as a whole using village as the unit of analysis. However, the results of our investigation using district as unit of analysis were consistent with the above findings thereby giving support to the contention that the low participation rate in Kerala may be ascribable to the difference between Kerala and the rest of India in respect to literacy rate, and industrial composition of the working force.

It should, however, be remembered that persons seeking employment (who belong to the category of "non-workers" according to the 1961 Census concepts) do constitute a substantial proportion of the population in Kerala. The lower participation rate in the state may, therefore, be partly attributable to the high rate of unemployment. Had Kerala been predominantly agricultural as are the other parts of India, or had the agricultural sector in the state been characteristically of the same type as that of the other states or had the industrial sector of Kerala been developed at least commensurately to the rest of India, it seems the participation rate in the state would have been higher than it is now. Further discussion of the factors responsible for the low participation rate in the State may perhaps better be taken after our examination of the change in the industrial composition of the working force in the State.

6.8 Industrial composition

Having separated the total population into "workers" and "non-workers", we may now enquire how the "workers" are differentiated into industrial and occupational patterns. Persons engaged in economic activity when distributed to the industry to which the activity belongs gives the industrial composition of the working force. The occupational composition is similarly obtained. The process by which "workers" become differentiated into industrial and occupational patterns may be considered "division of labour."[1] Thus the study of changes in industrial and occupational composition amounts to a study of the mechanics of social change.

Table 25 gives the industrial composition of workers in Kerala and all-India for the years, 1901-1961. Even in 1901, the industrial composition of the workers in Kerala was not the same as that of the

[1]Jaffe, A. J., "Working Force," in Hauser and Duncan (Eds.), *op. cit.*, p. 605.

workers for all-India. As time went by Kerala became more and more dissimilar to all-India with respect to the industrial composition of workers. This can be seen from the indices of dissimilarity presented in Table 26.[1]

Table 25

Per Cent Distribution of Workers by Industrial Class by Sex, Kerala and All-India, 1901-1961

Census year	Area	Industrial Class								
		All	I	II	III	IV	V	VI	VII	VIII	IX
Both Sexes											
1901	Kerala	100	37	17	9	..	17	1	10	2	7
	All-India	100	51	17	4	..	12	1	6	1	8
1911	Kerala	100	28	25	9	..	18	1	9	2	8
	All-India	100	50	20	5	..	10	1	6	1	7
1921	Kerala	100	28	23	10	..	18	1	10	2	8
	All-India	100	54	17	5	..	9	1	6	1	7
1931	Kerala	100	21	17	10	..	14	1	7	2	28
	All-India	100	45	25	5	..	9	1	6	1	8
1951	Kerala	100	23	25	7	..	19	2	7	3	14
	All-India	100	50	20	3	..	9	1	5	2	10
1961	Kerala	100	21	17	9	9	9	1	6	3	25
	All-India	100	53	17	3	6	4	1	4	2	10
Males											
1901	Kerala	100	35	18	12	..	13	1	10	3	8
	All-India	100	53	12	5	..	11	1	6	2	10
1911	Kerala	100	34	18	13	..	13	2	9	3	8
	All-India	100	53	15	5	..	10	1	6	2	8
1921	Kerala	100	33	18	12	..	14	1	10	3	9
	All-India	100	56	14	5	..	9	1	6	1	8
1931	Kerala	100	31	16	13	..	13	2	11	3	11
	All-India	100	51	18	6	..	9	1	6	1	8
1951	Kerala	100	26	23	7	..	16	2	8	4	14
	All-India	100	52	15	3	..	10	1	6	2	11
1961	Kerala	100	23	13	10	5	10	2	7	4	26
	All-India	100	51	14	3	6	6	1	5	2	12
Females											
1901	Kerala	100	39	16	3	..	25	..	11	..	6
	All-India	100	46	26	3	..	12	1	6	..	6
1911	Kerala	100	16	37	3	..	27	..	10	..	7
	All-India	100	43	31	3	..	11	1	5	..	6
1921	Kerala	100	19	34	4	..	25	..	10	1	7
	All-India	100	51	25	4	..	9	1	5	..	5
1931	Kerala	100	8	17	5	..	16	..	3	..	51
	All-India	100	32	40	4	..	9	1	5	..	9
1951	Kerala	100	17	32	8	..	27	..	2	1	13
	All-India	100	45	32	3	..	7	1	3	..	9
1961	Kerala	100	16	28	5	18	8	..	1	1	23
	All-India	100	56	24	2	8	1	..	1	..	8

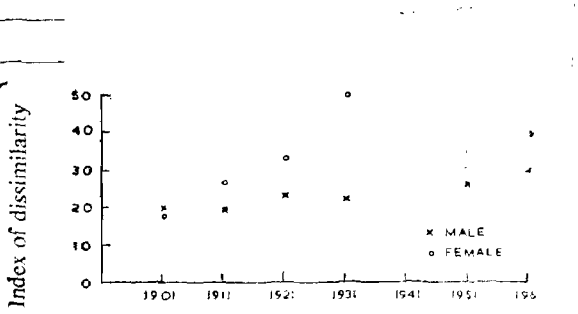
[1]These indices were calculated by comparing the percentage distribution of workers by industrial class for Kerala and all-India for each census year. Following is an illustration of the method of calculation of the index. Row 1 of the subjoined Table gives the per cent distribution of Kerala's working force (1901) and row 2 that for all-India (1901). In rows 3 and 4 are given the differences, (row 2 minus row 3); positive differences in row 3 and negative differences in row 4. The sum of the figures in row 3 is seen to be 15; the same sum is obtained by adding the figures in row 4 (ignoring sign). The index of dissimilarity between the industrial compositions of Kerala (1901) and all-India (1901) is 15. (Clearly the index calculated in this fashion might take any value between 0 and 100). The following interpretation may be given the index in our particular instance. If we want to make the industrial composition of Kerala's working force (1901) identical with that of all-India (1901), on proportional basis, 15 per cent of the workers (1901) in Kerala will have to be shifted from one industrial category to another.

Row number	Industrial Class									
	I	II	III	IV	V	VI	VII	VIII	IX	Total
1	37	17	9	..	17	1	10	2	7	100
2	37	17	4	..	12	1	6	1	8	100
3 (row 1—row 2):+ values	..	0	5	..	5	0	4	1	..	15
4 (row 1—row 2):— values	—14	..	..	..	..	..	..	..	—1	15

Table 26

Indices of Dissimilarity Between the Industrial Compositions of Kerala and All-India

Census year	Both sexes	Males	Females
1901	15	20	18
1911	22	19	28
1921	26	23	33
1931	32	22	50
1951	27	26	30
1961	32	30	40



Census Year

Fig. 6.6 Index of dissimilarity

Source : Table 25.

Table 26 shows interesting sex differentials in the indices of dissimilarity. The indices for males show a clear tendency for increase over time. The upward trend seems to have been accelerated since 1931. The trend for both sexes combined resembles that for males. Interestingly enough the index for 1931 for both sexes combined lies somewhat out of the general trend. The reason for this deviation from the general trend may be found if we examine the trend for females. The indices for males and females are plotted in Figure 6.6. As can be seen from Figure 6.6, the indices for males follow a more or less smooth trend, while those for the females do not. However, if the point in the graph corresponding to 1931 is ignored we get a more or less regular pattern for females also. What might have been responsible for the index for females for 1931 falling outside the general trend ? Some peculiarities of the procedures for collection and tabulation of the economic data in that census seem to have been responsible for this. Table 25 reveals that in 1931, 51 per cent of female working force was included in industrial class IX "(other services)", which amounted to a participation rate of about one-sixth of the *total female population* in that industrial class alone. Plausibly many females who should not have been counted as "workers" were classified as workers engaged in "other services" in 1931. Such a misclassification not only would result in inflating the proportion of the so-called workers engaged in "other services" but also would reduce the proportional share of the other industrial categories. This seems to have happened in 1931 in the case of females as a comparison of the industrial composition in 1931 with those for earlier or subsequent Censuses shows.

Because of the above peculiarity of the 1931 data, it seems safer to ignore the figures for 1931 in discussing the general trend in the composition of the female working force. Judging from the data for the remaining years, a tendency for progressive widening of the gap between Kerala and all-India is clearly discernible with respect to the industrial composition of female working force. In this respect, then, the female working force resembled by and large the male working force ; in both cases the industrial composition became progressively dissimilar to the corresponding composition of the all-India working force.

What might have caused the divergence of the industrial composition of Kerala's working force from that of the all-India working force ? In an investigation of a question like this, it may be appropriate to consider the compositions of males and females separately.

The industrial composition of the all-India male working force seems to have remained rather unchanged over the period 1901-1961. As opposed to that, the corresponding composition of male workers in Kerala underwent marked change during the period. A steadily changing pattern when compared with one that remains stable obviously presents a picture of progressive widening of the gap between the phenomena represented by the two patterns. Now let us examine the characteristic features of the change in the industrial composition of male working force in Kerala. The major features of the changing pattern seem to be the following : (1) a steady decrease in the proportion of male workers engaged in cultivation (industrial class I), and (2) a

steady increase in the proportion of male workers engaged in 'other services' (industrial class IX). The remaining industrial classes tended to remain by and large stable over the period. In fact very few of these latter industrial categories experienced a variation during the period exceeding 5 percentage points in their share of male working force ; and even among those classes which showed some variation in their share of male working force, few exhibited consistent pattern over time.

The case of female working force was somewhat different. Very few of the major industrial classes showed consistent trend in their share of female working force. This is true even if the data for 1931 are ignored. The irregularity in the trend of the share of female working force is characteristic of all-India data as well as that of Kerala data. An alternating pattern (increase followed by decrease which in turn is followed by an increase) was shown by the industrial class I (cultivation) in its share of the all-India female working force : 46 (1901), 43 (1911), 51 (1921), 45 (1951) and 56 (1961). A similar pattern was shown by industrial class II also (Agricultural labour) : 26 (1901), 31 (1911), 25 (1921), 32 (1951) and 24 (1961). Interestingly, the combined category of I and II (workers engaged in agriculture either as cultivators or as agricultural labourers), showed a consistently increasing pattern in its share of all-India female working force : 72 (1901), 74 (1911), 76 (1921), 77 (1951) and 80 (1961). This seems to suggest that there was some misclassification of female workers affecting these two classes in some of the census years. There seems to be no other plausible explanation for the alternating pattern shown by the industrial classes I and II and for the complementary nature of the two patterns (class I showing a decrease in its share when class II showed an increase and *vice versa*). So much for the industrial classes I and II in the case of all-India female working force. As regards the remaining industrial classes, it may be said that absence of wide fluctuations was the rule rather than exception ; in fact industrial class IX ('other services') showed a steady increase in its share over the period, 1901-1961.

Almost all the comments made above regarding the all-India female working force seem to be valid for Kerala female working force also. Errors of misclassification seem to have, however, affected Kerala data to a greater extent than they did all-India data, especially during the early censuses. The reversal of the relative shares of industrial classes I and II in 1911 as compared to 1901 is a case in point :

Census year	Share of female working force (Kerala)	
	Class I	Class II
1901	39	16
1911	16	37

Such a sudden shift in composition cannot be explained by intrinsic change in the economic structure ; a more plausible explanation seems to be that in 1901, or in 1911, cultivators were misclassified as agricultural workers or *vice versa*. One way to reduce the effect of errors of misclassification in compositional data is to combine categories affected by such errors. When the first two industrial classes are combined, the share of the female working force accounted for by the combined category assume the following pattern :

Area	Share of the combined category I + II in each year (females)				
	1901	1911	1921	1951	1961
Kerala	55	53	53	49	44
All-India	72	74	76	77	80

The proportion of female working force engaged in the combined category of cultivators and agricultural labourers decreased consistently over time in the case of Kerala while the opposite trend was exhibited by the all-India data. To a small degree the decreasing pattern observed for Kerala in the share of industrial categories I and II may be due to misclassification of workers of category II in Class IX ("other services").[1] But it is unlikely that any reasonable allowance made for such errors of misclassification will alter the trend observed above.

[1] In this connection it is worth noting that 23 per cent of the female workers were included in 'other services' in 1961 while the corresponding proportion in 1951 was only 13 ; the case of male working force was not different; 26 per cent of male working force was reported as engaged in 'other services' in 1961 as against 14 per cent in 1951. The sudden jump in the proportion of working force belonging to 'other services' seems to have resulted partly from the error of misclassification of person without adequate information on industrial status. In 1961 *all persons unclassifiable* with respect to industry were included in 'other services'. It seems quite plausible that those who do all kinds of odd jobs including tilling the soil and carrying headloads might have found it difficult to specify any one industrial class as encompassing their activities ; they might have even found it difficult to name a few industrial classes covering their activities. It seems not proper to include such persons in the class: 'other services'. Plausibly some of these unclassifiable cases rightly belonged to industry class II.

In other words, the available evidence suggests that the proportion of female working force engaged in agriculture (either as cultivators or as agricultural labourers) did in fact decline over time in Kerala while the all-India experience was in the opposite direction. These industrial classes (I & II) also showed a consistent decrease in their combined share of the male working force of Kerala ; the corresponding trend in the case of all-India data was however parabolic (increasing and then decreasing) (See the sub-joined Table).

Area	Share of the combined category I & II (male working force)				
	1901	1911	1921	1951	1961
Kerala	53	52	51	49	46
All-India	65	68	70	67	65

Thus the trends for males and females with respect to the agricultural sector's share of working force were similar ; both being characterized by a more or less steady decreasing pattern. The other important characteristic of the change in the industrial composition had to do with an increase in the proportion of working force engaged in 'other services'. In this respect also males and females behaved in a similar fashion. The corresponding all-India trends resembled those of Kerala, but were however, much less steep. The trends in the shares of the other industrial classes were almost without exception more or less flat.

Thus, while the all-India working force remained predominantly agrarian throughout the first six decades of the century without any change in its agrarian character, Kerala's working force which was relatively much less agrarian in composition even at the turn of the century became much less so by 1961, and this change was mostly brought about by a change in the relative shares of agrarian sector (industrial classes I and II) *versus* the industrial class 'other services'. While, in Kerala, all the other industrial classes, III to VIII, managed to expand proportionately during the period, 1901-1961, the agrarian sectors, (industrial classes I and II), failed to do so. The failure of the agricultural sector in that respect had to be compensated almost solely by the more than proportionate increase of the industrial class 'other services'. This trend, however, should not be misconstructed as indicative of a developing economy. On the other hand, the above symptoms are only indicative of relative stagnation. It reflects the population pressure on cultivable land and the underdeveloped nature of the manufacturing sector. Because of the high population pressure on cultivable land, agricultural sector had long ago become incapable of absorbing proportionately the additions to the labour force. The underdeveloped status of the manufacturing sector with its limited capacity to offer employment opportunities had been just managing to absorb its proportionate share of the additions to labour force. The net result was that, it became the fate of the service sector to absorb more than its proportionate share of the new entrants. As Kuznets has said, in underdeveloped economies, "there may be long periods of rise in the share of the service sector in the labour force, not because it is a necessary complement to increasing higher levels of technology and productivity in the A and M sectors, but only because population pressure on land and the limitation of employment opportunities in the M sector drive the surplus labour into low-paid service activities."[1]

That the growth of the service sector does not imply higher levels of technology and productivity can be seen from the relative income of the primary, secondary and tertiary sectors given below :

Table 27

Percentage Distribution of State Income and Working Force by Industrial Categories

Sector	Proportion of State income*	Proportion of working force	Relative income
Primary sector	0·51	0·47	1·09
Secondary sector	0·17	0·19	0·90
Tertiary sector	0·32	0·34	0·94

**Source* : Bureau of Economics and Statistics, *Statistical Year Book of Kerala*, 1961, Table XXII (pp. 132-133) : State income and five year plans (State income at current prices for 1960-61).

The relative income in the tertiary sector was less than that in the primary sector; and the relative income in the secondary sector was the lowest. The low relative income in the secondary sector may be explained by the fact that industries in this sector are mostly of the cottage type and even those of the

[1]S. Kuznets, *Six Lectures on Economic Growth*, Illinois : The Free Press, 1959, p. 63 ; also see P. G. K. Panicker "The Tertiary Sector in Kerala", *Kerala Labour and Industries* Review, Trivandrum, (January, 1964).

factory type are the ones based on agricultural produce (*e.g.*, cashew and coir). Agriculture being not organized on market-exchange basis, industries based on its products are likely to have less scope for expansion and be less productive. Perhaps what has been said above is enough to reveal that any inference concerning the economic organization of Kerala just from the industrial composition of its working force might be misleading. The foregoing discussion also has shown that the particular trend observed in the industrial composition of Kerala's working force largely stemmed from stagnation in Kerala's economy rather than from technological improvement and economic expansion.

Table 28

Per Cent Distribution of Male Workers in Broad Age Groups by Industrial Sectors of Activity for City, Non-City Urban, and Rural Areas of the Different Districts in Kerala, 1961

Districts	Age Group	City			Non-City urban			Rural		
		Primary sector	Secondary sector	Tertiary sector	Primary sector	Secondary sector	Tertiary sector	Primary sector	Secondary sector	Tertiary sector
Kozhikode	all	6	24	70	20	27	53	45	12	44
	15—34	6	25	69	19	29	52	42	12	46
	35—59	5	24	71	19	25	56	45	11	44
	60+	10	23	67	31	20	49	63	9	27
Ernakulam	all	4	24	72	8	21	71	46	19	34
	15—34	3	25	72	6	23	71	43	21	36
	35—59	4	24	72	9	19	73	46	18	35
	60+	17	20	63	26	17	57	66	13	21
Alleppey	all	9	33	58	23	19	58	51	16	33
	15—34	9	31	59	16	22	62	39	20	41
	35—59	9	35	56	24	18	59	47	17	36
	60+	13	31	56	54	11	34	71	10	19
Trivandrum	all	6	18	76	30	19	51	55	14	31
	15—34	5	18	77	27	20	52	51	15	35
	35—59	6	17	76	29	18	53	57	12	31
	60+	19	17	63	54	15	31	76	9	15
Cannanore	all	..	..	..	13	39	48	47	17	36
	15—34	..	..	..	10	44	45	43	20	37
	35—59	..	..	..	15	32	54	48	14	38
	60+	..	..	..	31	23	46	67	10	23
Palghat	all	..	..	..	16	23	61	54	15	31
	15—34	..	..	..	14	25	61	52	17	31
	35—59	..	..	..	16	21	64	53	15	33
	60+	..	..	..	28	20	51	65	13	23
Trichur	all	..	..	..	15	22	62	41	18	41
	15—34	..	..	..	12	26	62	36	21	42
	35—59	..	..	..	16	19	65	42	16	42
	60+	..	..	..	36	16	48	62	12	26
Kottayam	all	..	..	..	18	18	64	62	12	26
	15—34	..	..	..	14	20	66	59	13	28
	35—59	..	..	..	20	16	63	64	11	25
	60+	..	..	..	43	13	44	78	8	14
Quilon	all	..	..	..	17	28	55	62	14	23
	15—34	..	..	..	13	30	57	57	16	27
	35—59	..	..	..	18	28	54	65	14	22
	60+	..	..	..	42	21	37	83	8	9

Table 29

Per Cent Distribution of Female Workers in Broad Age Groups by Industrial Sectors of Activity for City, Non-City Urban, and Rural Areas of the Different Districts in Kerala, 1961

Districts	Age group	City			Non-city urban			Rural		
		Primary sector	Secondary sector	Tertiary sector	Primary sector	Secondary sector	Tertiary sector	Primary sector	Secondary sector	Tertiary sector
Kozhikode	all	2	31	67	16	48	37	51	20	29
	15—34	1	28	70	16	47	37	51	20	29
	35—59	2	37	61	17	49	34	53	19	28
	60+	4	33	63	21	50	29	54	24	22
Ernakulam	all	7	8	85	13	24	64	53	23	23
	15—34	6	9	85	12	25	63	53	23	24
	35—59	9	9	82	13	25	62	56	22	22
	60+	17	11	72	23	22	54	56	23	20
Alleppey	all	9	47	44	21	50	30	40	47	14
	15—34	11	44	45	16	52	31	35	48	17
	35—59	8	50	43	26	46	28	41	44	15
	60+	7	55	38	38	42	20	48	42	10
Trivandrum	all	3	9	89	14	36	50	35	39	26
	15—34	2	9	89	10	40	50	29	44	27
	35—59	4	9	87	17	30	53	42	31	27
	60+	10	12	78	37	22	41	63	19	18
Cannanore	all	..	..	..	27	27	46	66	10	24
	15—34	..	..	..	25	29	45	65	10	25
	35—59	..	..	..	31	23	46	67	10	23
	60+	..	..	..	37	23	40	74	11	15
Palghat	all	..	..	..	34	22	44	70	10	20
	15—34	..	..	..	36	23	41	70	10	20
	35—59	..	..	..	34	20	46	70	9	21
	60+	..	..	..	32	24	44	68	11	21
Trichur	all	..	..	..	20	17	63	44	24	33
	15—34	..	..	..	18	19	62	42	24	34
	35—59	..	..	..	23	14	64	47	21	32
	60+	..	..	..	33	15	52	51	24	25
Kottayam	all	..	..	..	18	16	66	69	12	19
	15—34	..	..	..	15	16	69	71	10	19
	35—59	..	..	..	22	17	61	69	13	18
	60+	..	..	..	35	20	45	60	22	18
Quilon	all	..	..	..	3	68	29	36	53	11
	15—34	..	..	..	..	75	24	28	61	11
	35—59	..	..	..	5	63	33	46	43	11
	60+	..	..	..	22	36	41	69	22	9

Before concluding this section we shall examine briefly two correlates of industrial composition. First we shall consider the geographic variation in industrial composition, and then take a look at the relationship between educational attainment and type of economic activity. Tables 28 and 29 give some data concerning geographic variation in industrial composition. Data are presented in terms of broad industrial categories only, namely, primary, secondary, and tertiary sectors. For each district, the percentage distributions of workers in each age group by industrial groups are given separately for rural, non-city urban and urban areas. The data in these Tables are consistent with the familiar rural-urban differentials in industrial composition. It is well known that as urbanization advances, the proportion of the working force engaged in primary sector (extractive) activities declines and the proportion engaged in tertiary sector increases. In all districts in the State, among all age groups, and for both sexes, the industrial composition of working force follow the pattern described above. Between district differences in industrial composition are also considerable. The proportion of male working force aged 60 years or more in rural areas engaged in tertiary sector ranged from 9 per cent in Quilon to 27 per cent in Kozhikode ; the corresponding range for females was 9 to 25 per cent. While primary sector accounted for 41 per cent of the male working force in rural areas of Trichur district, the corresponding proportion in Quilon district was 62 per cent. Between the four cities, a range of 47 per cent in Alleppey to 8 per cent in Ernakulam was observed in the proportion of female working force engaged in secondary sector; the corresponding range observed for male working force being 33 to 18 per cent. Among the non-city urban areas of the different districts, Quilon had 68 per cent of its female working force engaged in secondary sector while Kottayam had only 16 per cent. These geographic variations in industrial composition can be explained to a large extent by the geographic concentration of plantations and manufacturing industries in the State : rubber plantations are concentrated in Quilon and Kottayam districts and to a small extent in Cannanore district; tea plantations are concentrated in Kottayam and Cannanore districts ; and Coffee plantations in Cannanore ; coir industry is concentrated in Alleppey and Quilon Districts, Cashew industry in Quilon and textile industry in Cannanore.

In most populations close association exists between levels of education and industrial composition of working force. Those activities, the participation in which require little preparation or training and which yield relatively lower income predominate among persons with little education, whereas better educated and better skilled are found to be engaged primarily in professional, technical, and administrative positions and the like jobs. Data for 1961 Kerala presented in Table 30 are consistent with this pattern.

Table 30

Per Cent Distribution of Workers in Each education Group by Industrial Class of Activity Kerala, 1961

Education Group	Industrial Class				
	Cultivation or agricultural labour	Mining etc., Plantations	Household industry, other manufacturing industry, construction	Trade, Commerce, Transport, Communications, Storage	Other Services
Illiterate	43·0	10·0	17·9	4·8	24·3
Literate (without educational level)	37·9	8·0	21·9	10·3	21·9
Primary or Junior Basic	32·6	8·1	19·9	13·2	26·2
Matriculation and above	11·7	3·1	8·6	14·2	62·4

Illiterates are predominantly found engaged in cultivation and agricultural labour and those educated up to or above matriculation are concentrated in "other services". Manufacturing sector has attracted a fifth of those with no formal education but only a tenth of those with high-school or higher education. The first two divisions of the tertiary sector (trade and commerce, transport, storage and communication) accounts for only five per cent of illiterates while about one-seventh of those with higher education are engaged in these activities. It is interesting to note that the industrial class, "other services", accounts for about a quarter of even those without any formal education. The reason for this seems to be that a substantial proportion of those engaged in "other services" is made up of craftsmen, production process workers, and labourers not elsewhere classified (see the next section).

6·9 Occupational composition

At the beginning of the previous section it was stated that changes in industrial and occupational composition of working force throw light on the pace at which the social structure changes. Section 6.8 was devoted to the discussion of changes in the industrial composition of Kerala working force. The present section deals with occupational composition. Unfortunately, data on occupational composition are not available for earlier years. Occupation as distinct from industry was given emphasis for the first time in the 1961 Census. Therefore, our discussion of occupational composition will be confined to the state of affairs in 1961. Even so it is possible to make reasonable inference concerning changes in the economic structure of the population during the period previous to 1961.

Table 31 gives the percentage distribution of male and female workers in rural and urban areas of the State by occupational divisions within each industry class. The findings of that Table vouch for the "unorganized" nature of most of the activities in the State. Organization, in the sociological sense, involves expansion of the scope of interdependence. When a given activity becomes organized it becomes linked to other activities in a complementary or supplementary fashion. As the scope of interdependence increases the activity in question becomes developed in its internal structure also. For interdependence implies some kind of exchange relationship and a continuing exchange leads to specialization. Specialization means elaboration of the total activity and this necessitates the development of a wider organization of the specialized parts of the total activity. Specialization within and increased dependence on outside activities both demand the expansion of integrating and mediating functions. A crude index of the degree to which any activity has become specialized and the degree to which integrating and mediating functions have developed may be had in the proportion of working force engaged in 'white collar' jobs (professional and technical, administrative, executive, and managerial and clerical occupations). Using this index, we find from Table 31 that household industry in Kerala still remains as an 'unorganized' activity; construction, trade and commerce are perhaps the only activities that may be taken as relatively developed or organized; even that is true only for urban areas. Surprisingly, manufacturing other than household industry remains rather "unorganized" and underdeveloped ; only 9 per cent of the male working force in urban areas in that industrial class are engaged in white collar jobs while the corresponding proportion in rural areas is even smaller (4.3 per cent). Among females engaged in manufacturing other than household industry, practically there are no "head workers"[1] ; almost all (95 per cent in urban areas and 99 per cent in rural areas) are "hand workers".

It is also interesting to note that a substantial proportion of even the industrial class, "other services" in the State is made up of "hand workers" rather than "head workers". In the case of male workers in urban areas engaged in "other services", 38.2 per cent belong to the occupational group : craftsmen, production process workers and labourers not elsewhere classified, the corresponding proportion among males in rural areas is 60.0 per cent and among females 25.5 per cent in urban and 59.3 per cent in rural areas. Inflation of this industrial class (other services) in this fashion obviously does not indicate technological expansion or organizational improvement in the economy.

Thus the analysis of the occupational composition of the working force leads to the same conclusion as did the analysis of the industrial composition, namely that the Kerala's economy is characterized by stagnation rather than by change.

[1] "Head workers" here refer to professional persons, technical persons, managers, officials, clerks, and related type of workers.

Table 31

Percentage Distribution of Male and Female Workers in Each Industrial Class in Rural and Urban Areas of Kerala State by Occupation

Industrial Class	Occupational divisions*							
	0, 1&2	3	4&5	6	7&8	9	10	All
Urban—Males								
Cultivation	..	..	..	..	..	..	..	..
Agricultural labour	..	..	..	..	..	..	..	..
Mining, etc., Plantations	1·5	0·6	94·6	0·1	2·9	0·2	0·1	100·0
Household Industry	2·1	0·8	4·3	0·0	92·7	0·0	0·1	100·0
Manufacturing other than household Industry	9·1	2·2	0·7	0·4	86·2	1·0	0·4	100·0
Construction	23·9	0·0	0·2	0·6	73·5	1·0	0·8	100·0
Trade and Commerce	15·7	73·4	1·5	0·3	7·7	0·7	0·7	100·0
Transport, Storage & Communications	9·7	0·8	0·1	50·8	35·6	2·4	0·6	100·0
Other Services	36·3	1·1	0·6	0·6	38·2	21·7	1·5	100·0
Rural—Males								
Cultivation	..	..	..	..	..	..	..	..
Agricultural labour	..	..	..	..	..	—	..	..
Mining, etc., Plantations,	1·3	0·0	95·5	0·2	2·0	0·9	0·1	100·0
Household Industry	0·6	0·1	4·9	0·0	94·4	0·0	0·0	100·0
Manufacturing other than household industry	4·3	0·5	4·9	0·1	89·3	0·8	0·1	100·0
Construction	9·9	0·0	0·5	0·4	88·1	1·0	0·1	100·0
Trade and Commerce	7·7	89·8	0·3	0·0	2·0	0·2	0·0	100·0
Transport, Storage & Communications	4·2	0·3	0·0	62·1	31·4	2·0	0·0	100·0
Other Services	26·6	1·0	0·2	0·2	60·0	11·6	0·4	100·0
Urban—Females								
Mining, etc., Plantations	0·7	1·8	90·6	0·0	6·8	0·0	0·0	100·0
Household Industry	0·2	0·4	3·2	0·0	96·2	0·0	0·0	100·0
Manufacturing other than household industry	1·0	0·2	3·2	0·0	94·7	0·8	0·1	100·0
Construction	19·5	0·0	0·0	0·0	77·8	2·4	0·3	100 0
Trade and Commerce	4·0	82·3	4·7	0·0	7·1	1·9	0·0	100·0
Transport, Storage & Communications	11·3	0·1	0·1	16·5	64·3	7·4	0·3	100·0
Other Services	27.1	0·1	0·1	0·0	25·5	47·0	0·2	100·0
Rural—Females								
Mining, etc., Plantations	0·1	0·0	98·8	0·0	0·8	0·3	0·0	100·0
Household Industry	0·1	0·0	0·9	0·0	99·0	0·0	0·0	100·0
Manufacturing other than household industry	0·3	0·0	0·2	0·0	99·2	0·3	0·0	100·0
Construction	4·5	0·0	0·5	0·0	92·9	2·1	0·0	100·0
Trade and Commerce	1·0	88·5	7·7	0·0	2·3	0·5	0·0	100·0
Transport, Storage & Communications	2·2	0·0	0·0	10·2	86·9	0·7	0·0	100·0
Other Services	15·7	0·1	0·0	0·0	59·3	24·8	0·1	100.0

*The occupational divisions are :

0—Professional, technical and related workers.

1—Administrative, executive and managerial workers.

2—Clerical and related workers.

3—Sales workers.

4—Farmers, fishermen, hunters, loggers and related workers.

5—Miners, quarrymen and related workers.

6—Workers in Transport and Communication occupations.

7-8—Craftsmen, Production process workers and labourers not elsewhere classified.

9—Service, sport and recreation workers.

10—Workers not classifiable by occupation.

6.10 Religious composition

We shall conclude this chapter by examining a limited amount of data on religious composition of Kerala's population. At first thought, it might appear that religious composition and changes therein have little relevance for population dynamics. But several recent studies have shown that with whatever rigour religion and State may be treated as separate or with whatever vehemence caste may be despised in national policies, caste and religion are bound to affect the social, political, and economic structure of the society and would, therefore, influence directly and indirectly the course of population change.[1] Regular enumeration of caste membership was brought to an end in India by the 1941 Census; data on caste composition of the population are not available in censuses after that. Ironically enough, as data on caste membership have become not available, the need for such data have become much more keenly felt than ever before. This is true not only from the point of view of scientific investigation of political and social dynamics in the country but from the point of view of administration as well. From the social scientist's point of view, data on caste membership are invaluable, because as Srinivas puts it, "the politics of Mysore State will not make sense if we do not take into account the rivalry between Okkaligas and Lingayats. Similarly, in Kerala, there is a triangular struggle between Nayars, Ezhavas and Syrian Christians." For the administrators also data on the demography of caste are important because they are required to work out a sound basis on which decisions can be taken as to whether or not caste membership furnishes a sound criterion of social and economic backwardness.

Although data on caste membership are not available in recent censuses, we do have an unbroken series of data on religious composition of India's population.

The major religious groups in Kerala are the Hindus, the Christians, and the Muslims. At the turn of the century, more than two-third of the population of the State followed Hinduism, about one-sixth Mohammedanism, and about one-seventh Christianity (See Table 32). By 1961, the proportionate strength of the Hindus steadily declined to 61 per cent while that of the Christians steadily increased to 21 per cent. Muslims, on the other hand, experienced very little change in their relative numerical strength.

During the six decades, 1901-1961, the Christians increased their numerical size 4.06 times while numerically the Hindus multiplied only 2.35 times and the Muslims only 2.73 times. The much faster growth of the Christians is to a large extent attributable to their proselytising activities. The conversion to Christianity seems to have been mostly confined to the Hindus as may be inferred from the opposing trends in the relative numerical strength of the Hindus versus the Christians while the Muslims constituted a more or less constant proportion of the population throughout the period. The Hindu-Christian difference in growth rate, however, was much less pronounced in the recent decade compared to what obtained in the earlier decades of the century. This may probably be because, the proselytising activities of Christian missionaries were more productive in the early decades of the century than in the latter decades.

There are significant geographical differences in the State in the religious composition of the population. The Christians are relatively few in Malabar while the Muslims are relatively few in Travancore and Cochin. (See Table 32). The Muslims constituted about a third of Malabar's population in 1941 while only 2 per cent were Christians. On the other hand, Travancore in 1941 had a third of its population following Christianity while only 7 per cent followed the Muslim faith. While there was definite tendency for concentration for the Muslims and the Christians, the Hindus were more or less evenly distributed in the State although their relative numerical strength was slightly less in Travancore than in Cochin and Malabar.

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[1]See for instance G. E. Lenski, *The Religious Factor : A Sociological Study on Religion's Impact on Politics, Economics, and Family Life*, Garden City, New York : Doubleday, 1961, and also, M. N. Srinivas, *Caste in Modern India and other Essays*, Bombay, Asia Publishing House, 1962.

Table 32

Percentage Distribution of Population by Sex and Religion : Travancore, Cochin and Malabar, 1901-1941

Census year	Total	Males				Total	Females			
		Hindus	Muslims	Chris-tians	Others		Hindus	Muslims	Chris-tians	Others
Travancore										
1901	100·0	68·6	6·6	23·8	1·0	100·0	69·2	6·3	23·5	1·0
1911	100·0	66·2	6·7	26·6	0·5	100·0	67·0	6·5	26·0	0·5
1921	100·0	63·3	6·9	29·5	0·3	100·0	64·1	6·6	29·0	0·3
1931	100·0	61·1	7·0	31·9	9·1	100·0	61·9	6·8	31·2	0·2
1941	100·0	58·0	7·2	32·6	2·2	100·0	58·7	7·1	32·0	2·2
Cochin										
1901	100·0	67·8	6·8	24·8	0·6	100·0	68·8	6·6	24·0	0·6
1911	100·0	66·5	7·2	25·8	0·6	100·0	67·7	6·8	25·0	0·5
1921	100·0	65·3	7·2	27·3	0·2	100·0	66·7	6·8	26·4	0·1
1931	100·0	64·1	7·6	28·2	0·1	100·0	65·4	7·0	27·4	0·2
1941	100·0	62·4	7·9	29·2	0·5	100·0	63·7	7·4	28·4	0·5
Malabar										
1901	100·0	67·7	30·3	1·9	0·1	100·0	68·7	29·4	1·8	0·1
1911	100·0	66·1	32·1	1·8	0·0	100·0	67·1	31·1	1·7	0·1
1921	100·0	65·3	32·9	1·8	0·0	100·0	66·3	32·0	1·7	0·0
1931	100·0	64·9	33·2	1·9	0·0	100·0	65·5	32·7	1·8	0·0
1941	100·0	62·9	34·2	2·0	0·9	100·0	63·3	33·9	2·0	0·8

Table 33

Percentage Distribution of Population by Religion, Kerala, 1901-1961

Census year	Total Population	Hindus	Muslims	Christians	Others
1901	100·0	68·4	17·3	13·8	0·5
1911	100·0	66·6	17·7	15·4	0·3
1921	100·0	64·8	17·4	17·6	0·2
1931	100·0	63·3	17·1	19·5	0·1
1941	100·0	60·7	17·1	20·5	1·7
1951	100·0	61·6	17·5	20·9	0·0
1961	100·0	60·9	17·9	21·2	0·0

Summary

We have examined in this chapter some data on the composition of the population by sex, age, education, residence, marital status, working force status, industrial status, occupational status, and religion.

1. The sex composition of the population of the state seemed to be more or less consistent with what one might expect given the fertility and mortality trends and migration pattern obtained in the state during the past several decades. The masculinity in the state, however, was found to be lower than that prevailing in the other states in India. An explanation for that difference will have to be found by examining why masculinity is higher than normal in the other states.

2. The age composition of the population of Kerala has remained more or less unchanged so far. About two-fifths of the population belong to the age group, under 15 years, and a little over 50 per cent to the group, 15-60. That pattern is characteristic of populations with sustained high fertility over a long period and high or moderately declining mortality.

3. There has been a steady increase in the literacy level of the population over the period, 1901-61. In 1961, the literacy level of Kerala was higher than that of all the other states and union territories except Delhi.

4. Judging from the proportion of the population living in urban areas, Kerala is definitely less urbanized than is India as a whole. But throughout the period, 1901-61, the urban population in the state grew more rapidly than did the rural counterpart, and the rural-urban difference in growth rate has been increasing from one decade to the next. Most of the urban growth resulted from annexation of outlying territories to existing urban areas rather than from rural-urban migration in the real sense of the term.

5. Almost all the people tend to get married at some point in their life time; the proportion remaining unmarried throughout life has always been insignificant. A slight tendency to postpone marriage has become apparent as the upward trend in average age at marriage shows.

6. Working force participation rate in Kerala had been lower than in India as a whole throughout the period in question. That however, does not indicate that the state is more industrialized than the rest of the country.

7. The agricultural sector's share of the working force of Kerala decreased more or less steadily during the period, 1901-61, while the proportion of working force engaged in "other services" showed a consistent increase. As a result of these tendencies, the industrial composition of the working force in Kerala became progressively dissimilar to that of the all-India working force during the period.

8. Occupational composition of the working force of any industrial category may be taken as an indication of the extent to which the industry in question has become 'organized'. One index that may be used for that purpose is the proportion of the working force doing white collar jobs (professional, technical, administrative, managerial, and clerical). Using that index, one finds that manufacturing in the state is not at all an organized sector. Construction, trade, and commerce, in the urban areas, are the only industries that qualify themselves to be termed organized.

9. The analysis of the trend in working force participation rate, and the industrial and occupational composition of the working force leads one to the conclusion that the economy of the state has very few characteristics of dynamism in it.

10. This chapter also has presented some data on the religious composition of the population. The three major religious groups in the state are, the Hindus, Christians and Muslims. The first declined, the second increased, while the third remained more or less unchanged in their relative numerical strength in the state during the period.

CHAPTER VII

CONCLUDING REMARKS

As was mentioned in the beginning of the monograph, our purpose has been to examine the available data on population change in the state with a view to understanding their implications for economic and social change. In the preceding chapters we have seen many aspects of population change in the state. Let us now turn to some of their implications.

In any serious discussion of the implications of population change to economic growth in Kerala, the following points are usually made.:—

1. There is little scope for extensive cultivation in the state ; almost all the available land has already been brought under plough. But the state is one of the deficit areas in India with respect to food production ; about fifty per cent of its food requirements has to come from outside.

2. The agricultural sector in Kerala has almost reached a saturation point as far as absorbing additional labour is concerned.

3. The secondary sector has always been, and is likely to remain for a long time to come, in a rudimentary state.

4. The tertiary sector of Kerala's economy has been showing a tendency to absorb disproportionately large number of new entrants to the labour force. But the productivity of that sector has always been inexorably low.

5. All these indicate the lack of dynamism in the economy of the state. Further, the state is perhaps the poorest among the different states in India ; according to one estimate, the per capita income of Kerala was Rs. 283 in 1960-61 as against Rs. 326 for all-India ; it is unlikely that the situation has changed much since then. The wretched living conditions facing a typical person in Kerala can be easily imagined.

6. While not much success has been achieved in the matter of raising the level of living of the bulk of the population, the number of mouths to be fed has been increasing at an exploding rate, thus presenting a picture of rapid multiplication in wretchedness.

Once the nature of Kerala's pedicament is presented in this form, the question is immediately raised: can this continue for long? A negative answer to that question may be given by most people if only on the ground that a population increasing at the rate of 25 per cent per decade would soon reach a stage in which space itself may be lacking to accommodate all the people, and out of a logical necessity something new should turn up so as to modify the conditions. The new factor that might emerge may be a good one or a bad one depending upon the value system used to judge its merit. Altogether there seems to be four forms which that new factor may assume. We shall enumerate them and then discuss each one of them in turn.

A low income population living at the subsistence level but multiplying in numbers rather rapidly, perhaps doubling every generation or so, because of relatively low mortality and high fertility, may eventually be faced with one or the other or a combination of two or more of the following possibilities:—

A. Return to an increased death rate either voluntarily or involuntarily,

B. Emigration of surplus population to other regions,

C. Increase in production of subsistence at a rate equal to or greater than the rate of population growth,

D. Reduction of birth rate.

It is worth noting that all other possibilities that might occur to mind will in the final analysis fall into these categories. Another point to be emphasized here is that in examining these possibilities as they are relevant to Kerala, they have to be viewed in terms of their applicability to India as a whole rather than to Kerala in isolation. It is not possible, for example, to think of increasing the death rate in Kerala while the rest of the country continues to combat the forces of mortality with added vigour. Kerala's problem of economic development is to be solved in an all-India context and not in isolation. Of course, there may be special features of Kerala's plight that might need special attention. But it is not possible to think of the rest of the country surviving while Kerala fails to do so or *vice versa*. For that reason our examination of the aforementioned possibilities will be done from an all-India perspective.

Let us first examine the possibility of an increase in death rate. An increased death rate might occur as a result of certain voluntary steps taken, or due to involuntary factors. For example, if medical progress is blocked or if the modern public health measures are slackened, the decline in death rate may be arrested or even reversed. The question may be at once raised: would a country do anything like that? When confronted with the necessity of making a choice between allocation of resources for medical care versus economic investment, it is not unlikely that a country shows a bit of partiality to the latter. But primary medical care expenses usually form only a small fraction of the total expenditure, so that only if medical and public health expenditure is cut drastically will anything significant become available to be diverted to economic investment. A decision to abandon altogether a concern on public health is quite unlikely to be taken by leaders of any nation given the value system that is dominant at present in human societies.

But mortality situation might worsen due to involuntary causes. For example, acute food shortage might open way for famine conditions and the accompanying illnesses due to debility as well as to epidemics. Despite all attempts to achieve self-sufficiency in food production, India has a long way yet to go before reaching that goal. Some people even doubt whether India will ever reach that goal. Projections of population and food production have shown that *per capita* food availability is likely to start a downward trend rather than an upward one in the near future. The question of diverting a substantial proportion of national income for the purchase of large volumes of food grains from the open world market is almost unthinkable at present in India. Short famines in sporadic areas may not matter very much. What we have to be concerned about is the likelihood that famine conditions resulting from crop failure caused by repeated floods or droughts might prevail for several months in various parts of the country. Recent experiences seem to indicate that such a possibility cannot be entirely ruled out. If anything like that happens, Kerala state is likely to be among the worst affected areas, it being dependent on outside for almost half of its food requirements. To be fair, it should be added that it is unlikely that the rich nations would let millions to die of hunger if they can help to prevent it. Perhaps countries like the U.S.S.R. and U.S.A. might compete with each other to prevent a cataclysm in India. But there is always the possibility that the situation might go beyond rectification through voluntary assistance from other nations. Needless to say, if that happens that is not going to be welcomed by our people or leadership.

The next to be considered is migration. Emigration is often suggested as a solution to the difficult subsistence problem of countries with explosive populations. In the past emigration has served as a safety valve for populations when faced with excessive growth rate. But now the picture is different. Few countries today are prepared to admit a large number of immigrants each year continuously for a large number of years. Further no country would want its nationals to emigrate unless there is some assurance that their transportation, settlement in the area of destination, etc., all will be taken care of in an orderly fashion. Consequently the cost of transferring a person from one country to another today is much higher than it used to be in the nineteenth century. Now think of the cost involved in organizing the transfer of a large number of persons from India to other countries year after year for a long period of time. Obviously that is going to be prohibitive. Who is going to bear that? Then there is the question: will sufficient number of people volunteer every year to be transferred? Experiments with redistribution of population within her own boundaries have revealed to India the magnitude and variety of problems involved. Organized transfers of population in large numbers are not easy especially when two countries are involved, a sending country and a receiving one. However, emigration can certainly help, and may be relatively easy to organize, if what is involved is migration of persons from a small underdeveloped territory to a large highly developed territory adjacent to it. If Kerala were one of the few underdeveloped areas in India while the rest of the country is experiencing rapid growth, organized emigration from Kerala would probably help that state to reach the take off stage sooner. But unfortunately that is not the present situation. All parts of India are more or less underdeveloped. Consequently, organized transfer of population from Kerala to the rest of India or to outside India is not going to be a feasible proposition. Therefore, if a return to increased death rate is to be prevented, the economy should be developed faster than the rate at which the population multiplies itself or the rate of growth of the population should be cut down (by reducing birth rate). The former may be called

a purely economic solution and the latter a purely demographic solution.

To understand the problems involved in working out a purely economic solution, it is useful to remember that the solution aims at least to maintain the standard of living. Now to maintain the standard of living, the national income will have to be allocated in a prudent fashion to the following expenditure categories. A—Consumption of the young people (those under the age of entry to the labour force); B—Consumption of the other (economically) inactive persons; C—Consumption of the economically active persons; and D—Investment to increase the number of jobs, factories, schools, housing and the like so that the children of today may enjoy tomorrow the same facilities as those enjoyed by the grownups of today. One calculation[1] shows that in countries like India, about 15 per cent of the national income will have to be allocated to item A, 11 per cent to item B, and 10 per cent to item D, leaving 64 per cent or just below two-thirds to item C. Note that no provision is made to improve the standard of living. We need not bother ourselves whether these are realistic allocations. Their realistic merits do not affect our argument. Now suppose a 2% annual increase in the level of living is aspired for. To achieve that it may be necessary to provide a certain proportion of the national income to what may be called economic investment. How much should that be? One estimate (again let us not bother how realistic that is) gives a figure 8%. Where would that come from? If no foreign assistance is available, that 8% will have to be obtained by reducing the allocation to the consumption items (A to C). In other words, the present wretchedness will have to be increased by about a tenth in order that tomorrow may be bettered. Can the people who do not have enough food nor enough money to buy food for a balanced meal all the year round be pursuaded to increase the wretchedness of their living conditions? It is in this connection that the discussion brings into consideration the tenets of Indian philosophy, the otherworldly mindedness of the people, the fatalistic ideology rooted in the masses, etc. The arguments of some experts hold that given a view of life implied by the phrases just given, the people are not likely to be concerned at all about improving the living conditions in this world. A counter argument made by other experts is that the lack of emphasis on the pleasures of life in this world makes it all the more easy for the people to reconcile themselves to a much worse life's condition than they have experienced so far. Whatever be the merits of the arguments on either side, the issue involved would not have assumed importance had it been possible for India to get foreign aid in large enough volume so as to take care of the investment requirements of its plans for economic change.

It is well known that rich societies do not lend or give in any other way money unless they stand to profit by doing so in one way or other. They may expect, for example, strategic involvement in international relations, political subservience, or economic advantage. In other words, the rich societies seldom give 'aid' in large volume without any strings attached. Whether or not to accept large scale foreign aid without regard to its implications for a country's national and international policies is not an easy matter to decide.

Suppose all these hurdles are passed and funds for investment in developmental outlays become available, either from foreign aid or from internal saving. Then arises the most crucial question of all: would adequate funds for investment alone do the trick? An intense effort at producing economic change amounts to heading for a real social revolution inside the country. Changing a subsistence economy to a dynamic one depends on the people becoming self-disciplined, co-operative among themselves, organized into wholes, freed from attitudes of apathy and resignation to fate, imbibed with initiative and ambition, and reconciled to the idea of deferred gratification. These are not matters that could be accomplished overnight. Nor do we find in the social engineer's ken ready-made formulae for such transformations.

If a purely economic solution involves so many difficulties, it is only natural if the question is raised as to the possibility of finding a purely demographic solution. But it is not at all certain that a cut in birth rate can be accomplished without prior or at least a simultaneous economic and social development. A majority opinion seems to be that it would be wise to study and envisage both solutions simultaneously rather than leaving one to follow the other.

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[1]These estimates have been taken from Alfred Sauvy, *Fertility and Survival*, New York: Criterion Books, Inc., 1961, p. 105.

APPENDICES

APPENDIX I

BRASS' FERTILITY GRADUATION TECHNIQUE[1]

Given below is a description of the technique used by William Brass to derive age specific fertility rates from data on ratio of children (ever born) to women in different age groups in the child bearing years.

Let X denote age of the woman and suppose 15-50 years represents the reproductive period. Let $z=(X-15)/(50-15)$ be the transformed age variable so that the reproductive period is converted to a range 0 to 1. We now assume that the fertility "y" (*i.e.*, average number of children born per woman) at age z can be represented by a polynomial in z as follows :

$$y=z\ (1-z)^3\ (A+Bz+Cz^2+Dz^3), \qquad (1)$$

where A, B, C and D are parameters and z the transformed age variable. The total number of children a woman bears by the time she reaches age t, if she is subjected to the above pattern of fertility performance, is given by (2).

$$F(t)=\int_0^t y\ dz \qquad (2)$$

Now consider the age groups : $\left(0, \frac{1}{7}\right)$, $\left(\frac{1}{7}, \frac{2}{7}\right), \ldots \left(\frac{6}{7}, 1\right)$. In any age group, $\left(\frac{i}{7}, \frac{i+1}{7}\right)$, we may assume that women are evenly distributed over the age range. Under this assumption, the proportion of women within the interval $\left(\frac{i}{7}, \frac{i+1}{7}\right)$ will be proportional to the length of the interval. Consequently, the ratio :

Children to women in the interval i/7 to (i+1)/7 is given by the following equation :

$$r_i^* = 7 \int_{i/7}^{(i+1)/7} dt \int_0^t y\ dz. \qquad (3)$$

Actual integration of (3) for i=0, 1, 2, 3, 4, 5, and 6 after substituting the polynomial (1) for y gives the following equations for r_i^* in terms of A, B, C and D.

$$\left.\begin{aligned}
r^*_1 &= .002936\ A + .0002033\ B + .00001705\ C + .00000159\ D \\
r^*_2 &= .017166\ A + .0024781\ B + .00042139\ C + .00007909\ D \\
r^*_3 &= .03746\ A + .0083228\ B + .00217288\ C + .00062218\ D \\
r^*_4 &= .057080\ A + .0166667\ B + .00578182\ C + .00221039\ D \\
r^*_5 &= .071935\ A + .0250105\ B + .01051661\ C + .00492451\ D \\
r^*_6 &= .080334\ A + .0308551\ B + .01460991\ C + .00780935\ D \\
r^*_7 &= .083111\ A + .0331300\ B + .01648043\ C + .00935303\ D
\end{aligned}\right\} \qquad (4)$$

It may be useful for the rest of the argument to represent the above equation in matrix notation. Let R* stand for the (1×7) vector, $(r^*_1, r^*_2, r^*_3, r^*_4, r^*_5, r^*_6, r^*_7)$, P for the (1×4) vector, (A, B, C, D), and Q for the (4×7) matrix of coefficients of the 7 equations (4). (Note that in Q, the first row is composed of the seven coefficients of A in the seven equations in (4), the second row of the seven coefficients of B, the third row of the seven coefficients of C, and the fourth row of the seven coefficients of D). We may now rewrite equation (4) as follows :

$$R^* = PQ. \qquad (5)$$

R* gives the theoretical values of the "child-woman ratios" under the assumption that fertility performance can be represented by the polynomial (1). Let $R=(r_1, r_2, r_3, r_4, r_5, r_6, r_7)$ stand for the vector of actual values of child woman ratios calculated for any population. It is possible to determine P in (5) such that the sum of squares of the deviations of R from R* is a minimum; in other words, we could determine the unknowns in R* such that R* best fits the data in some sense. Minimizing the sum of squares of deviations of observed

[1]W. Brass, "The Graduation of Fertility Distributions by Polynomial Functions," *Population Studies*, XIV, 148—162.

R's from R*, we arrive at the following equations for P in terms of R and Q :

$$P = RQ'(QQ')^{-1} \qquad (6)$$

Equation (6) is obtained by equating to zero the partial differential coefficient of $(R-R^*)(R-R^*)'$ with respect to. P.

Q being readily known we can calculate $Q'(QQ')^{-1}$ and thus get P in terms of the observed R values. Brass obtained the following values for $Q'(QQ')^{-1}$:

$$\left\{\begin{array}{rrrr} 147.69 & -1411.97 & 3616.40 & -2693.10 \\ 229.83 & -1973.63 & 4617.80 & -3194.20 \\ -67.32 & 1029.47 & -3302.80 & 2784.60 \\ -115.49 & 1178.25 & -2924.10 & 2000.50 \\ 82.10 & -1060.73 & 3496.90 & -3150.60 \\ 86.32 & -956.98 & 2721.90 & -2142.20 \\ -85.53 & 1027.68 & -3243.20 & 2924.20 \end{array}\right\} \qquad (7)$$

In order to get the age specific fertility rates in terms of the vector R, we note that the total fertility performance during the age range (i/7, i+1/7) is given by

$$f_i^* = \int_{i/7}^{(i+1)/7} y \, dz \qquad (8)$$

Integration of (8) after substituting the polynomial (1) in z for y gives f_i^* (i=1, 2, 3, 4, 5, and 6) in terms of the P vector. Substituting in the resulting equations for P from (6) and (7) we get the following formulae :

$$(f^*_1, f^*_2, f^*_3, f^*_4, f^*_5, f^*_6, f^*_7) =$$

$$R \left\{\begin{array}{rrrrrrr} .411 & -.242 & -.351 & .139 & .200 & -.160 & -.132 \\ .740 & -.183 & -.617 & -.051 & .214 & -.083 & -.111 \\ -.009 & .493 & .116 & -.499 & -.337 & .239 & .178 \\ -.273 & .379 & .463 & -.114 & -.383 & -.134 & .028 \\ .121 & -.245 & .123 & .530 & .084 & -.569 & -.283 \\ .183 & -.240 & -.109 & .340 & .296 & -.103 & -.110 \\ -.157 & .231 & .019 & -.266 & .145 & .662 & .290 \end{array}\right\}$$

The estimate of the conventional age specific fertility rate can be obtained from f_i^* (i=1, 2, 3, 4, 5, 6 and 7) by dividing it by 5.

APPENDIX II

DERIVATION OF AGE-SPECIFIC FERTILITY RATES: KERALA (1961)

In this appendix note we describe how we derived the age specific fertility rates pertaining to 1961. A fertility survey on a sampling basis was conducted just after the 1961 Census. The data obtained in that survey furnished separately for rural and urban segments of the population estimates of numbers of children ever born to mothers of different age groups. Dividing these estimated numbers of children by the corresponding number of women as obtained in the 1961 Census we obtained the average number of children ever born per woman in the different age groups. To this data we applied the technique developed by Brass and thus obtained age specific fertility rates. (See Table 1).

Table 1

Fertility Data from 1961 *Fertility Survey and Age Specific Fertility Rates Estimated Therefrom*

Age group	Estimated Number of children	Number of women	Average number of children per woman	Estimated age specific fertility rate
0	1	2	3	4
13—17	13,950	864,099	0·02	147
18—22	420,000	762,860	0·55	209
23—27	1,310,250	722,749	1·81	293
28—32	2,127,500	661,314	3·22	230
33—37	2,032,900	481,489	4·22	147
38—42	2,075,150	450,229	4·61	91
43—47	1,623,300	318,023	5·10	22

These estimates being for five-year age groups centering ages ending in 0 and 5 are not comparable to the estimates obtained for other census years. The following procedure was, therefore, adopted to obtain estimates of age specific fertility rates for the conventional five-year age groups.

The data in column (3) of Table 1 were plotted on a graph along with similar data for 1951 Travancore-Cochin State. (See Figure 1). It was found that the 1961 graph almost coincided with the 1951 graph below age 35, while the former remained well below the latter above age 35. However, the divergence of the 1961 graph from the 1951 graph in the upper part of the child-bearing years appeared to be rather uniform, that is, without any marked tendency to vary with age. The following adjustments were made on the basis of this observation.

A logistic curve was fitted for the 1951 data on average number of children (y) per woman in the different age groups (t) and from the curve average numbers of children per woman at ages, 35.5, 40.5 and 45.5 were calculated. These were assumed to correspond to the average numbers of children per woman in the following age groups : 33-37, 38-42, and 43-47. These estimated 1951 figures are shown below together with the corresponding figures for 1961 Kerala.

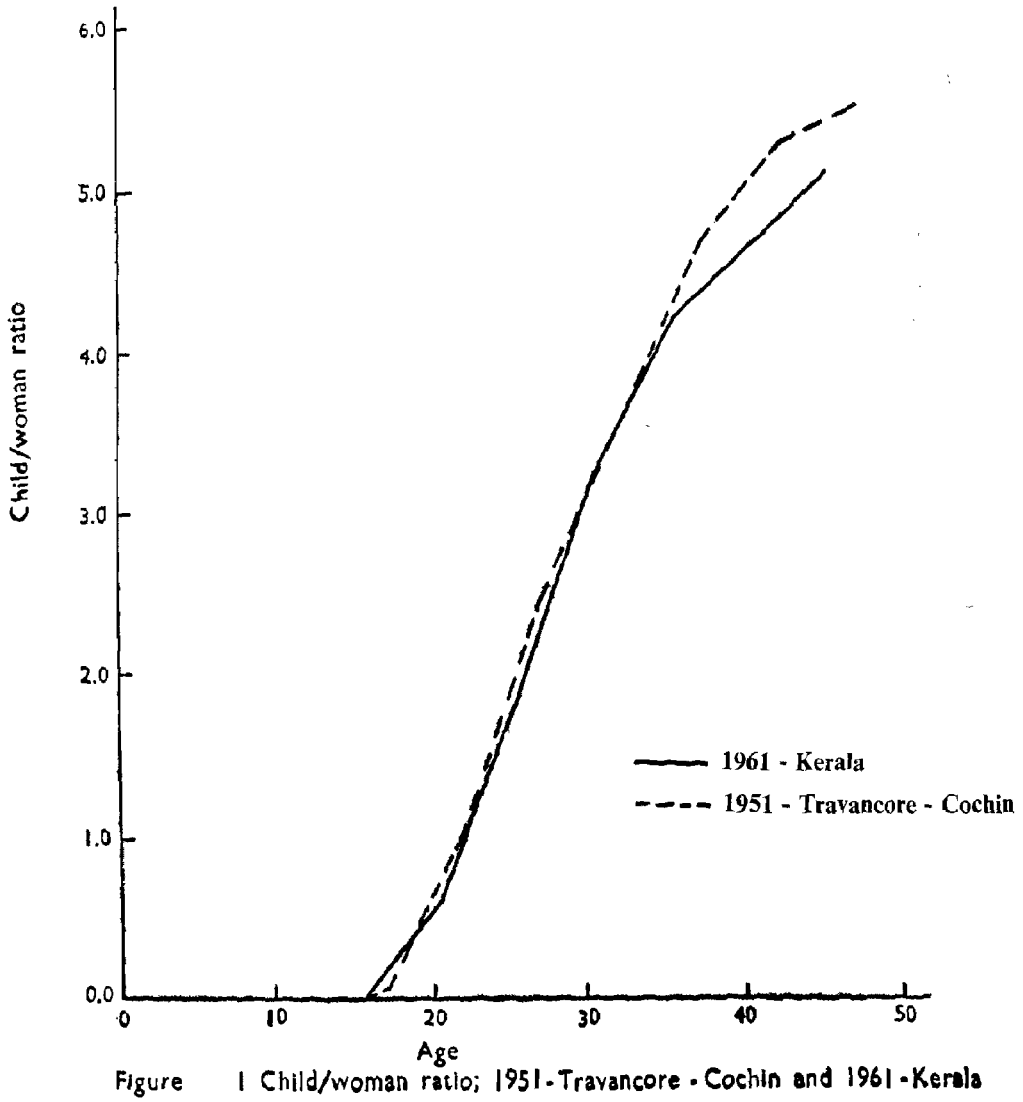


Figure 1 Child/woman ratio; 1951-Travancore - Cochin and 1961-Kerala

Age group	Average number of children per woman	
	1951 Travancore-Cochin	1961 Kerala
33—37	4·31	4·22
38—42	5·08	4·61
43—47	5·45	5·10

The difference between the 1951 and 1961 figures were then averaged. The average difference came to 0.30. It was then assumed that the average number of children per woman in the age groups, 35-39, 40-44, and 45-49 for 1961 Kerala population fell short of the corresponding figures for 1951 Travancore-Cochin by 0.30, while for earlier age groups the two sequences were identical. On the basis of this assumption we obtained the figures in Table 2.

Table 2

Average Number of Children Per Woman in the Conventional Five-Year Age Groups for 1961 *Kerala and the Estimated Age Specific Fertility Rates Therefrom*

Age group	Average number of children per woman	As specific fertility rates obtained by applying Brass' technique
15—19	0·12*	100
20—24	1·11*	254
25—29	2·47*	266
30—34	3·60*	196
35—39	4·44**	129
40—44	4·97**	79
45—49	5·19**	21

*Same as the observed figure for 1951 Travancore-Cochin.

**This is 0·30 less than the observed figure for 1951 Travancore-Cochin.

To make sure that the age specific fertility rates obtained in Table 2 are consistent with those presented in Table 1, we calculated the cumulative rates from both sequences and plotted them on the same graph. It was found that the two graphs tended to coincide. (See Table 3 and Figure 2).

Table 3

Cumulative Fertility Rates Corresponding to the Age Specific Age Fertility Rates Given in Tables 1 and 2 for 1961 *Kerala*

Age group	Cumulative fertility rates corresponding to age specific rates in Table 1	Age group	Cumulative fertility rates corresponding to age specific rates in Table 2
13—17	0·0734	15—19	0·4976
18—22	1·1184	20—24	1·7658
23—27	2·5863	25—29	3·0951
28—32	3·7382	30—34	3·9747
33—37	4·4752	35—39	4·6210
38—42	4·9305	40—44	5·0151
43—47	5·0568	45—49	5·1184

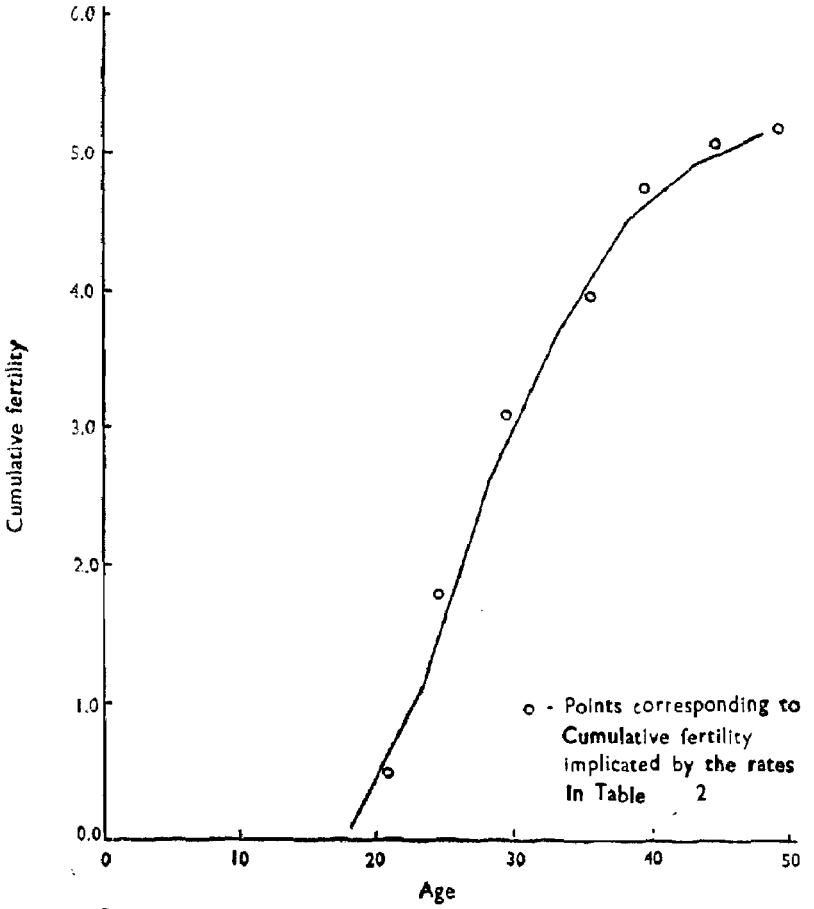


Figure 2 Cumulative fertility by age obtained from the age specific fertility given in Tables 1 and 2

APPENDIX III

ADJUSTMENTS TO FERTILITY DATA: TRAVANCORE (1941)

Certain adjustments had to be made to the data on ratio of children (ever born) to women in different age groups as reported in the 1941 Census publications of Travancore State. In this appendix note we discuss these adjustments. The 1941 Census Report of Travancore State furnishes data on average number of children ever born per married woman in the different age groups. However, a comparison of these figures with the maternity data obtained in 1951 for Travancore-Cochin State indicated that there was possibly an underestimation of fertility in 1941. To pinpoint the discrepancy, the child-woman ratios (considering only married women) in the 10-year age groups, 15-24, 25-34, 35-44, and for 45+ were calculated. (See Table 1).

Table 1

Average Number of Children Ever Born Per Married Woman in 1941 *Travancore and* 1951 *Travancore-Cochin*

Age group	1941 Travancore	1951 Travancore-Cochin
15—24	1·15	1·10
25—34	3·17	3·13
35—44	4·95	5·11
45 +	6·65	5·76

These ratios were calculated for the ten-year age groups because data on civil condition by age were available for Travancore-Cochin for 1951 only in ten year age groups, and ratio of children to married women was not readily available for the different age groups in the census reports of 1951. Similar ratios were then compared taking all women in the above age groups. (See Table 2 below).

Table 2

Average Number of Children Ever Born Per Woman Without Regarding to Marital Status

Age group	1941 Travancore	1951 Travancore-Cochin
15—24	0·66	0·59
25—34	3·04	2·95
35—44	4·88	4·97
45 +	6·58	5·68

From these comparisons it is clear that the fertility level reported for the age group 35-44 for 1941-Travancore is not consistent with the levels reported for the other age groups. It is only in the age group 35-44 that we find the 1941 figure less than the corresponding 1951 figure. Since in all other age groups the 1941 figure exceeded the 1951 figure in Tables 1 and 2, it was thought fair to make some adjustment to the reported rate for age group 35-44 for Travancore in 1941. The adjustment was done in two steps. First the ratios of children to married women in each five year age groups for Travancore -Cochin 1951 were estimated. Then, to these figures were applied estimated difference between the average numbers of children per married woman in five-year age groups for 1941 Travancore and 1951 Travancore-Cochin. These steps are described in some detail below.

The 1951 maternity data were not available for married women in five-year age groups. Nor were available the proportions of women married in each five-year age group. Hence it became necessary to estimate the proportion of women married in each five-year age group so that these proportions could be used to get ratio of children (ever born) to married women in each five-year age group from the corresponding ratio taking all women together. The ten-year age group data on proportion married for 1951 Travancore-Cochin were compared with the corresponding data for 1941 Travancore. Linear interpolation was then applied to the 1941-51 difference in proportion married thus obtained setting these differences against the mid-points of the corresponding ten-year age groups and thus the 1941-51 differences in proportion married (1941-Travancore and 1951-Travancore-Cochin) corresponding to the mid-points of the different five-year age groups were obtained. These differences were then applied to the observed proportion of women married in each five age group for 1941-Travancore in order to get the corresponding proportions for 1951-Travancore-Cochin. The ratio of children (ever born) to all women in each five-year age group was then divided by the corresponding proportion of women married to get the ratio of children (ever born) to married women in each five-year age group for 1951-Travancore-Cochin State.

The next step was to examine the figures in Table 1 and to get estimates of the 1941-51 differences for five-year age groups. The differences in Table 1 against the ten-year age groups were plotted on a graph and a free hand curve was drawn from which were read the differences for the five-year age groups. The differences thus obtained were as follows :—

Age group	Estimated 1941-1951 difference in ratio of children to married women
25—29	0·05
30—34	0·09
35—39	0·10
40—44	0·25
45—49	0·55

The rest of the calculations in deriving the adjusted ratios of children to women in different age groups for 1941 Travancore are shown in Table 3.

Table 3

Calculations Showing the Adjustments to Ratio of Children to Women in Different Age Groups for 1941, *Travancore*

Age group	Ratio of children to married women 1941—Travancore	Proportion of women married, 1941—Travancore	Ratio of children to all women, 1941—Travancore	Ratio of children to all women 1951, Travancore-Cochin	Proportion of women married, 1951—Travancore-Cochin	Estimated 1941-1951 difference obtained above*	Adjusted ratio of ** children to all women 1941, Travancore
0	1	2	3	4	5	6	7
15—19	0·45	·37573	0·17	0·12	·33588	..†	0·17
20—24	1·52	·79665	1·21	1·11	·76570	..†	1·21
25—29	2·70	·94685	2·56	2·47	·92480	0·05	2·58
30—34	3·76	·97582	3·67	3·60	·95967	0·09	3·75
35—39	4·75	·98324	4·67	4·74	·96999	0·10	4·90
40—44	5·25	·98717	5·18	5·27	·97682	0·25	5·57
45—49	6·65***	·98969	6·58***	5·49	·98224	0·55	6·08

*The figures in this column refer to the difference between the ratio of children to married women in each five-year age group for 1941 Travancore and the corresponding figure for 1951 Travancore-Cochin.

**The figures in this column were obtained as follows :

$$\left[\frac{\text{Column 4}}{\text{Column 5}} + \text{Column 6}\right] \times \text{Column 2}$$

***These figures are for the age groups 45 and over.

†No adjustment was made for this age group; hence no estimated difference. For this age group, the figure in column 7 is identical with that in column 3.

A comparison of the figures in columns 7 and 3 of the above Table will reveal the magnitude of the adjustments made in the reported figures. The adjusted figure exceeds the reported figure by 0.00 for the first two age groups, 0.02 for 25-29, 0.08 for 30-34, 0.23 for 35-39, and 0.39 for 40-44. It seems likely that the adjusted figure for 45-49 is somewhat below the actual.

Brass' technique was applied to the unadjusted figures in column 3 of Table 3 and to the adjusted figures in column 7 of that Table. For ready comparison, the age specific fertility rates derived from these figures are presented in Table 4.

Table 4

Two Sets of Age Specific Fertility Rates, One Based on Unadjusted and the Other on Adjusted Ratios of Children to All Women in the Different Age Groups for 1941-*Travancore*

Age group	Unadjusted ratio of children to all women	Estimated age specific fertility rates based on unadjusted ratios of children to all women	Adjusted ratio of children to all women	Estimated age specific fertility rates based on adjusted ratios of children to all women
0	1	2	3	4
15—19	0·17	0·084	0·17	0·115
20—24	1·21	0·305	1·21	0·260
25—29	2·56	0·265	2·60	0·268
30—34	3·67	0·150	3·79	0·224
35—39	4·67	0·181	5·03	0·186
40—44	5·18	0·233	5·69	0·130
45—49	6·58*	0·084	6·21	0·034

*The value 6·58 is for women in the age group 45 and over. For our purpose here this ratio has been taken to be applicable to women in the age group 45—49.

The age specific fertility rates obtained in Table 4 were applied to the distribution of women in Travancore (1941) by age and crude birth rates were calculated. It was found that the age specific fertility rates implicated in the unadjusted figures in column (1) of Table 4 gave an estimate of 45.74 births per 1,000 population whereas the figures in column 4 of Table 4 gave an estimate of 44.62 births per 1,000 population for 1941 Travancore. It is our considered opinion that the figures in column (4) of Table 4 represents more closely the age pattern of fertility in 1941 Travancore than do those in column (2) of the Table.

MGIPCBE—S1—2 RGI/ND/66—1-7-68—1,000.