

AGE PATTERNS OF FERTILITY IN SRI LANKA

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Abstract

To examine the age patterns of fertility in Sri Lanka, ASMR, ASMFR, indexed marital fertility schedules and estimated natural fertility schedules derived from the $m(a)$ has been calculated by using the method suggested by Coale and Trussel (1974). To examine the effects of nuptiality change and contraceptive practice I_f , I_m and I_g have been calculated for the census periods 1953, 1963, 1971 and 1981 at district level. The analysis revealed that changes in proportion of never married women had a greater impact on fertility decline than changes in marital fertility.

Introduction

The third quarter of the century, 1950-80, has witnessed a rapid decline initially in the mortality and then in the fertility, in many of the developing countries. Sri Lanka has not been an exception to this transition. In fact, there has been a fast decline in the level of fertility and mortality in the country which is unprecedented in the history of demographic transition of the developing countries of the present era. Many authors have examined the reasons for the decline in fertility and mortality during the past. During 1940-45, the influence of malaria eradication in Sri Lanka has been shown as a cause for fertility decline (Frederiksen, 1960). In 1966 Jayawardene and Selvaratnam (1967) has attributed the decline in fertility to increase in age at marriage. Write (1968) concluded that the decline in fertility (CBR) between 1953-1963 was due to changes in the age structure and the marital status of women (15-19 years). Fernando (1970) in his fertility analysis for the period 1953 and 1968 examined the influence of infant mortality due to malaria and its impact on fertility and concluded that the consequence of depression of women in the reproductive age group (25-29) in 1963 was due to loss of female infant cohort in 1934-1938 as a result of out break of malaria. Fernando (1972) concluded that the most significant contributing factor in the decline of the fertility has been a change in the proportion marrying. Hence it is evident from the above studies that the increase in mean age at marriage, decline in the proportion of currently married women in the reproductive age group and decline in marital fertility are the main factors for the fertility decline in Sri Lanka.

Keeping above points in view an attempt has been made to examine the age patterns of fertility in Sri Lanka for the periods 1953, 1963, 1971 and 1981. These age patterns of fertility explain the age group having low fertility and its trend at four points of time.

Methodology

To examine the age patterns of fertility in Sri Lanka, age specific fertility rates, age specific marital fertility rates, indexed marital fertility schedules fixing fertility at age 20-24 at 100, the $m(a)$ index of fertility regulation and estimated natural fertility schedules derived from the $m(a)$ has been calculated by using the method suggested by Coals and Trussell (1974), which represents the patterns of marital fertility prevailing in the absence of any deliberate fertility regulation.

Coale and Trussell (1974) have suggested that the age specific marital fertility schedule of any population can be expressed in the following form :

$$r(a) = n(a) \cdot M \cdot m \cdot v(a)$$

where

$r(a)$ is the age specific marital fertility rate

$n(a)$ is the natural fertility at age ' a ' ;

' M ' is the scaling factor of natural fertility ;

' m ' is the factor representing the relative use of fertility regulation at age ' a '

and

$v(a)$ is the standard schedule by which the age specific marital fertility rate is reduced because of fertility regulation.

Coale and Trussell (1974) have computed the age specific fertility schedules of 13 populations identified by Louis Henry (1961) which were experiencing natural fertility. The values of the function $v(a)$ have been estimated by taking into consideration the extent to which selected age-specific marital fertility schedules of contracepting population have differed from natural fertility population. Using these functions M and m can be estimated for any given population for which the age specific marital fertility rates, $r(a)$, are known. The procedure, first estimates ' M ' as :

$$M = \frac{r(20-24)}{n(20-24)}$$

For a value of M computed as above, values of ' m ' can be estimated for different age groups with the knowledge of age-specific marital fertility rates, $r(a)$, the standard natural fertility schedule, $n(a)$ and $v(a)$. The average of ' m ' for different age groups (\bar{m}) can be considered to represent the population. Table gives the computed values of M , m and \bar{m} for each district for three periods. If the given age-specific marital fertility schedule of a population is close to its natural fertility, then the estimated values of $m(a)$

for any age group should be almost equal to and close to zero. For all practical purpose values of 'm' less than 0.2 are assumed to represent natural fertility conditions. After ensuring that the population under study have not been very different from natural fertility conditions, one can compare the levels and age patterns of fertility at different time points in order to judge how they have shifted under conditions of modernisation.

Further in order to study the effects of nuptiality changes and contraceptive practice separately the fertility indexes viz. index of over 24 fertility (I_f), index of marital fertility (I_g) and index of proportion married (I_m) were computed with the concept developed by Coale (1965). The three indices, suggested by Coale (1965), were as follows :

$$\text{The index of overall fertility } I_f = \frac{\sum f_i w_i}{\sum F_i w_i}$$

$$\text{The index of fertility of married womens : } I_g = \frac{\sum g_i m_i}{\sum F_i m_i}$$

$$\text{The index of the proportion of married : } I_m = \frac{\sum F_i m_i}{\sum F_i w_i}$$

Where

f_i = births per women in i^{th} age interval ;

g_i = births per married women in i^{th} age interval ;

w_i = number of women in i^{th} age interval ;

m_i = number of married women in i^{th} age interval ;

F_i = birth per women in i^{th} age interval in the standard population (married Hutteritec 1921-30).

Srinivasan, Pathak (1981) suggested that the Coale (1965) index separately computed for women aged 15-29 and 30-44 will explain fertility levels between younger and older couples. Hence the three indices were computed separately for women aged 15-29, 30-49, and 15-49. The values of nine indices I_f , $I_f^{(1)}$, $I_f^{(2)}$, I_g , $I_g^{(1)}$, $I_g^{(2)}$, and I_m , $I_m^{(1)}$, $I_m^{(2)}$ for the year 1971, 1963 and 1953 census periods were computed for twenty-two districts of Sri Lanka, by utilizing the data given in the Appendix-I and Table 2.

Data

The main sources of data were census and vital registration statistics. Age sex and marital status by district have been collected from 1953, 1963, 1971 censuses for computing age specific marital fertility rate. Further data were collected from the Bulletin of Vital Statistics, published by the Department of Census and Statistics. The analysis was carried out for the whole of Sri Lanka and for 22 sub-divisions. These are generally called "revenue districts", which were existing in 1971.

It is generally agreed that the official statistics of Sri Lanka are reasonably complete. Sarkar (1957) estimated the extent of under-enumeration in census of 1945 at about seven per cent and Kumaraswamy (1953), concluded that the coverage in the census of 1953 was virtually complete. According to recent estimates given by the Population Division of U.N. (1976), the under-registration of births and deaths are about twelve per cent in earlier census (before 1953) and about 1.5 per cent for births and 5.5 per cent for deaths between 1963 and 1971. In recent censuses and registrations, quality of data has improved and virtually have no error. All the statistics presented in this paper, have been taken directly from the original source.

Results :

Crude birth rate in Sri Lanka which was 39.67 in 1953 has declined to 27.43 in 1981 (Table 1). Age specific fertility rates in all age groups have shown a declining trend during the 1953-1981 period. On the other side the proportion of single women is increasing and having maximum increment in the age group 25-29 (Table 1) during the period 1953-1981. From the percentage of never married women in the selected age group for different census periods (Table 1), it is clear that the nuptiality pattern is an important variable, influencing decline in fertility.

Fertility within marriage (Age specific Marital Fertility Rates) for twenty-two districts of Sri Lanka for the different census periods viz, 1953, 1963, 1971 (Table 2) showed increasing values in the age group 15-19 and 20-24 (earlier ages) while the other age groups show a declining trend.

This may be due to (i) postponement of marriage leading to reduction of proportion of married women in child bearing age or (ii) limitation of fertility regulation through various forms of contraception. These factors have been examined by calculating the indexes suggested by Coale (1965).

From table 3 it can be seen that the quantum of decline in the index of overall fertility (I_f), the index of fertility of married women (I_g) and the index of the proportion married (I_m) reflects the impact of change in nuptiality and contraceptive practice. All districts, except Colombo, have exhibited declining values of the indices I_f , I_m and I_g , during 1953-1971. While the district Colombo has shown an increase in the index values, of I_f and I_g and decline in I_m values. The impact of the nuptiality changes can be expected through the index of proportion married ($I_m^{(1)}$ among women below 30) and the impact is not felt for women aged 30-49. $I_m^{(1)}$ has declined in all districts except in Batticaloa and $I_m^{(2)}$ has declined in all the districts except Kalutara, Batticaloa, Puttalam. I_g , $I_g^{(1)}$, $I_g^{(2)}$, are found to be declining in all the districts except in the Colombo district.

TABLE 1
Fertility Indices of Sri Lanka, 1953-1981

	<i>Census Year</i>			
	1953	1963	1971	1981
1. Crude Birth Rate ..	39.67	34.55	30.16	27.43
2. General Fertility Rate ..	190.09	169.73	138.65	115.80
3. General Marital Fertility Rate ..	245.00	240.00	213.00	---
4. Total Fertility Rate ..	5.32	5.04	4.22	---
5. Age Specific Fertility Rate				
15—19 ..	68.2	52.2	43.0	40.0 ^c
20—24 ..	259.3	227.8	178.0	179.9*
25—29 ..	295.1	278.4	230.0	237.9*
30—34 ..	246.0	239.5	203.5	187.5*
35—39 ..	150.1	157.0	140.3	92.4*
40—44 ..	38.1	45.8	43.3	29.1*
45—49 ..	6.8	6.6	6.7	4.0
6. Proportion Single Women				
15—19 ..	75.7	84.7	89.4	89.7
20—24 ..	32.5	41.4	53.2	55.3
25—29 ..	12.8	17.3	24.6	30.1
45—49 ..	4.4	3.9	4.3	4.4

* Refers to 1978 year

Source : (1) Registrar General : *Report of the Registrar General of Ceylon on vital statistics for 1953*, Govt. Press Ceylon 1954.

(2) Registrar General : *Report of the Registrar General of Ceylon on vital statistics for 1963*, Govt. Press Ceylon, 1968.

(3) Registrar General : *Bulletin on Vital Statistics, 1979* Ministry of Plan implementation, Dept. of Census and Statistics, Colombo, 1981.

(4) Longford, C. M. : "Fertility change in Sri Lanka since the war : An analysis of the experience of different districts" *population studies* 35(2) : 285-306.

TABLE 2
Age Specific Marital Fertility Rates for Sri Lanka at District
Level 1971, 1963, 1953

<i>Age Specific Marital Fertility Rates</i>								
<i>Country/District</i>	<i>Year</i>	15-19	20-24	25-29	30-34	35-39	40-44	45+
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sri Lanka	.. 1971	·3743	·3934	·3026	·2235	·1391	·0415	·0091
	1963	·3405	·3864	·3337	·2582	·1652	·0480	·0068
	1953	·2808	·3840	·3384	·2658	·1586	·0401	·0071
1. Colombo	.. 1971	—	·9571	·5725	·3473	·1791	·0033	·0160
	1963	·4378	·4623	·3535	·2567	·1516	·0389	·0050
	1953	·4172	·4454	·3664	·2772	·1568	·0370	·0049
2. Kalutara	.. 1971	·2371	·2866	·2661	·1971	·1207	·0489	·0078
	1963	·2834	·3710	·3061	·2394	·1378	·0498	·0061
	1953	·2641	·3867	·3469	·2643	·1733	·0450	·0073
3. Kandy	.. 1971	·1884	·2614	·2202	·1804	·1220	·0469	·0103
	1963	·3308	·3631	·3263	·2534	·1639	·0504	·0071
	1953	·2998	·3729	·3196	·2378	·1502	·0345	·0078
4. Matale	.. 1971	·2062	·2657	·2460	·1751	·1435	·0503	·0133
	1963	·3990	·3842	·3473	·2690	·1809	·0550	·0081
	1953	·3069	·3928	·3342	·2706	·1557	·0416	·0073
5. Nuwara Eliya	.. 1971	·1487	·2161	·2214	·1731	·1262	·0608	·0190
	1963	·3042	·3270	·3096	·2187	·1426	·0387	·0066
	1953	·2881	·3273	·2837	·2282	·1652	·0400	·0070
6. Galle	.. 1971	·2498	·2775	·2542	·2202	·1488	·0691	·0345
	1963	·3427	·3872	·3361	·2736	·1835	·0640	·0084
	1953	·3380	·3998	·3634	·3193	·2010	·0618	·0100
7. Matara	.. 1971	·2392	·2760	·2611	·2291	·1627	·0706	·0191
	1963	·3197	·4400	·4084	·3592	·2465	·1009	·0165
	1953	·0468	·4472	·4374	·3506	·2275	·0704	·0130
8. Hambantota	.. 1971	·3018	·3409	·2979	·2361	·1861	·0624	·0236
	1963	·3137	·4215	·3839	·3394	·2403	·0713	·0069
	1953	·4165	·4345	·3875	·3089	·1970	·0425	·0075
9. Jaffna	.. 1971	·2121	·2318	·1890	·1662	·0976	·0326	·0091
	1963	·3280	·3657	·3368	·2323	·1423	·0352	·0031
	1953	·2964	·3263	·2824	·2174	·1174	·0271	·0043
10. Mannar	.. 1971	2313	·3034	·2527	·1987	·1297	·0636	·0092
	1963	2652	·3684	·4077	·2924	·1819	·0773	·0195
	1953	3014	·3300	·3154	·2493	·1843	·0550	·0077

(Contd.)

TABLE 2 (Contd.....)

Age Specific Marital Fertility Rates								
Country/District	Year	15-19	20-24	25-29	30-34	35-39	40-44	45+
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11. Vavuniya ..	1971	.2373	.2864	.2902	.1719	.1627	-.0487	-.0104
	1963	.4287	.3887	.3796	.3007	.2044	-.0391	-.0056
	1953	.4050	.3880	.3842	.2486	.1635	-.0309	-.0096
12. Batticaloa ..	1971	.2050	.2598	.2323	.1731	.1299	-.0398	-.0098
	1963	.3007	.3340	.3462	.3020	.1713	-.0662	-.0068
	1953	.3549	.3973	.3739	.2704	.1292	-.1247	-.0056
13. Amparai ..	1971	.2747	.2635	.2365	.1939	.1205	-.0292	-.0127
	1963	.3185	.3817	.3378	.2525	.1518	-.0430	-.0060
	1953	—	—	—	—	—	—	—
14. Trincomalee ..	1971	.1690	.2590	.2087	.1714	.1145	-.0358	-.0041
	1963	.3150	.3593	.3229	.2420	.1504	-.0396	-.0078
	1953	.2769	.3153	.3353	.2163	.0890	-.0196	-.0041
15. Kurunegala ..	1971	.2168	.2706	.2368	.1771	.1113	-.0456	-.0111
	1963	.3631	.3888	.3168	.2501	.1576	-.0353	-.0059
	1953	.3029	.3747	.3251	.2534	.1409	-.0304	-.0068
16. Puttalam ..	1971	.1731	.2436	.2177	.1649	.1115	-.0304	-.0065
	1963	.3339	.4189	.3326	.2440	.1379	-.0287	-.0337
	1953	.3311	.3726	.2985	.2336	.1156	-.0264	-.0036
17. Anuradhapura	1971	.2649	.2792	.2463	.1973	.1501	-.0690	-.0147
	1963	.3567	.3726	.3482	.2942	.1813	-.0419	-.0086
	1953	.3000	.3607	.3189	.2552	.1543	-.0326	-.0066
18. Polonnaruwa ..	1971	.2869	.3188	.2557	.2521	.1645	-.0744	-.0169
	1963	.3165	.3550	.3285	.3093	.1890	-.0816	-.0195
	1953	—	—	—	—	—	—	—
19. Badulla ..	1971	.1785	.2755	.2569	.1963	.1222	-.0588	-.0131
	1963	.3541	.3855	.3384	.2679	.1803	-.0529	-.0097
	1953	.2797	.3660	.3089	.2603	.1624	-.0462	-.0084
20. Moneragala ..	1971	.1939	.3495	.2824	.2596	.1969	-.0881	-.0200
	1963	.3541	.3855	.3384	.2679	.1803	-.0529	-.0097
	1953	.2797	.3660	.3089	.2603	.1624	-.0462	-.0084
21. Ratnapura ..	1971	.2278	.2723	.2451	.1955	.1382	-.0605	-.0114
	1963	.3459	.3494	.3047	.2452	.1610	-.0384	-.0053
	1953	.2854	.3547	.3260	.2663	.1640	-.0421	-.0085
22. Kegalle ..	1971	.221	.2494	.2180	.1600	-.0955	-.0412	-.0111
	1963	.2919	.3191	.2840	.2104	.1564	-.0394	-.0954
	1953	.3335	.3441	.3283	.2477	.1482	-.0411	-.0095

Computed from the source referred in Table 1 and the data given in Table 1 of the Appendix 1.

TABLE 3
Indexes of Overall Fertility, Marital Fertility and Proportion
Married for the Districts of Sri Lanka

Districts	Year	(1)	(2)	I_f	(1)	(2)	I_m	(1)	(2)	I_g
		I_f	I_f		i_m	i_m		i_g	i_g	
Sri Lanka	.. 1971	.3317	.3432	.3287	.4622	.9310	.6120	.6959	.3718	.5371
	1963	.3943	.4140	.4014	.5512	.9399	.5909	.7153	.4404	.5809
	1953	.4607	.4073	.4423	.6529	.9382	.7511	.7057	.4342	.5890
1. Colombo	.. 1971	.6456	.4382	.5764	.4211	.8792	.5740	.5332	.4984	.0041
	1963	.3987	.3787	.3718	.4596	.9080	.6286	.8022	.4152	.5915
	1953	.4371	.3989	.4234	.5543	.9050	.6804	.7885	.4408	.6223
2. Kalutara	.. 1971	.2037	.3075	.2388	.3818	.9207	.5639	.5336	.3339	.4234
	1963	.2796	.3582	.3091	.4290	.9110	.6099	.6518	.3932	.5069
	1953	.4663	.3810	.4379	.6801	.9612	.7738	.6856	.3964	.5658
3. Kandy	.. 1971	.2033	.3054	.2352	.4392	.9413	.5960	.4627	.3245	.3946
	1963	.3838	.4129	.3936	.5546	.9479	.6870	.6940	.4356	.5729
	1953	.4663	.3810	.4379	.6801	.9612	.7738	.6856	.3964	.5658
4. Matale	.. 1971	.2578	.3254	.2793	.5165	.9505	.6543	.4992	.3424	.4269
	1963	.3793	.3597	.3730	.6412	.9580	.7502	.7440	.4718	.6244
	1953	.5548	.4256	.5119	.7664	.9749	.8357	.7239	.4366	.6125
5. Nuwara Eliya	.. 1971	.2117	.3214	.2456	.5006	.9461	.6381	.4229	.3397	.3849
	1963	.3793	.3597	.3730	.5982	.9677	.7167	.6340	.3717	.5204
	1953	.4603	.3956	.4375	.7419	.9684	.8219	.6205	.4085	.5323
6. Galle	.. 1971	.1824	.3357	.2360	.3512	.8595	.5289	.5193	.3906	.4462
	1963	.2686	.4247	.3262	.3833	.8819	.5675	.7007	.4816	.5749
	1953	.3395	.4858	.3891	.4606	.9068	.6121	.7371	.5356	.5358
7. Matara	.. 1971	.1856	.3759	.2478	.3550	.8912	.5303	.5227	.4218	.4873
	1963	.3320	.5962	.4294	.4057	.9106	.5919	.8184	.6548	.7256
	1953	.4336	.5571	.4747	.6181	.9285	.7214	.7015	.6040	.6580
8. Hambantota	.. 1971	.2758	.4212	.3217	.4352	.9429	.5954	.6338	.4467	.5403
	1963	.7818	.5970	.6877	1.0000	.9747	.9871	.7818	.6125	.6967
	1953	.5716	.5006	.5485	.7067	.9557	.7878	.8099	.5234	.6962
9. Jaffna	.. 1971	.1934	.2569	.2148	.4646	.9466	.6274	.4163	.2714	.3424
	1963	.4015	.4033	.4021	.5694	1.0715	.7485	.7051	.3763	.5372
	1953	.4060	.3228	.3749	.6675	.9747	.7824	.6083	.3312	.4792
10. Mannar	.. 1971	.3574	.3508	.3554	.6406	.9853	.7479	.5579	.3560	.4751
	1963	.6011	.5066	.5661	.7966	.9784	.8639	.7546	.5178	.6553
	1953	.5670	.4454	.5241	.8563	.9776	.8991	.6620	.4556	.5828
11. Vavuniya	.. 1971	.3922	.3383	.3753	.6852	.9560	.7702	.5725	.3529	.4873
	1963	.6533	.5088	.6018	.8044	.9833	.8683	.8123	.5174	.6931
	1953	.7205	.4214	.6216	.8926	.9864	.9236	.8072	.4272	.6730
12. Batticaloa	.. 1971	.3448	.3064	.3320	.6919	.9655	.7836	.4984	.3174	.4236
	1963	.5676	.4982	.5426	.8094	.9808	.8712	.7013	.5079	.6228
	1953	.5482	.3172	.4679	.6878	.7954	.7252	.7971	.3988	.6453

(Contd.)

TABLE 3 (Contd.....)

Districts	Year	(1)	(2)	I _f	(1)	(2)	I _m	(1)	(2)	I _g
		I _f	I _f		I _m	I _m		I _g	I _g	
13. Amparai	1971	.3524	.3208	.3423	.6704	.9866	.7713	.5256	.3252	.4438
	1963	.6002	.4138	.5363	.8114	.9853	.8710	.7398	.4199	.6158
	1953	—	—	—	—	—	—	—	—	—
14. Trincomalee	1971	.3462	.2912	.3291	.7514	.9655	.8179	.4607	.3016	.4024
	1963	.5752	.4016	.5161	.8096	.9785	.8671	.7105	.4104	.5952
	1953	.5816	.3076	.4934	.8812	.9821	.9137	.6600	.3132	.5399
15. Kurunegala	1971	.2432	.2907	.2585	.4896	.9496	.6366	.4969	.3061	.4060
	1963	.4489	.4045	.4323	.6351	.9663	.7587	.7067	.4186	.5698
	1953	.5366	.3914	.4888	.7761	.9762	.8419	.6914	.4009	.5806
16. Puttalam	1971	.2493	.2707	.2560	.5552	.9654	.6843	.4400	.2804	.3741
	1963	.4789	.3678	.4670	.6330	.9541	.7559	.7531	.3855	.5781
	1953	.4743	.3360	.4237	.7139	.9518	.7975	.6644	.3531	.5338
17. Anuradhapura	1971	.3141	.3726	.3324	.5825	.9730	.7044	.5393	.3829	.4718
	1963	.5670	.4758	.5334	.7705	.9779	.8423	.7360	.4865	.6356
	1953	.5965	.4128	.5396	.8632	.9830	.9038	.6871	.4199	.5971
18. Polonnaruwa	1971	.3671	.4552	.3947	.6273	.9940	.7423	.5852	.4580	.5317
	1963	.5375	.5437	.5396	.7820	.9777	.8469	.6873	.5561	.6371
	1953	—	—	—	—	—	—	—	—	—
19. Badulla	1971	.2497	.3301	.2753	.4886	.9389	.6318	.5111	.3516	.4357
	1963	.4502	.4521	.4508	.6226	.9636	.7310	.7231	.4692	.6167
	1953	.5033	.4274	.4776	.7470	.9777	.8250	.6737	.4371	.5789
20. Moneragala	1971	.3699	.4930	.4081	.6124	.9748	.7249	.5040	.5058	.5630
	1963	.6441	.6143	.6340	.8864	.9821	.8525	.8191	.6255	.7437
	1953	—	—	—	—	—	—	—	—	—
21. Ratnapura	1971	.2294	.3399	.2644	.4554	.9385	.6089	.5037	.3621	.4345
	1963	.3684	.3988	.3786	.6533	.4188	.5443	.5639	.9522	.6959
	1953	.4739	.4374	.4620	.7075	.9047	.7918	.6698	.4534	.5835
22. Kegalle	1971	.1861	.2516	.2070	.4096	.9202	.5728	.4543	.2734	.3614
	1963	.3088	.3449	.3217	.5205	.9035	.6576	.5932	.3818	.4892
	1953	.4533	.3961	.4345	.6797	.9632	.7732	.6669	.4412	.5619

For Computation of I_g, I_m, I_f, see Coale (1965).

Among the indices, $I_f^{(2)}$, $I_m^{(2)}$, $I_g^{(2)}$ were having higher values than $I_f^{(1)}$, $I_m^{(1)}$, $I_g^{(1)}$ for all the periods and for all the districts except for Colombo. This clearly explains that the overall fertility, marital fertility and proportion married were higher for higher age group (30-49) of women. In the case of Colombo there was a substantial decline in the overall fertility ($I_f^{(1)}$ to $I_f^{(2)}$), marital fertility ($I_g^{(1)}$ and $I_g^{(2)}$) and increase in proportion married ($I_m^{(1)}$ and $I_m^{(2)}$) between 15-29 and 30-49 age group of women. Further, in all the districts, the proportion of married women in the age group 30-49 ($I_m^{(2)}$) was much higher than $I_m^{(1)}$ for all the periods. Increase in proportion marrying in the age group 30-49 and having high value of $I_g^{(2)}$ (index of fertility of married women in the age group 30-49) indicates that the fertility performance was high in older women (30-49). Decline in I_f^1 , I_m^1 , I_g^1 indicates, a substantial decline in marital fertility of younger women, after a time lag, from the decline in the marital fertility of older women aged (30-49). Further, the decline in the proportion married was faster in the younger women as compared to older women. Sri Lanka, as a whole, had experienced a maximum decline in the proportion married in case of younger women. The decline was from 0.65 in 1951 to 0.46 in 1971, where as it was 0.94 to 0.93, respectively for the elder women. This fertility transition in Sri Lanka was mainly due to the decline in the proportion of younger married women.

The extent to which increase in the practice of family planning has contributed to the decline in marital fertility rates of older women between 30-49 can be assessed indirectly by a comparison of age pattern of fertility of all the districts at different years, with the standard curve of natural fertility pattern that has been derived by Coale and Trussell (1974, 1978) and which represent the pattern of marital fertility prevailing in the absence of any deliberate fertility regulation. Figure 1 indicates the indexed age specific marital fertility rate (by considering 20-24 age group as hundred) of the districts of Sri Lanka for the years 1953 and 1971. It can be seen from the figure that in the majority of the districts the age group 20-29 during 1953 and 1971 were close to the standard curve and for the age group 30-34 and 35-39, some districts have departed from the curve. The departure of the indexed age specific fertility rates from the standard curve indicates the degree of fertility regulation. Figure 1 clearly explains that except for Colombo all other districts are close to the curve indicating that there was very little practice of contraception to control fertility.

Quantitative estimates of the degree of regulation in fertility can be obtained from the values of 'm' (level of fertility regulations) derived from Coale and Trussell model (1981). Table 4 gives the index of fertility regulation measured by the $m(a)$.

TABLE 4

Index of Fertility Regulation $m(a^*)$ by districts of Sri Lanka 1971, 1963, 1953

Country/ District	Year	$M = \frac{r(20-24)}{n(20-24)}$	m_1 (25-29)	m_2 (30-34)	m_3 (35-39)	m_4 (40-44)	\bar{m}	MSE m
Sri Lanka ..	1971	.8558	-.0179	-.6096	-.6570	-.8749	-.5309	-.0560
	1963	.8405	-.2937	-.3699	-.4747	-.7593	-.4744	-.0340
	1953	.8353	-.2212	-.3179	-.5078	-.8821	-.4823	-.0676
1. Colombo ..	1971	2.0820	1.6100	1.2718	1.2676	3.2942	1.8609	.0307
	1963	1.0057	0.7299	0.6434	0.7292	1.0348	.7843	.0276
	1953	.9689	-.4679	-.4749	-.6611	1.0439	-.6620	-.0621
2. Kalutara ..	1971	.6104	-.0417	-.2962	-.4688	-.5199	-.3109	-.0249
	1963	.8070	-.4573	-.4215	-.6097	-.7045	-.5483	-.0122
	1953	.8412	-.1574	-.3366	-.4294	-.8055	-.4322	-.0577
3. Kandy ..	1971	.5686	-.3828	-.3222	-.3905	-.4993	-.3987	-.0046
	1963	.8116	-.2485	-.3459	-.4487	-.7001	-.4358	-.0293
	1953	.8112	-.3209	-.4390	-.5319	-.9677	-.5649	-.0675
4. Matale ..	1971	.5780	-.0442	-.3904	-.2504	-.4614	-.2866	-.0144
	1963	.8358	-.1300	-.3010	-.3821	-.6590	-.3680	-.0352
	1953	.8545	-.3471	-.3249	-.5473	-.8721	-.5229	-.0530
5. Nuwara Eliya	1971	.4701	-.3187	-.1022	-.1754	-.1821	-.0350	-.0152
	1963	.7113	-.0359	-.3686	-.4557	-.7936	-.3955	-.0671
	1953	.7120	-.2806	-.3072	-.3154	-.7709	-.4185	-.0534
6. Galle ..	1971	.6037	-.0824	-.1161	-.2573	-.2675	-.1808	-.0048
	1963	.8423	-.2754	-.2874	-.3758	-.5573	-.3740	-.0143
	1953	.8697	-.1103	-.1065	-.3192	-.6047	-.2852	-.0445
7. Matara ..	1971	-.6004	-.0330	-.0495	-.1664	-.2185	-.1079	-.0093
	1963	.9571	-.0352	-.0741	-.2153	-.3258	-.1626	-.0122
	1953	.9728	-.1525	-.1331	-.3078	-.3918	-.2201	-.0598
8. Hambantota..	1971	.7416	-.2514	-.3170	-.2401	-.4852	-.3234	-.0121
	1963	.9169	-.1030	-.0944	-.1985	-.5410	-.2342	-.0400
	1953	.9452	-.1784	-.2784	-.4183	-.9284	-.4399	-.0953
9. Jaffna ..	1971	.5042	-.4997	-.2659	-.4893	-.6716	-.4816	-.0187
	1963	.7955	-.0632	-.4447	-.5651	-.9397	-.5032	-.0804
	1953	.7098	-.2860	-.3743	-.6402	1.0441	-.5861	-.0900
10. Mannar ..	1971	.6599	.4235	-.3996	-.4748	-.3893	-.4218	-.0011
	1963	.8014	-.5952	-.1157	-.3365	-.3886	-.0614	-.0662
	1953	.7179	-.0697	-.1887	-.2183	-.5514	-.2222	-.0448
11. Vavuniya ..	1971	.6230	-.2791	-.5285	-.2019	-.5373	-.2471	-.0457
	1963	.8456	-.1469	-.1536	-.2760	-.9086	-.2978	-.1543
	1953	.8440	-.1966	-.4320	-.4885	1.0737	-.4494	-.1627
12. Batticaloa ..	1971	.5651	-.1691	-.3742	-.3244	-.6111	-.3697	-.0244
	1963	.7266	-.3605	-.0768	-.3000	-.4289	-.0729	-.0669
	1953	.8643	-.0143	-.3428	-.7373	1.2489	-.5787	-.1957

(Contd.)

TABLE 4 (Contd.....)

Country/District	Year	$M = \frac{r(20-24)}{n(20-24)}$	m_1 (25-29)	m_2 (30-34)	m_3 (35-39)	m_4 (40-44)	\bar{m}	MSE m
13. Amparai ..	1971	.5732	-.1556	-.2275	-.4101	-.8401	-.4083	-.0785
	1963	.8303	-.2060	-.3848	-.5441	-.8285	-.4909	-.0485
	1953	---	---	---	---	---	---	---
14. Trincomalee ..	1971	-.5634	-.5421	-.3842	-.4426	-.6838	-.5132	-.0143
	1963	-.7816	-.1510	-.3582	-.4949	-.8440	-.4620	-.0611
	1953	-.6859	-.4523	-.3311	-.8731	1.2489	-.5002	-.2711
15. Kurunegala ..	1971	-.5886	-.2463	-.4001	-.5118	-.5437	-.4216	-.0077
	1963	-.8458	-.5021	-.5261	-.5258	-.9810	-.6088	-.0601
	1953	-.8151	-.2770	-.3522	-.5929	1.0606	-.5719	-.1014
16. Puttalam ..	1971	-.5299	-.1710	-.3508	-.4092	-.7561	-.4218	-.0462
	1963	-.9112	-.5415	-.5728	-.5255	1.1802	-.7550	-.0762
	1953	-.8105	-.5629	-.4641	-.7824	1.1560	-.7414	-.0768
17. Anuradhapura	1971	-.6073	-.2175	-.2875	-.2548	-.2729	-.2581	-.0002
	1963	-.8105	-.0109	-.1744	-.3505	-.8297	-.3414	-.0096
	1953	-.7846	-.2096	-.2855	-.4741	-.9843	-.4884	-.1034
18. Polonnaruwa ..	1971	-.6935	-.5586	-.1212	-.2942	-.3134	-.3219	-.0048
	1963	-.7722	-.0462	-.0220	-.2642	-.3241	-.1531	-.0174
	1953	---	---	---	---	---	---	---
19. Badulla ..	1971	-.5993	-.0187	-.2751	-.4394	-.3766	-.2774	-.0107
	1963	-.8386	-.2352	-.3120	-.3885	-.6889	-.4064	-.0335
	1953	-.7962	-.3760	-.2778	-.4390	-.7490	-.4602	-.3640
20. Moneragala ..	1971	-.7602	-.5322	-.2136	-.2099	-.2589	-.3037	-.0043
	1963	-.9748	-.2954	-.0502	-.6346	-.6346	-.3384	-.0430
	1953	---	---	---	---	---	---	---
21. Ratnapura ..	1971	-.5923	-.1453	-.2639	-.3101	-.3470	-.2666	-.0032
	1963	-.7601	-.2588	-.2976	-.4028	-.8460	-.4513	-.0655
	1953	-.7716	-.0705	-.1434	-.3995	-.7915	-.3513	-.0832
22. Kegalle ..	1971	-.5425	-.2504	-.4301	-.5805	-.5577	-.4547	-.0084
	1963	-.6941	-.1858	-.3896	-.3435	-.7636	-.4207	-.0193
	1953	-.7485	-.0634	-.2599	-.4676	-.7871	-.3628	-.0782

* Coale and Trussell (1974) "Model Fertility Schedules: Variations in the age structure of childbearing in Human Population", *Population Index*, 40, pp. 185-258, $m(a) = I_n [r(a) / M.n.(a)] / r(a)$.

It is observed that, the average incidence of fertility (\bar{m}) is declining in all the districts with the increase of time except in the six districts *viz.*, Mannar, Batticaloa, Amparai, Kurunegala, Ratnapura and Kegalle. Districts of Nuwara Eliya, Galle, Matara, Vavuniya, Anuradhapura, Badulla, Ratnapura have exhibited \bar{m} very close to the population listed by Louis Henry (1961). These districts determined natural fertility schedule which explained that there was no control on fertility. Other districts, except Colombo, were very close to natural fertility pattern, indicating very little or no practice of control of fertility during 1953-1971.

Discussion and Conclusion

During the period 1953-1981, the general fertility has declined (Table 1) faster than the crude birth rate. No substantial difference in the proportion of women in the reproductive age (15-44) in the districts were observed. Nevertheless, the proportion of never married (single) women had increased significantly in all the age groups during these years. Apart from the decline in the proportions married, the fertility within marriage had also declined.

The index calculated by the method suggested by Coale (1965), indicated that, for the entire country while the overall fertility and proportion of married women were still high in 1971 in the age group 30-49 but lower than 1951, the marital fertility rate was higher in the age group 15-29. Increase in age at marriage seems to be followed by increase in I_{15}^m , with substantial decline in marital fertility after age 30 (I_{30}^m), implying that family planning methods are adopted only for limitation of family size. The women who marry late had relatively higher fertility before 30 years and had low fertility after 30 years (I_{30}^m), at district level only Colombo showed an increase in the index value of I_r and I_g while recording a decline in I_m (proportion married).

The curve of age specific marital fertility rate has exhibited a higher peak in 20-24 years with a rapid decline in subsequent age group. The analysis through Coale's indexes has shown that changes in the proportion of never married women had a greater impact on fertility decline than changes in marital fertility. Notwithstanding the decline in fertility as revealed through the present investigations, the data has shown little effect of contraceptive use on fertility decline in Sri Lanka during 1953-71.

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APPENDIX

TABLE 1: Age specific Fertility rates in the districts
of Sri Lanka, 1953, 1963, 1971

Country/District	Year	Age-Specific Fertility Rates						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
Sri Lanka	1971	·0398	·1842	·2319	·1991	·1310	·0396	·0087
	1963	·0520	·2264	·2761	·2380	·1572	·0460	·0066
	1953	·0682	·2593	·2951	·2460	·1501	·0381	·0068
Colombo	1971	·0995	·3843	·4082	·2999	·1647	·0030	·0108
	1963	·0401	·2165	·2685	·2265	·1400	·0363	·0047
	1953	·0432	·2436	·2966	·2469	·1434	·0339	·0046
Kalutara	1971	·0166	·1002	·1732	·1672	·1075	·0449	·2046
	1963	·0212	·1576	·2226	·2086	·1294	·0471	·0058
	1953	·0236	·2013	·2782	·2380	·1611	·0422	·0069
Kandy	1971	·0142	·1145	·1601	·1647	·1148	·0478	·0100
	1963	·0439	·2239	·2799	·2359	·1570	·0486	·0059
	1953	·0750	·2715	·2878	·2260	·1453	·0335	·0076
Matale	1971	·0248	·1471	·2032	·1556	·1435	·0485	·0138
	1963	·0775	·2738	·3129	·2553	·1743	·0532	·0078
	1953	·1105	·3241	·3142	·2616	·1527	·0409	·0071
Nuwara Eliya	1971	·0119	·1027	·1849	·1622	·1195	·0576	·0196
	1963	·0482	·2264	·2631	·2091	·1389	·0378	·0065
	1953	·0927	·2680	·2684	·2225	·1577	·0394	·0069
Galle	1971	·0145	·0939	·1530	·1736	·1296	·0674	·0045
	1963	·0180	·1438	·2271	·2297	·1666	·0595	·0080
	1953	·0200	·1787	·2753	·2799	·1858	·0578	·0094
Matara	1971	·0113	·0927	·1724	·1842	·1546	·0662	·0189
	1963	·0185	·1796	·2907	·3149	·2301	·0955	·0157
	1953	·0253	·2335	·3517	·3187	·2142	·0667	·0122
Hambantota	1971	·0288	·1612	·2341	·2075	·1814	·0608	·0254
	1963	·3137	·4215	·3839	·3394	·2301	·0680	·0066
	1953	·0778	·3226	·3517	·2920	·1896	·0411	·0073
Jaffna	1971	·0216	·1102	·1475	·1531	·0947	·0311	·0085
	1963	·0595	·2237	·2876	·2215	·1748	·0378	·0035
	1953	·0626	·2336	·2607	·2106	·1149	·0265	·0043
Mannar	1971	·0628	·2056	·2418	·1824	·1383	·0637	·0077
	1963	·1157	·3196	·3913	·2844	·1791	·0758	·0190
	1953	·1586	·2991	·3063	·2416	·1841	·0542	·0076
Vavuniya	1971	·0652	·2159	·2771	·1692	·1455	·0491	·0111
	1963	·1795	·3407	·3651	·2937	·2021	·0387	·0055
	1953	·2491	·3619	·3745	·2446	·1616	·0306	·0094

(Contd.)

TABLE 1 (Contd.....)

Country/District		Year	Age-Specific Fertility Rates						
			15-19	20-24	25-29	30-34	35-39	40-44	45-49
Batticaloa	..	1971	.0698	.2019	.2126	.1612	.1284	.0393	.0098
		1963	.1533	.2916	.3283	.2948	.1686	.0652	.0067
		1953	.1614	.2919	.2896	.2149	.1019	.0201	.0044
Amparai	..	1971	.0799	.1929	.2146	.1828	.1266	.0276	.0124
		1963	.1557	.3346	.3264	.2483	.1499	.0424	.0059
		1953	—	—	—	—	—	—	—
Trincomalee	..	1971	.0594	.2161	.2036	.1746	.1036	.0346	.0041
		1963	.1620	.3111	.3075	.2356	.1478	.0389	.0077
		1953	.1735	.2904	.3262	.2116	.0875	.0194	.0040
Kurunegala	..	1971	.0233	.1436	.1928	.1661	.1052	.0446	.0110
		1963	.0657	.2668	.2873	.2396	.1532	.0343	.0058
		1953	.0998	.3072	.3057	.2389	.1373	.0297	.0110
Puttalam	..	1971	.0288	.1408	.1879	.1576	.1079	.0298	.0063
		1963	.0725	.2931	.3017	.2305	.1324	.0276	.0036
		1953	.0788	.2793	.2708	.2208	.1107	.0253	.0034
Anuradhapura	..	1971	.0555	.1812	.2142	.1838	.1467	.0727	.0155
		1963	.1222	.3173	.3302	.2769	.1777	.0411	.0084
		1953	.1611	.3330	.3092	.2497	.1523	.0322	.0065
Polonnaruwa	..	1971	.0652	.2215	.2222	.2475	.1607	.0788	.0186
		1963	.1108	.3003	.3138	.3012	.1854	.0800	.0191
		1953	—	—	—	—	—	—	—
Badulla	..	1971	.0168	.1349	.2051	.1801	.1157	.0572	.0129
		1963	.0626	.2624	.3043	.2545	.1755	.0515	.0095
		1953	.0952	.3015	.2928	.2526	.1597	.0453	.0082
Moneragala	..	1971	.0372	.2347	.2569	.2507	.1927	.0874	.0193
		1963	.1182	.3854	.3709	.3644	.2098	.0650	.0138
		1953	—	—	—	—	—	—	—
Ratnapura	..	1971	.0195	.1234	.1842	.1763	.1323	.0595	.0110
		1963	.0461	.2122	.2607	.2293	.1551	.0371	.0051
		1953	.0714	.2684	.3012	.2636	.1592	.0410	.0083
Kegalle	..	1971	.0137	.1003	.1554	.1416	.0909	.0381	.0106
		1963	.0293	.1755	.2404	.1958	.1328	.0379	.0052
		1953	.0650	.2459	.2942	.2362	.1438	.0398	.0092

TABLE II

Data Compiled for Calculation of Fertility Indices for Different Census Periods for Sri Lanka

Sr. No.	Districts	Births				Women Between 15-44 Years			
		1953	1963	1971	1981*	1953	1963	1971	1981
1.	Colombo ..	64889	71039	75712	80900	355200	453760	569889	738428
2.	Kalutara ..	18722	17750	18798	21237	113770	136620	164610	193590
3.	Kandy ..	33018	36733	37659	36140	176030	223440	269799	276895
4.	Matale ..	8793	9967	10409	10591	39943	50860	66866	85153
5.	Nuwara Eliya ..	12881	13489	14358	13825	69367	83670	103354	132428
6.	Galle ..	19620	19393	18881	20261	118458	141030	165954	191860
7.	Matara ..	18006	19122	18436	19289	89164	108140	130543	152843
8.	Hambantota ..	9695	10889	10611	12334	40268	51020	70775	97637
9.	Jaffna ..	16825	20465	20793	25473	106659	127300	153974	196377
10.	Mannar ..	1786	2505	2705	3653	7979	10200	14778	22691
11.	Vavuniya ..	1765	2936	3591	5101	6446	14930	17694	36488
12.	Batticaloa & Amparai ..	11308	17327	19954	22987	5623	76110	103805	158402
13.	Trincomalee ..	3345	5320	6949	9575	15513	23940	35756	54456
14.	Kurunegala ..	27592	30770	29554	24921	129435	166900	237071	317337
15.	Puttalam ..	8670	11299	12782	15346	46854	60190	82239	112819
16.	Anuradhapura & Polonnaruwa ..	10296	15587	18538	25932	43497	120920	107111	185184
17.	Badulla & Moneragala ..	19286	26858	36318	28597	95163	128940	171507	209376
18.	Ratnapura ..	16829	18125	20362	24712	84433	112560	146237	186652
19.	Kegalle ..	17881	16268	15156	15547	94678	121380	148026	168029
	Sri Lanka ..	321217	365842	382668	407243	1689794	2155480	2760020	3516645

* Refers to 1980 births.

TABLE II (Contd.....)

Sr. No.	Districts	Total Population							
		Total Women			Total Population				
		1953	1963	1971	1981	1983	1963	1971	1981
1.	Colombo	784251	1036250	1271751	1491264	1708726	2207420	2672265	3087812
2.	Kalutara	255439	313300	362057	415878	523550	631690	729514	827189
3.	Kandy	402621	508500	582627	570234	840382	1047160	1187925	1126296
4.	Matale	93357	123190	152580	176904	201049	255880	314841	357441
5.	Nuwara Eliya	155028	191570	220668	259969	325254	398780	450278	522219
6.	Galle	266678	326070	371833	414541	524369	642340	735173	814579
7.	Matara	205000	257420	296893	331906	413431	515020	586443	664231
8.	Hambantota	91534	134150	165343	208307	191508	274670	340254	424102
9.	Jaffna	245472	305160	351663	421273	419849	613230	701603	831112
10.	Mannar	17823	27240	35946	49248	43689	60180	77780	106940
11.	Vavuniya	14852	29350	42480	80482	35112	68500	95243	173416
12.	Batticaloa & Amparai	126251	191640	253703	349483	270493	407910	529326	697785
13.	Trincomalee	34333	60720	85931	119447	83917	138220	188244	256790
14.	Kurunegala	291672	411260	499535	601091	626336	854800	1025633	1212755
15.	Puttalam	105939	143080	183678	240637	228892	302140	378430	493344
16.	Anuradhapura & Polonnaruwa	97419	175710	253337	388030	229282	393240	552423	850575
17.	Badulla & Moneragala	220124	311000	390648	433632	466896	653800	808425	932636
18.	Ratnapura	196253	259320	316656	383598	421555	546570	661344	796468
19.	Kegalle	225119	282280	321207	344345	471605	578521	654752	682411
	Sri Lanka	3829165	5087210	6158536	7280269	8097895	10590061	12689897	14850001

Source: Registrar General: *Bulletin of Vital Statistics*, 1979, 1972, 1963, 1964, 1953, 1954., Dept. of Census and Statistics, Ministry of Plan Implementation, Colombo.