

**Below-replacement fertility of ethnic Indians in Fiji:
a decomposition analysis of the components of changes in the
total fertility rate**

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Introduction

The growth rate of a population is determined by the interplay of fertility, mortality and international migration. Fertility rates are directly related to the population growth and the age structure of the population. Understanding fertility is necessary for assessing opportunities for boosting economic development as well as for anticipating future challenges, such as population ageing. Policy-makers and planners depend on fertility rate statistics for effective social planning and allocation of resources to public services, including education and healthcare. A civil registration system is the most efficient data source for the generation of fertility statistics; however, as Fiji has not achieved full recording of births, the census provides a unique opportunity to examine the fertility levels and trends of the entire population. Additionally, the demographic and household characteristics recorded in the census provide an excellent basis for studying fertility levels and trends against different background characteristics, such as ethnicity, urban-rural residence and educational attainment.

Fiji has a long history of census taking dating back to 1879, the year of the first census which was rather a rough head count. Two years later, the first comprehensive census was conducted. Since 1881, censuses in Fiji have been conducted on a decennial basis with very few exceptions.

The latest census, henceforth referred to as the “2007 census”, was conducted in September 2007 and enumerated 837,271 people residing in Fiji on the census night. According to this census, 56.8 percent of the population of Fiji are of indigenous Melanesian origin, henceforth referred to as “Fijians”, 37.5 percent are of Indian origin, henceforth referred to as “Indians”, and 5.7 percent are of other ethnic origin, primarily European, Chinese or other Pacific Islands.

The 2007 census also revealed that the process of urbanization is advancing in Fiji. The urban population has surpassed the rural population: some 51 percent of the population live in urban areas. This trend differs across ethnicity with nearly 57 percent of the Indian population living in urban areas, as compared to approximately 45 percent of the Fijian population.

The population of Fiji grew at a slow rate between 1901 and 1936 with a rate of growth hovering between 1.0 and 1.6 percent per annum. The intercensal growth rate increased between 1936 and 1946 to 2.7 percent per year and then further accelerated to 2.9 percent per year by 1956 and 3.3 percent by 1966. Over the following decades, Fiji witnessed a slowdown in its population growth. The 1966-1976 intercensal population growth rate plummeted to 2.1 percent per year, and remained at that level until 1986. Between 1986-1996 another drastic reduction in the population growth rate occurred as the rate fell below 1 percent per year. The 2007 census showed that this decline has continued in recent years: between 1996 and 2007 the intercensal growth rate was on

average just 0.7 percent per year. A noticeable disparity in the population growth rate is observed between Fijians and Indians. During 1996-2007, the Indian population decreased by 0.7 percent per year while the Fijian population increased by 1.8 percent per year.

This paper focuses solely on the issue of fertility. A continuous decline in fertility can play a major role in the reduction of population growth and also affects changes in the age structure of the population. The shift from high birth rates to lower birth rates is in line with the “demographic transition model” which predicts that as a country develops from a pre-industrial to an industrialized economic system both birth and death rates will decline (Thompson, 2003).

Demographic analyses of previous censuses have been carried out by Zwart (1979), Gubhaju and Navunisaravi (1989) and Seniloli (2002), using the 1976, 1986 and 1996 censuses, respectively. The present paper examines the level, trends and differentials in fertility based on the 2007 census of Fiji and disseminates findings, which allow planners and policy-makers timely information for formulating policies and implementing programmes for the socioeconomic development of the nation at large and the well-being of the people.

Methodology

This study is based on current fertility reported by women in the reproductive ages of 15 to 49. Current fertility estimates are directly obtained from information on the date of birth of the last child to women 15 years and over. In addition, the Fiji census continued to gather information on the relationship of mothers with their own children, allowing a unique opportunity to estimate fertility trends for the past 15 years preceding the census by the application of the own-children method (Cho, 1973). Current estimates of fertility based on the census data are presented for Fijians and Indians. Also presented are current estimates of fertility by urban-rural residence and educational attainment.

Components of intercensal changes in the total fertility rates are also analysed by using a decomposition analysis technique to determine the relative impacts of marital structure and marital fertility. Finally, this paper summarises the findings and suggests areas for further study of fertility.

Fertility level, trends and differentials

The age-specific and total fertility rates (TFR) are robust measures of fertility and while they may still be affected by reporting errors, these indicators are generally accepted as accurate representations of fertility pattern, level and trends.

ASFR and TFR

The age-specific fertility rate (ASFR) is defined as the ratio of the number of live births occurring during a specified period to specified age or age group of women to the number of women in the same period and same age. Summation of the age-specific fertility rates multiplied by the age interval gives an age standardized index of fertility, referred to as the total fertility rate (TFR).

The total fertility rate is defined as the number of children that would be born per woman if all women were to live to the end of their childbearing years and would bear children according to the age-specific fertility pattern that prevailed at the time reference point or period of the TFR.

Table 1 presents the age-specific and total fertility rates for Fijians and Indians obtained directly from the 2007 census. These rates are based on the numbers of reported births occurred during the year preceding the census. Thus, they refer to the year immediately preceding the census. Also presented in this table are the corresponding data from previous censuses to show the changes over time. It is evident from this table that the fertility transition in Fiji started in the late 1960s, which recorded a high TFR of around 5.5 children per woman. Ethnic variation in fertility levels was almost nil at the start of the transition. Fiji witnessed a spectacular decline in fertility between 1966 and 1976, registering a decline of TFR from 5.5 to 3.5 children per woman among Indians and from 5.6 to 4.3 children per woman among Fijians. This is a

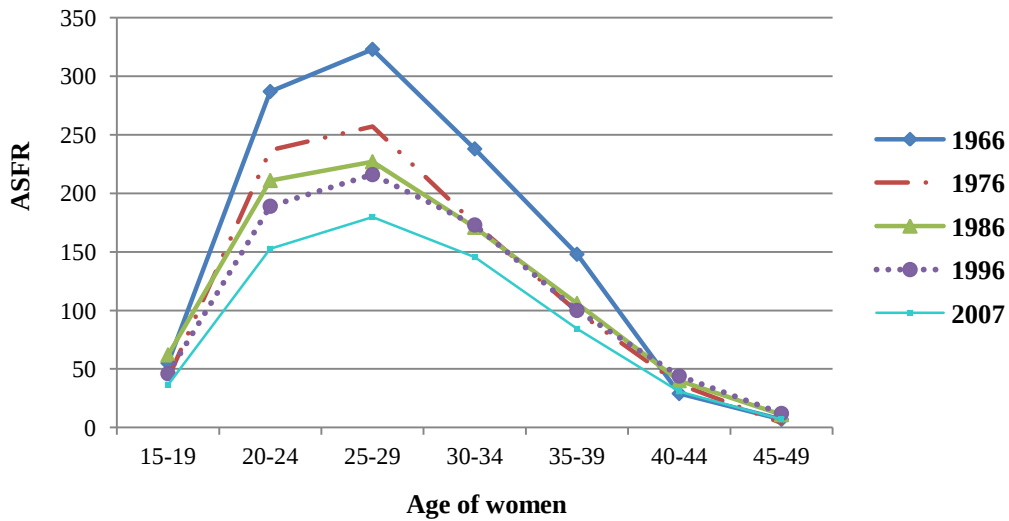
remarkable fertility decline, with a notable differentiation between Fijians and Indians. The TFR among Indians continued to decline to 2.8 children per woman in 1986, slowed down to reach a level of 2.5 by 1996, and by 2007 dropped further to reach a level of 1.9 children per woman, which is well below replacement fertility. By contrast, Fijian fertility remained almost unchanged between 1976 and 1986 and experienced only a slight drop to 3.9 in 1996. Fijian fertility fell sharply to 3.2 in 2007. These figures suggest that the Indian population in Fiji has rapidly completed its fertility transition, whereas the Fijian population follows a slower trajectory and has not yet completed it. Notably, the current difference in TFR between Fijians and Indians stands at more than one child per woman.

Table 1. Age-specific fertility rates (per 1,000) and total fertility rates by ethnicity, Fiji, 1966-2007					
Age of Women	Total				
	1966	1976	1986	1996	2007
15-19			65	54	36
20-24			213	195	139
25-29			194	185	154
30-34			128	124	116
35-39			67	61	59
40-44			27	25	20
45-49			8	8	4
TFR			3.51	3.26	2.64
Age of Women	Fijians				
	1966	1976	1986	1996	2007
15-19	55	42	62	46	37
20-24	287	237	211	189	153
25-29	323	257	227	216	180
30-34	238	174	171	173	146
35-39	148	99	106	100	84
40-44	59	37	40	44	31
45-49	7	4	11	12	7
TFR	5.60	4.30	4.20	3.90	3.18
Age of Women	Indians				
	1966	1976	1986	1996	2007
15-19	95	53	62	58	35
20-24	329	244	207	188	121
25-29	299	218	162	139	120
30-34	203	113	80	70	69
35-39	122	49	29	23	22
40-44	48	14	10	8	6
45-49	6	1	5	4	2
TFR	5.50	3.50	2.80	2.50	1.87

Source: Fiji Census of Population and Housing, 1966 to 2007

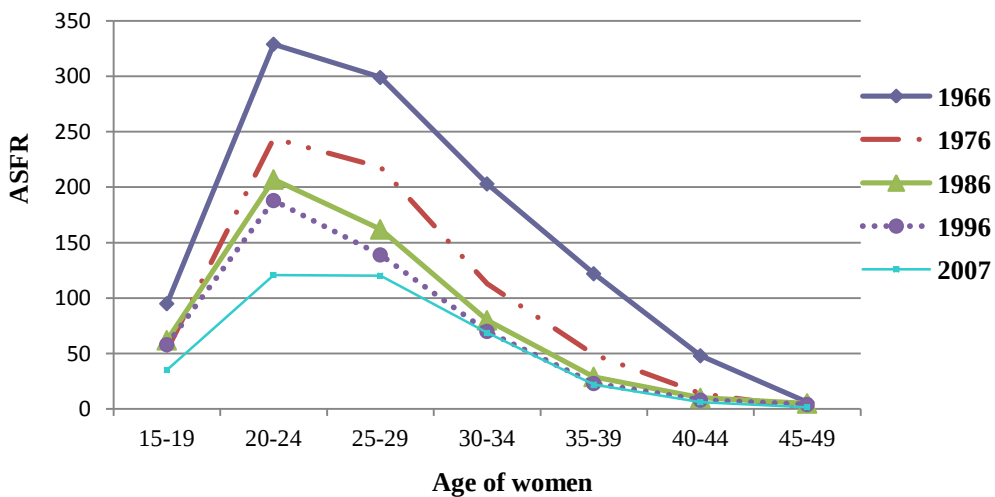
Figures 1 and 2 present the age pattern of fertility of Fijians and Indians. It is apparent that during 1966-1976, a sharp drop in fertility occurred across nearly every age group among both Fijians and Indians. Among Fijians the decline was more prominent in the age groups 20-24 to 35-39, while for Indians the decline was observed in every age group except for women aged 45-49. During the periods 1976-1986 and 1986-1996, fertility decline among Fijians occurred exclusively in the central childbearing age groups 20-24 and 25-29. Among Indians, the rapid fertility decline during the 1966-1976 decade continued across most age groups except very young (15-19) and elderly women (45-49). The 1996-2007 period witnessed resumption of the fertility decline among both Fijians and Indians in all age groups. It is particularly to be noted that fertility levels of women 15-19 also significantly declined during this period.

Figure 1. Age-specific fertility rates (per 1,000), Fijians
1966-2007



Source: Fiji Census of Population and Housing, 1966 to 2007

Figure 2. Age-specific fertility rates (per 1,000), Indians
1966-2007



Source: Fiji Census of Population and Housing, 1966 to 2007

It is also to be noted that not only the level of fertility is different between Fijians and Indians but also the age pattern of fertility. Among Fijians, there has been a consistent age pattern of fertility characterized by a peak occurring in the age group 25-29. While fertility rates in each age group have declined, this age-specific fertility pattern prevailed across all five censuses. However, as the peak fertility became less pronounced the trend in the fertility pattern for Fijians can be characterized as one of decreasing concentration. By contrast, the age pattern of fertility among

Indians in the 1966 and 1976 censuses reached a peak in the age group 20-24, suggesting that Indian women commenced childbearing at younger ages than their Fijian counterparts. In the 1986 and 1996 censuses a sharp decline in fertility of older Indian women occurred. As a result, the trend of this age-specific fertility pattern can be summarized as one of increasing concentration of fertility, with the concentration taking place in the central childbearing ages. A further change in the age pattern of fertility among Indians was evident in the 2007 census, in that the reduction in fertility was most prominent in the younger age groups 15-19 and 20-24 with a relatively small decline in fertility in the age group 25-29. As a result, age-specific fertility rates of women in the age groups 20-24 and 25-29 reached the same level, giving rise to a plateau, rather than a peak, in the age pattern of Indian fertility. These differences in patterns and trends reflect the fundamentally different demographic behaviours of the two ethnic groups.

The adolescent fertility rate (ages 15-19) is highly useful in the planning of reproductive health services to improve the health and well-being of adolescent mothers and their children. Motherhood at a very young age entails a risk of maternal mortality that far exceeds the average, and the children of young mothers tend to have higher levels of morbidity and mortality. Because adolescents are physiologically and socially immature, health risks associated with their pregnancies and childbearing tend to be more pronounced than are those among older women. Adolescent women also face increased risks during pregnancy and childbirth because they tend to have less information and access to prenatal, delivery and postpartum care as compared with older women.

Two distinct demographic trends coexist in the Asian and Pacific region that have important implications for the sexual and reproductive health of adolescents and youth. First, there is the widening gap between sexual maturity and age at marriage, which results in premarital sexual activities among adolescents in many countries of the region. The second trend is the continuing prevalence of adolescent marriage and the low use of contraceptives during adolescence, resulting in a high rate of adolescent fertility (Gubhaju, 2002).

Data presented in table 1 show that there has been a precipitous decline in adolescent fertility among both Fijians and Indians over time. In 1966, Indian adolescents had much higher fertility rate (95 per 1,000 women) than Fijian adolescents (55 per 1,000 women). There has been a rapid decline in adolescent fertility among Fijians and Indians between 1966 and 1976. Between 1976 and 1996, adolescent fertility fluctuated, increasing in 1986 and then decreasing again by 1996. The 2007 census recorded a sharp drop in adolescent fertility, which now stands at 37 per 1,000 women for Fijians and 35 for Indians.

Estimates of age-specific and total fertility rates based on own-children method

The Fiji census is among the very few censuses which collect data on the relationship of mothers with their own children. This information allows application of the so-called “own-children method” to estimate fertility trends over the 15 years preceding the census (Cho, 1973). In essence, the own-children method results in age-specific and total fertility rates for each of the 15 years preceding the census, based on data for mothers matched with their biological children. Reverse survival of these children, allows reconstruction of birth rates for the years in which those children were born by age of their mother, that is, age-specific fertility. See also the text box for further explanation of technical aspects of the own-children method.

The own-children method of fertility estimation

The input data required for the application of the own-children technique is the single-year age distribution of the population under 16 years of age by age of their mothers. This is used to create a matrix of children under 16 years of age corresponding to their own mothers aged 15 to 64. This also provides data on the number of children under 16 years of age who are not matched with the mothers, giving the estimate of non-own children. Based on this method, the age-specific fertility rates are estimated by the reverse projection of enumerated children to the time of their birth and the female population to each of the 15 years preceding the census in which the children were born. For the purpose of the reverse projection of enumerated children and female population from the Fiji census of 2007, the life expectancy at birth estimated around the year 2007 has been used. The advantage of this method is that it does not depend upon any assumption about fertility trends and is not very sensitive to assumptions about recent changes in mortality (United Nations, 1983). The sensitivity analysis carried out by Abassi-Shavazi (1997) using data from the 1991 census of Australia by place of birth has demonstrated that this method gives robust estimates of time trends in fertility under conditions of changing fertility and mortality during past years. Therefore, only one set of life expectancy at birth has been used in the reverse projection of the population and this is assumed to have remained constant during the period of study. As stated by Abassi-Shavazi (1997), this method has only a small effect on the fertility estimates where non-own children constituted 25 to 30 percent of all children. In the present census, the percentage of non-own children is below 20 percent.

Table 2. Trends in total fertility rates estimated by the application of own-children method by ethnicity, Fiji, 1966-2007											
Year	Total			Fijians				Indians			
	1986 census	1996 census	2007 census	1976 census	1986 census	1996 census	2007 census	1976 census	1986 census	1996 census	2007 census
1966				5.6				5.4			
1967				5.2				4.8			
1968				5.2				4.5			
1969				5.0				4.5			
1970				5.0				4.2			
1971				4.6				4.1			
1972	4.1			4.5	4.4			3.8	3.9		
1973	4.2			4.5	4.4			3.9	3.9		
1974	4.1			4.4	4.5			3.6	3.7		
1975	4.1			4.5	4.5			3.6	3.7		
1976	4.0			4.3*	4.3			3.5*	3.7		
1977	3.9				4.4				3.5		
1978	4.0				4.4				3.6		
1979	4.2				4.6				3.7		
1980	4.2				4.7				3.8		
1981	4.1				4.5				3.7		
1982	4.0	4.0			4.5	4.4			3.5	3.6	
1983	3.8	3.9			4.5	4.4			3.3	3.5	
1984	3.7	3.9			4.4	4.4			3.2	3.5	
1985	3.4	3.7			4.1	4.2			2.9	3.3	
1986	3.4*	3.5			4.1*	4.1			2.8*	3.1	
1987		3.5				4.1				2.9	
1988		3.1				3.7				2.6	
1989		3.0				3.7				2.4	
1990		3.2				3.8				2.6	
1991		3.3				4.0				2.7	
1992		3.4				4.0				2.8	
1993		3.3	3.1			3.8	3.5			2.7	2.8
1994		3.3	3.2			3.9	3.7			2.6	2.8
1995		3.3	3.2			3.9	3.6			2.6	2.6
1996		3.0*	3.0			3.7*	3.4			2.3*	2.5
1997			2.8				3.4				2.2
1998			2.8				3.4				2.1
1999			2.6				3.2				1.9
2000			2.9				3.6				2.0
2001			2.6				3.3				1.8
2002			2.6				3.3				1.7
2003			2.6				3.3				1.7
2004			2.6				3.3				1.8
2005			2.6				3.2				1.8
2006			2.6				3.2				1.8
2007			2.7				3.4				1.8

Note * The estimates in the year before the census are often low. [UN, 1983, p. 183].

Source: Fiji Census of Population and Housing, 1986, 1996 & 2007

Table 2 shows the total fertility rates derived from the own-children method. Results of the own-children method obtained from the previous censuses of 1976, 1986 and 1996 are also presented in this table and displayed in figures 3(a) and 3(b). As figure 3(a) shows yearly fluctuations in the estimated TFR obtained from the own-children method, a three-year moving average of TFR is presented in figure 3(b) which reveals a smooth trend in the TFR.

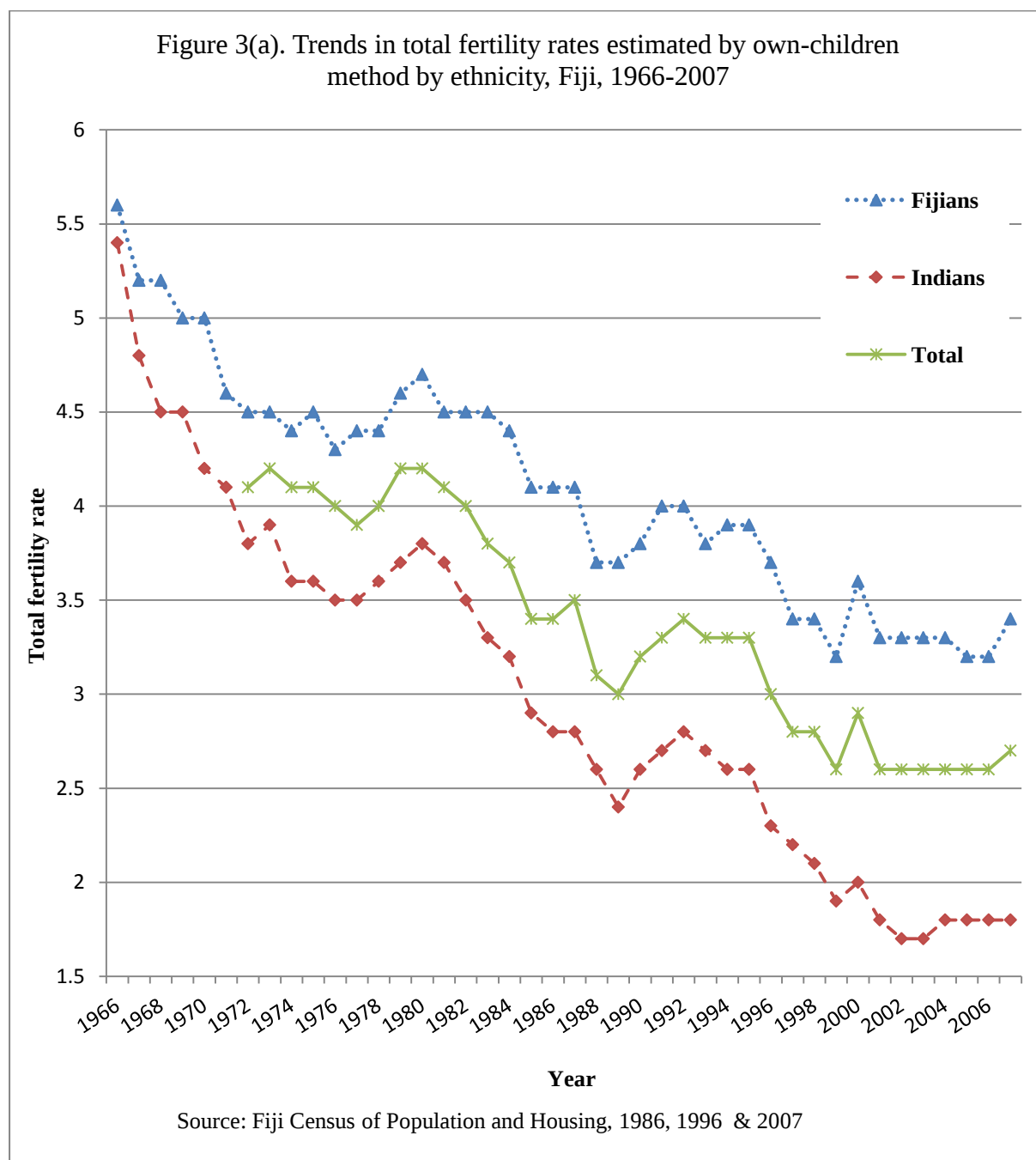
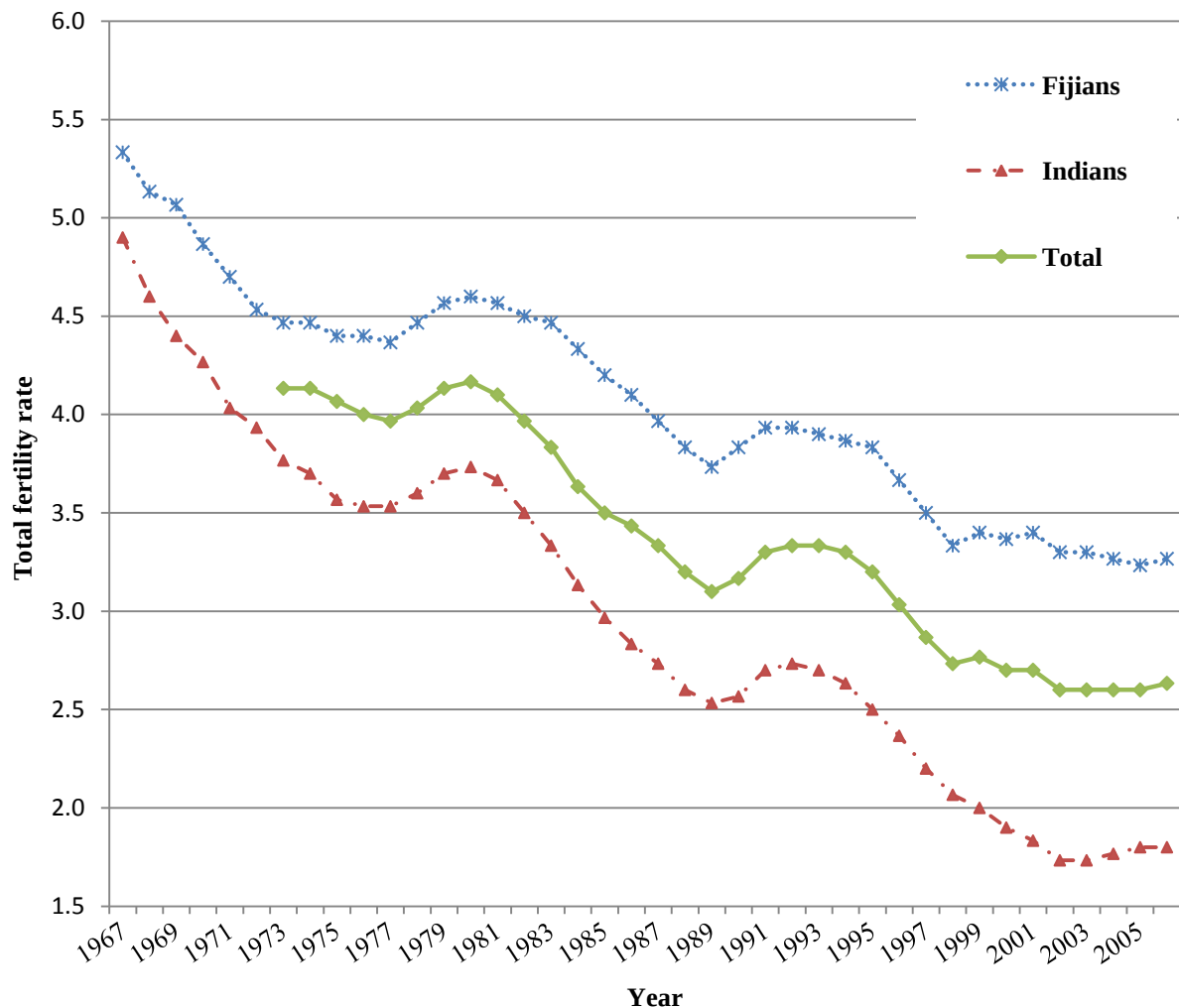


Figure 3(b). Trends in total fertility rates estimated by own-children method (three-year moving average) by ethnicity, Fiji, 1967-2006



Source: Fiji Census of Population and Housing, 1986, 1996 & 2007

Although minor fluctuations in the estimated TFR around the period of the census are evident, in general the estimated TFR based on all four Fiji censuses reveals a consistent trend of declining fertility from the mid-1960s to the present. It is to be noted that the TFR estimated from the own-children method shown in table 2 are almost identical with the TFR obtained directly from the census data on births during the year preceding the census (see table 1). The time trend in the estimated TFR confirms the findings regarding differentiation in the TFR along ethnic lines. Whereas ethnic differentiation in fertility rates was almost negligible in the mid-sixties, it has considerably widened, with the Fijian TFR above 3 children per woman and the Indian TFR below the replacement level in 2007. The TFRs and fertility age patterns estimated from the own-children method are found to be consistent with direct estimates from the census.

Age-specific and total fertility rates by urban-rural residence and woman's education

Using current estimates of fertility, this section examines fertility differentials by urban-rural residence and women's education among Fijians and Indians. It can be seen from table 3(a) that the total fertility rate for women in urban areas is close to replacement level at 2.3 children as compared to 3.1 children for women in rural areas. The ethnic differentiation in fertility is quite marked by areas of residence. The TFR of Fijian women in rural areas is 3.6 children per woman while that of Indian women in rural areas of Fiji is below the replacement level at 2.0 children. However, in urban areas the TFR of Fijian women is also relatively low at 2.7 children, which is nearly one child lower than that of their rural counterparts. By contrast, the TFR of Indian women in urban areas is not much lower than that of Indian women in rural areas at 1.8 children.

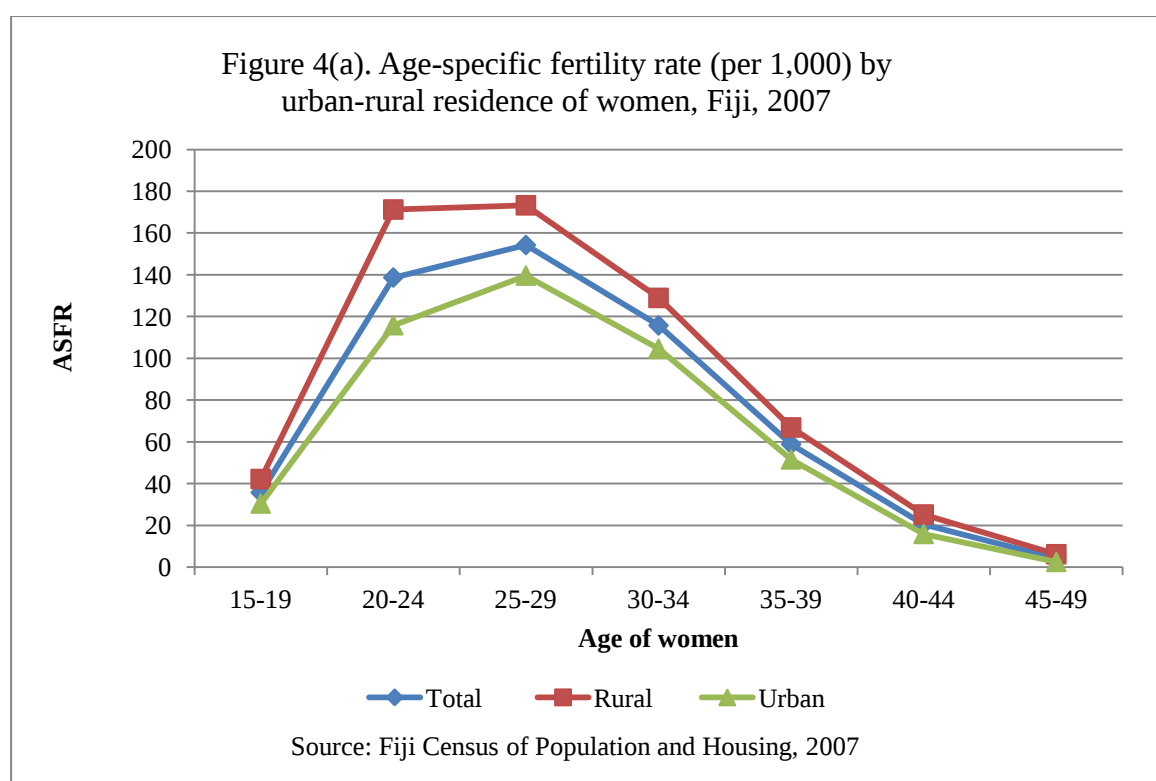
Table 3(a). Age-specific fertility rates (per 1,000) and total fertility rates by urban-rural residence of women, Fiji, 2007									
Age of Women	Total			Urban			Rural		
	Total	Fijians	Indians	Total	Fijians	Indians	Total	Fijians	Indians
15-19	36	37	35	30	28	35	42	46	35
20-24	139	153	121	116	124	106	171	186	145
25-29	154	180	120	140	163	115	173	197	128
30-34	116	146	69	105	131	69	129	159	69
35-39	59	84	22	52	76	21	67	92	23
40-44	20	31	6	16	23	6	25	37	6
45-49	4	7	2	3	4	1	6	10	2
TFR	2.64	3.18	1.87	2.30	2.75	1.77	3.07	3.63	2.04

Source: Fiji Census of Population and Housing, 2007

Table 3(b). Age-specific fertility rates (per 1,000) and total fertility rates by education of women, Fiji, 2007									
Age of Women	Primary			Secondary			Post Secondary		
	Total	Fijians	Indians	Total	Fijians	Indians	Total	Fijians	Indians
15-19	95	102	82	34	35	34	39	36	41
20-24	161	165	153	166	175	150	97	108	86
25-29	159	187	124	159	184	121	143	168	119
30-34	104	127	73	116	150	61	118	137	90
35-39	53	82	23	59	85	20	63	80	34
40-44	23	39	10	21	31	5	17	21	9
45-49	4	7	3	4	7	1	5	6	4
TFR	3.00	3.55	2.34	2.80	3.34	1.96	2.41	2.79	1.92

Source: Fiji Census of Population and Housing, 2007

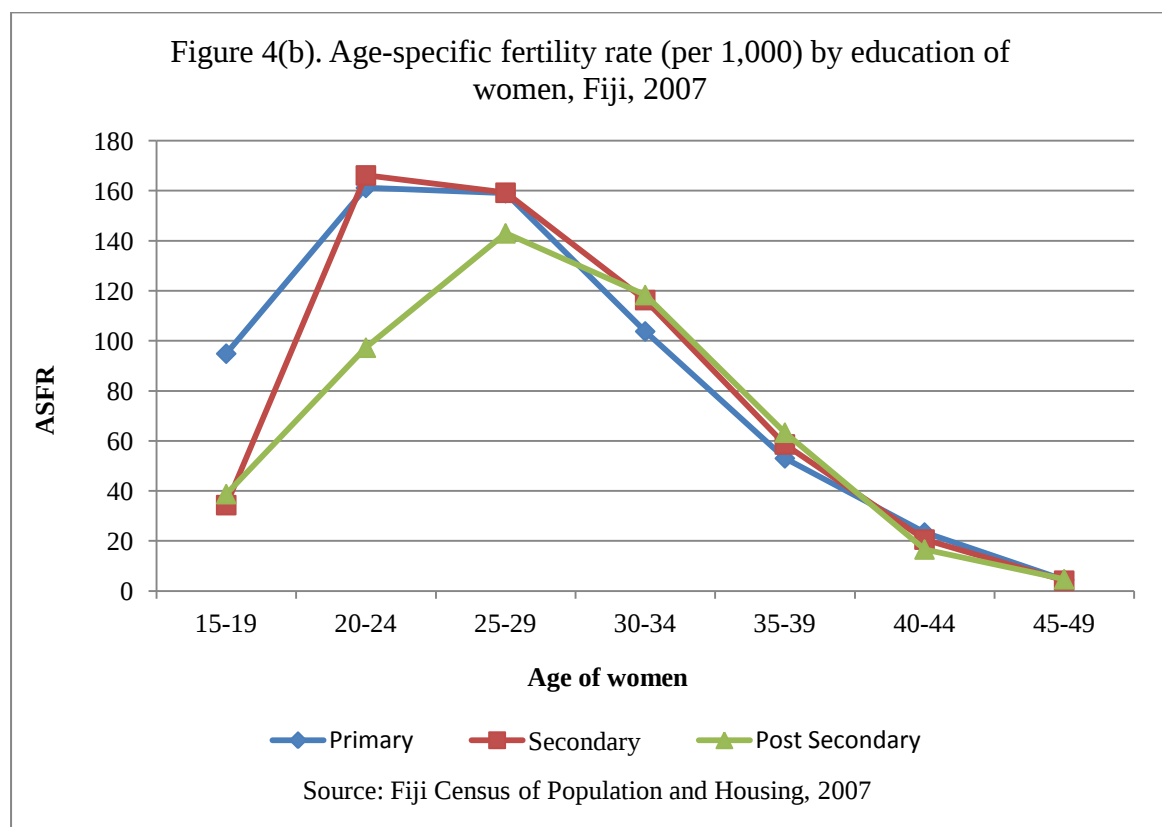
Differentials in fertility by educational attainment (the highest level of education that a person has achieved) of women are presented in table 3(b). As expected, women with post-secondary education have lower fertility at 2.4 children per woman as compared with 2.8 and 3.0 children per woman among those with secondary and primary educations, respectively. As with areas of residence, there is a marked ethnic variation in fertility by education of women. Fertility differentials by ethnicity decrease with the increase in education of women to post-secondary. For instance, among women with primary education, the TFR of Fijians is 3.6 as compared with the TFR of 2.3 among Indians, a difference of 1.3 children. Among women with secondary education, the ethnic variation remains the same, with the TFR of 3.3 among Fijians and slightly below 2 children among Indians. However, among women with post-secondary education, the gap between the TFR of Fijians and Indians is less than one child, with the TFR of 2.8 among Fijians and 1.9 among Indians. It is also worth noting that below-replacement fertility has been achieved by Indian women who have at least secondary education. Among Indian women with primary education the TFR is slightly above replacement level. This result clearly shows the impact of education on fertility level for the different ethnicity.



The age pattern of fertility by urban-rural residence and education of women is displayed in figures 4(a) and 4(b). Figure 4(a) shows that the age-specific fertility rates (ASFRs) are consistently higher for women in rural areas as compared to the ASFRs for women in urban areas, at each and every age group. The urban-rural difference is much wider in the prime age groups of 20-24 and 25-

29. It is also worth noting that the peak fertility for rural women spans across the age range 20-29, whereas for women in urban areas the peak fertility occurs at higher ages, among women aged 25-29. This is attributed to the observation that women in urban areas tend to marry late and consequently experience delayed childbearing as compared to their rural counterparts.

The age-pattern of fertility is quite distinct by educational level of women. While the age-specific rates of older women more or less converge by educational level, a noticeable difference is observed among younger women aged 15 to 29. Women with secondary and post-secondary education have the lowest adolescent fertility, which is less than 40 per 1,000 live births, whereas women with primary education have high adolescent fertility at 95 per 1,000 live births. Likewise, women aged 20-24 with post-secondary education have lower fertility (97 per 1,000 live births) as compared with their counterparts who had secondary and primary education (166 and 161 per 1,000 live births, respectively). It may also be noted from figure 4(b) that fertility reaches its peak at age groups 20-24 and 25-29 among women who had primary and secondary education, while among women with post-secondary education, peak fertility occurs at the age group 25-29. Irrespective of education, there is a precipitous drop in fertility of women after reaching age 30.



Decomposition analysis of fertility decline

As discussed previously, Fiji has witnessed a remarkable decline in fertility during the past 40 years. The total fertility rate dropped from a high level of around 5.5 children per woman in 1966 to 2.6 in 2007. The most striking aspect of the fertility transition in Fiji is its ethnic differentiation. While Fijians and Indians both started the transition from the same level of fertility in 1966, Indian women experienced a much more dramatic fertility decline than their Fijian counterparts. The 2007 census reveals that the TFR among Indian women has plummeted to below replacement level (1.9 children per woman) while the TFR among Fijian women remained relatively high at 3.2 children per woman.

In the present section the changes in the total fertility rate are decomposed into the sub-components of marital structure (proportions married at different ages) and marital fertility (the fertility of married women). This is done by means of a simple decomposition technique previously developed by Kitagawa (1955) and later adapted by Retherford and Ogawa (1978). Differences in relative contribution of either sub-component between Fijians and Indians may help explain how the differential trends came about. See text box on fertility decomposition technique.

Fertility decomposition

According to the technique, the total fertility rate can be written as: $TFR = 5\sum f_i$; also, $TFR = 5\sum M_i \cdot F_i$, where f_i is the age-specific fertility rate in the age group i , M_i is the proportion of women married in the age group i , and F_i is the age-specific marital fertility Rate (fertility of married women) in age group i . The changes in TFR can then be decomposed into components as follows:

$$\Delta TFR = 5\sum \bar{F}_i \cdot \Delta M_i + 5\sum \bar{M}_i \cdot \Delta F_i,$$

where the symbol Δ denotes changes and $\bar{F}_i$ and $\bar{M}_i$ are averages over the period, obtained by summing the beginning and end values and dividing by 2. From this equation, we obtain a sum of two components of changes in TFR: the first on the right hand side of the equation is the contribution of the changes in TFR due to changes in marital structure and the second indicates the changes in TFR due to changes in marital fertility. Each of the two components can also be broken down by five-year age groups.

This analysis is applied to data from the 1996 and 2007 censuses of Fiji. The results of the analysis carried out for Fijians and Indians are presented in Table 4.

Table 4. Decompositon of the changes in the total fertility rate by ethnicity, Fiji, 1996-2007

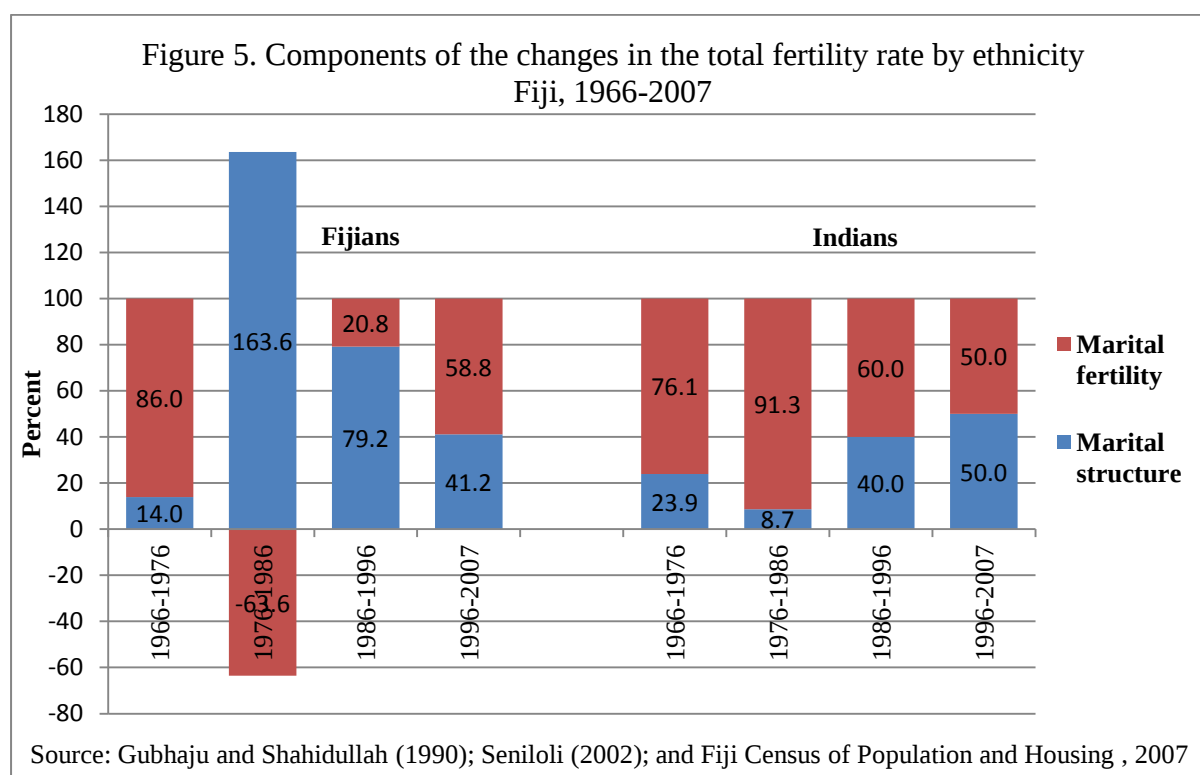
Total	ASFR per 1,000 women		Components of change		
Age of Women	1996	2007	Marital structure	Marital fertility	Total
15-19	54.0	35.7	8.8	9.5	18.3
20-24	195.0	138.7	35.7	20.6	56.3
25-29	185.0	154.2	14.6	16.2	30.8
30-34	124.0	115.7	6.8	1.5	8.3
35-39	61.0	58.8	1.0	1.2	2.2
40-44	25.0	20.4	-0.1	4.6	4.6
45-49	8.0	4.2	-0.1	3.8	3.8
TFR	3.26	2.64	333.4	287.6	621.0
			53.7%	46.3%	100%
Fijians	ASFR per 1,000 women		Components of change		
Age of Women	1996	2007	Marital structure	Marital fertility	Total
15-19	46.0	36.6	3.5	5.9	9.4
20-24	189.0	152.6	30.0	6.4	36.4
25-29	216.0	179.8	16.0	20.2	36.2
30-34	173.0	145.6	8.0	19.4	27.4
35-39	100.0	84.3	1.1	14.6	15.7
40-44	44.0	30.8	0.3	13.0	13.2
45-49	12.0	6.9	0.2	5.0	5.1
TFR	3.90	3.18	295.5	421.9	717.3
			41.2%	58.8%	100%
Indians	ASFR per 1,000		Components of change		
Age of Women	1996	2007	Marital structure	Marital fertility	Total
15-19	58.0	35.2	8.7	14.1	22.8
20-24	188.0	120.8	36.2	31.0	67.2
25-29	139.0	120.3	9.9	8.8	18.7
30-34	70.0	68.6	3.1	-1.7	1.4
35-39	23.0	22.1	0.2	0.8	0.9
40-44	8.0	6.1	-0.1	2.1	1.9
45-49	4.0	1.5	-0.1	2.6	2.5
TFR	2.45	1.87	288.7	288.4	577.1
			50.0%	50.0%	100%

Source: Fiji Census of Population and Housing, 1996 and 2007

Among Fijians, almost three-fifths of the fertility decline (0.7 children per woman) during the past decade is explained by changes in marital fertility. The remaining two-fifths of the decline is due to changes in marital structure. The analysis also shows that the fertility impact of changes in marital structure occur primarily among Fijian women in the age groups 20-29. Among Fijian women in the age groups 25 and above most of the fertility decline is due to changes in marital fertility.

Among Indians, marital fertility and marital structure are found to be equally important in accounting for the observed fertility decline (0.6 children per woman). Most of the fertility decline over the period 1996-2007 is observed for Indian women of ages 20-24 and the contribution of marital structure slightly outweighs that of marital fertility. Amongst the youngest age group of Indian women (15-19), changes in marital fertility are found to have had nearly twice the impact as compared to marital structure. In other words, the observed fertility decline among Indian adolescents is not so much due to fewer marriages, but rather due to limiting or postponing of childbearing.

It may also be noted that decomposition analyses were carried out by Gubhaju and Shahidullah (1990) using the 1966, 1976 and 1986 censuses and by Seniloli (2002) using the 1986 and 1996 censuses. Results of these studies are summarised in figure 5.



It is interesting to note that among Indians, marital fertility decline has been the dominant factor in triggering the decline in fertility throughout the 1966-2007 period. What is most striking is

that in the earlier phase of rapid fertility decline, three quarters of the decline during 1966-1976 and more than 90 percent of the decline during 1976-1986 can be explained by the reduction in marital fertility of Indian women, while changes in marital structure had very little effect. Although the contribution of marital fertility has reduced during the past decade, changes in marital fertility still explain half of the fertility decline which occurred during this period.

There is a remarkable difference in the relative contribution of marital structure and marital fertility in the overall fertility decline among Fijians. During 1966-1976, when Fijian fertility fell significantly, changes in marital fertility contributed the most, explaining 86 percent of the decline. By contrast, the next decade 1976-1986 saw a complete reversal in the relative contribution of marital structure and marital fertility to the Fijian fertility decline. The changes in marital fertility actually contributed to a rise in the total fertility rate, which was more than counterbalanced by the negative influence of the changes in marital structure. As a consequence, the total fertility rate of Fijians remained almost unchanged during 1976-1986. The relative contributions of marital structure and marital fertility to the changes in the total fertility rate of Fijians between 1986-1996 and 1996-2007 continued to shift. The changes in marital structure played a major role in the fertility decline during 1986-1996 but the decline in marital fertility contributed the most during the period 1996-2007.

The role of marital structure in the overall decline in fertility is explained by the fact that the mean age at marriage of Indian women increased from 20.3 years in 1966 to 21.1 years in 1976, remained unchanged in 1986 and increased further to 23.0 years in 2007. Whereas among Fijian women, the mean age at marriage fell from 22.4 years in 1966 to 22.1 years 1976 and then rose consistently to 23.4 years in 1986, 23.9 years in 1996 and 24.7 years in 2007 (table 5).

Table 5. Percentage currently married among women in reproductive age and singulate mean age at marriage (SMAM) by ethnicity, Fiji, 1966-2007										
Age of	Fijians					Indians				
Women	1966	1976	1986	1996	2007	1966	1976	1986	1996	2007
15-19	9.9	9.6	9.9	7.3	6.7	22.3	15.7	15.9	13.3	11.0
20-24	56.3	52.2	48.1	45.1	37.8	77.3	66.4	64.4	63.2	49.8
25-29	81.6	77.4	73.6	73.0	67.3	92.9	86.1	85.0	86.7	80.3
30-34	88.0	86.3	83.3	81.9	77.9	94.5	91.6	89.6	90.2	86.3
35-39	88.1	87.7	85.9	84.1	83.1	94.2	90.2	89.7	89.5	88.9
40-44	86.4	86.2	87.3	84.8	84.2	90.9	87.6	86.8	86.5	88.3
45-49	82.8	82.3	84.0	83.4	82.0	83.2	81.1	82.2	80.4	84.2
SMAM	22.4	22.1	23.4	23.9	24.7	20.3	21.1	21.6	21.6	23.0

Source: Fiji Census of Population and Housing, 1966 to 2007

Discussion of findings and conclusions

This paper has examined fertility levels and trends of Fijians and Indians over the past four decades. It has shown that fertility transition in Fiji started in the mid-sixties and both ethnic groups, Fijians and Indians, witnessed a sustained decline in fertility. The total fertility rate dropped from a high level of around 5.5 children per woman in 1966 to 2.6 in 2007. Reduction in fertility by more than half in four decades is significant. What makes the fertility transition in Fiji even more striking is its ethnic variation. While both Fijians and Indians started the transition at approximately the same level of fertility in 1966, the Indian population is way ahead in completing the transition as compared to their Fijian counterparts. Indian women experienced an accelerated decline in fertility. As a result, the gap between Fijian and Indian fertility widened considerably, with Indian fertility reaching 1.9 which is below replacement level, while Fijian fertility remains at a level of 3.2, a difference of more than one child per woman. It has also been found that there is a marked variation in the total fertility rate between women in urban and rural areas, with the TFR close to replacement level of 2.3 children per woman in urban areas as opposed to 3.1 in rural areas.

Educational attainment of women is found to have impacted on fertility levels and patterns. Women with post-secondary education have a TFR of 2.4 children per woman while women with secondary and primary education have higher TFRs, of 2.8 and 3.0 children per woman, respectively. Overall, however, the fertility differentials between educational levels are less pronounced than those between ethnic groups.

The results of the decomposition analysis showed that the decline in marital fertility made the greatest contribution to the decline in the total fertility rate of both ethnic groups during the decade 1966-1976. During the decades 1976-1996, marital fertility declined very little among Indians, and increased slightly among Fijians (table 6). However, during the recent period 1996-2007, marital fertility decline has been the most important factor in reducing fertility among both Fijians and Indians. During this period, the total marital fertility rate declined from 8.7 children per woman to 7.5 among Fijians and from 5.1 children per woman to 4.0 among Indians.

The changes in marital structure have also played a crucial role: they tended to reduce fertility among Indians during the 1966-1976 decade, but their effect was almost negligible during the 1976-1986 decade. Their contribution has gained momentum during the 1996-2007 decade. Changes in marital structure played a pivotal role in the reduction of fertility among Fijians, particularly in 1976-1986 decade. In the recent decade, however, changes in marital structure among Fijian women have become less important.

Table 6. Marital age-specific fertility rates (per 1,000) and total marital fertility rates (TMFR) by ethnicity, Fiji, 1966-2007										
Age of Women	Fijians					Indians				
	1966	1976	1986	1996	2007	1966	1976	1986	1996	2007
15-19	556	438	626	630	546	426	338	390	436	320
20-24	510	454	439	419	404	426	367	321	297	243
25-29	396	332	308	296	267	322	253	191	160	150
30-34	270	202	205	211	187	215	123	89	78	79
35-39	168	113	123	119	101	130	54	32	26	25
40-44	8	43	46	52	37	53	16	12	9	7
45-49	83	5	13	14	8	7	1	6	5	2
TMFR	9.88	7.93	8.80	8.71	7.75	7.89	5.76	5.20	5.06	4.13

Source: Fiji Census of Population and Housing, 1966 to 2007

Recommendations for further study

This study has examined the fertility transition in Fiji over the past four decades and its ethnic variations, using data from 1966 census to the latest 2007 census. Decomposition analysis has been carried out to identify the contribution of marital structure and marital fertility to the changes in fertility between Fijians and Indians. Due to the nature of data collected in the census, it was not possible to determine covariates of fertility decline or causal factors, such as contraceptive prevalence and unmet need for family planning, or utilization of health services, affecting fertility between Fijians and Indians. It is to be noted that there has been no demographic survey conducted in Fiji after the Fiji Fertility Survey in 1974, which was carried out in collaboration with the World Fertility Survey (Bureau of Statistics, 1976). It is, therefore, recommended to undertake an in-depth survey, such as Demographic and Health Survey in Fiji which would permit detailed analysis of fertility, child mortality and reproductive health. This would also allow in-depth study of socio-economic, demographic and health factors affecting fertility and identification of proximate determinants of fertility, such as use of contraception, postpartum amenorrhea, age at marriage and abortion.

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