Papers of the
East-West Population Institute, no. 66

Prevalence and demographic significance of contraceptive sterilization in Fiji, the Republic of Korea, and Sri Lanka

Charles F. Westoff,
Noreen Goldman,
and Minja Kim Choe

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Number 66 • April 1980

PAPERS OF THE EAST-WEST POPULATION INSTITUTE

CHARLES F. WESTOFF is Professor of Demographic Studies and Sociology at Princeton University and Director of the Office of Population Research, Princeton University.
NOREEN GOLDMAN is a Research Associate at the Office of Population Research, Princeton University, and Research Demographer for the World Fertility Survey, London.
MINJA KIM CHOE is a doctoral candidate in public health, University of Hawaii, and formerly Data Analysis Officer, East-West Population Institute.

Library of Congress Cataloging in Publication Data

Westoff, Charles F
Prevalence and demographic significance of contraceptive sterilization in Fiji, the Republic of Korea, and Sri Lanka.

(Papers of the East-West Population Institute ; no. 66)
Bibliography: p.
1. Sterilization (Birth control)–Fiji Islands. 2. Sterilization (Birth control)–Korea. 3. Sterilization (Birth control)–Sri Lanka. 4. Fiji Islands–Population. 5. Korea–Population. 6. Sri Lanka–Population. I. Goldman, Noreen, joint author. II. Choe, Minja Kim, 1941- joint author. III. Title. IV. Series: East-West Population Institute. Papers of the East-West Population Institute ; no. 66.
HQ767.7.W47 363.9'7'09519 80-14805

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PREFACE

A summary of this Paper was presented at the Workshop on Methodological Aspects of Demographic Analysis of Sterilization, sponsored jointly by the International Union for the Scientific Study of Population (IUSSP) Committee on Comparative Analysis of Fertility and the East-West Population Institute, and held at the East-West Center in September 1979. The authors wish to acknowledge the contribution of the following persons from the East-West Population Institute: Ruby Bussen for programming assistance, Gregory Chu for graphics, and Siew-Ean Khoo for the section on "Availability of Sterilization." Funds for the preparation of this Paper were provided by the Office of Population, Agency for International Development.

ABSTRACT This paper presents estimates of the probability of being contraceptively sterilized and of births averted by sterilization based on World Fertility Survey data for Fiji, the Republic of Korea, and Sri Lanka. The estimates are for the early history of sterilization during the first half of the 1970s. Sterilization diffused earlier in Fiji, later in Sri Lanka, and even later in Korea, although it has since spread very rapidly in Korea. In this early period, the probability of becoming sterilized by 30 years of marriage was 0.54 in Fiji, 0.38 in Sri Lanka, and 0.17 in Korea. Couples electing sterilization had higher past fertility than other couples. They also tended to live more in urban areas and never to have used contraceptive methods. About two thirds of the operations occurred when the wife was 25–34 years of age. On the assumption that sterilized couples, if they had not been sterilized, would have had the same fertility as other couples of the same marriage duration, births averted by sterilization are estimated to be 0.8 for Fiji, 0.3 for Korea, and 0.7 for Sri Lanka.

In view of rapidly increasing rates of contraceptive sterilization throughout the world, Westoff et al. (1979) recently developed a standard set of procedures for the analysis of its prevalence and demographic significance for application to data collected in the World Fertility Survey (WFS). Their model was developed with data from Panama, a country having particularly high rates of sterilization. The present report is an application of some of the model procedures to three additional countries—Fiji, the Republic of Korea, and Sri Lanka. These three countries have lower but nevertheless substantial sterilization rates, rates that have undoubtedly increased since the WFS was undertaken. Sterilization rates are demonstrably higher in Korea now than at the time of the WFS in 1974,[1] and they have presumably also increased in Fiji since 1974 and in Sri Lanka since 1975. The substantive interest in this analysis lies in tracing the growth and demographic implications of contraceptive sterilization in the early years of its history.

1 According to Koh et al. (1979), the number of sterilizations performed in the government program increased from 37,368 in 1974 to (an estimated) 230,320 in 1978.

AVAILABILITY OF STERILIZATION

There are no legal sanctions against sterilization in Fiji, Korea, or Sri Lanka. Both male and female sterilization procedures are offered in the national family planning programs of the three countries. Because sterilization is a surgical procedure and can be performed only by trained physicians in a suitable medical setting, however, it is unlikely to be available uniformly in all regions of the countries.

Male and female sterilization is offered by the medical department of Fiji and its family planning program. That it has become the most commonly used method among currently married women who want no more births attests to its wide availability in that country. The Fiji Fertility Survey has found that regional, rural-urban differentials in the prevalence of sterilization are minor for the Indian population. But the prevalence among Fijians in the rural areas and the northern region is lower, and it has been suggested in the report on the Fiji Fertility Survey of 1974 that "perhaps the relatively greater geographical isolation of the Fijian compared to the Indian community with consequently reduced access to hospital facilities partially accounts for these variations" (Fiji, Bureau of Statistics, 1976:92). Unfortunately, the Fiji Fertility Survey produced no data with which we can test this hypothesis.

Vasectomy has been available as a program method in Korea since 1962. when the family planning program was initiated. Female sterilization was first offered in the program in 1972, and since 1976 the program has given special emphasis to sterilization as a means of contraception. Private physicians who have undergone training by the program are authorized to perform the sterilization procedures. Physicians' fees are subsidized by the program, and since 1976 sterilization has been available at no cost to the acceptor who goes to a program-designated physician. As of mid-1978, 1,060 doctors were authorized to provide vasectomy services, 472 trained to perform laparoscopy, and 526 trained in the minilap technique (Hong, 1979). Currently about half of the authorized physicians are stationed in the cities, and the remaining work in rural areas, where the majority of Koreans live. Sterilization is therefore less accessible to the rural population and this imbalance is reflected in the urban-rural prevalence differential (shown in Table 1). The introduction of 95 new laparoscopes into the rural areas in 1979 should increase the availability of female sterilization in those areas (Koh et al., 1979).

In Sri Lanka, sterilization is also more accessible to the urban than to the rural population because the procedure is performed in govern-

ment hospitals or by private physicians in nursing homes, most of which are in the urban areas. The operation is available free through the family planning program, but the consent of the acceptor and the acceptor's spouse is required and acceptors must have a minimum of three living children.

DATA AND DEFINITIONS USED IN ANALYSIS

Information on sterilization was obtained in the WFS interviews either from responses to questions on contraceptive methods currently being used, or in response to a question asked of women who could not have a (another) child as to whether they or their husbands had had an operation at least in part to prevent additional childbearing (Fiji, Bureau of Statistics, 1976; Korea, National Bureau of Statistics and Korean Institute for Family Planning, 1977; Sri Lanka, Department of Census and Statistics, 1978). A couple's motive to elect sterilization may be exclusively contraceptive or it may involve medical considerations as well. For our analysis, we have included operations reported to have been motivated only in part by contraceptive considerations as well as operations reported to be solely contraceptive in intent. Since contraceptive sterilization accounts for the overwhelming majority of all surgical sterilization cases,[2] there would be only slight increases in prevalence rates, concentrated primarily at the older ages, had we analyzed all sterilizing surgery. Noncontraceptive operations occur primarily at older ages, and therefore their inclusion would have had little significance for births averted.

The prevalence of male sterilization varies considerably across the three countries. In Korea two-thirds of the contraceptively sterilized were male as of 1974—though this proportion has declined dramatically in more recent years; in Sri Lanka only 6 percent were male; and in Fiji less than 1 percent were male. Our analysis covers both male and female operations in the measurement of sterilization rates, although it focuses on the demographic characteristics of female acceptors.

We employ two definitions of the population at risk. Most calculations are based on the total samples of ever married women; accordingly, the temporal dimension of risk is represented by years since first marriage. Another denominator, "currently married, fecund women who want no more births," is used for some purposes because it ap-

2 Contraceptive operations comprised 86 percent of all sterilizations in Korea and 95 percent in Sri Lanka. The prevalence of noncontraceptive sterilizing surgery could not be determined for Fiji.

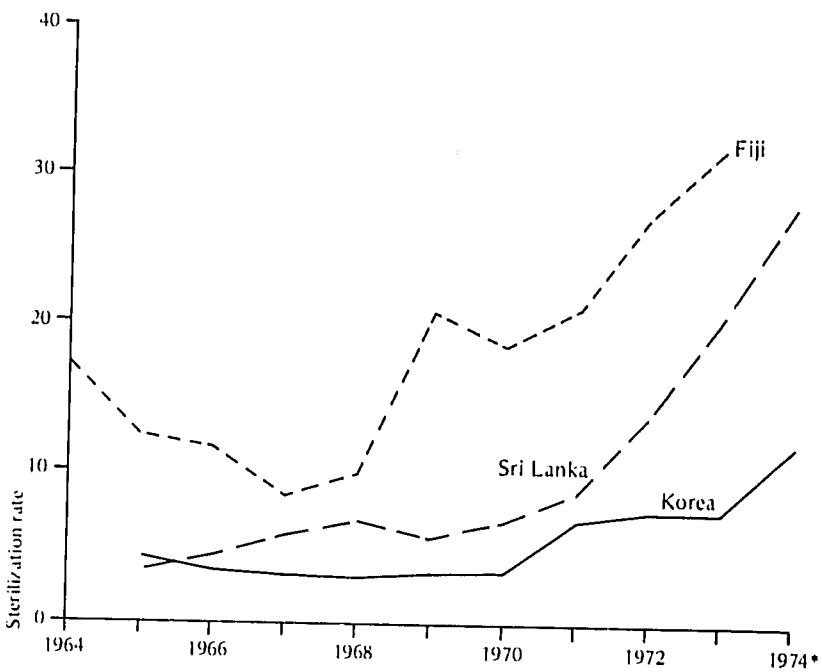
proximates more closely the concept of a population at risk for contraceptive sterilization. The denominator of "all ever married women" is the more interesting for overall demographic purposes, whereas that of "currently married, fecund women who want no more births" is the more refined for the analysis of correlates of sterilization.

FINDINGS

Prevalence of contraceptive sterilization

Trends in the rate of sterilization for the three countries are depicted in Figure 1 as an annual series of rates for the decade 1964–74. These sterilization rates have been reconstructed from the dates of sterilization reported in the WFS interviews. Because the surveys did not interview women over 49 years of age, rates reconstructed for a period x

FIGURE 1 Annual sterilization rates (male and female) per 1,000 ever married women aged 20–39, during ten years prior to World Fertility Survey



* Rates for Korea are based on only ten months' exposure in 1974.

years ago are restricted to women under 49 - x years of age. To avoid a truncation bias, the rates in Figure 1 for each given year are expressed as the number of (male and female) contraceptive sterilizations per 1,000 ever married women aged 20–39 (as of the midpoint of the year).

The takeoff point occurred earliest in Fiji, accelerated rapidly, and had reached the highest level of the three countries by 1974. In Sri Lanka and Korea, the growth started later and proceeded more gradually, but it sharply accelerated in the last few years. As already noted, the growth in sterilization rates has been very pronounced in Korea since 1974, so that Korea may conceivably now have a higher rate than the other two countries.

The proportions sterilized by marriage duration[3] are shown in Figure 2 according to two measures: simple and synthetic. The "simple" measure is the proportion sterilized by current marriage duration–that is, the proportion of women (couples) at each duration who were sterilized at any time prior to the date of interview. The "synthetic" measure represents the proportion of women (couples) sterilized as implied by the duration-specific rates prevailing in the five years preceding the interview. The synthetic measure projects the distribution of sterilization on the assumption that women will continue to experience recent sterilization rates throughout their lifetimes. As Figure 2 indicates, the synthetic rates are substantially higher than the simple rates in each country. Since the popularity of sterilization has increased considerably in recent years in all three countries (Figure 1), this finding could have been anticipated. The decline in simple proportions sterilized through the higher marriage durations in Sri Lanka and Korea most probably reflects the recency of sterilization in these countries. That is, women married for longer periods spent many of their childbearing years during a time when interest in and availability of sterilization were limited. In Fiji, the synthetic cumulative probability of becoming sterilized within 30 years after first marriage reaches 0.54, considerably higher than the values of 0.38 in Sri Lanka and 0.17 in Korea. It is important to stress that these are hypothetical values projected from the duration-specific sterilization rates observed for the five-year period preceding the survey (1970–74 or 1971–75).

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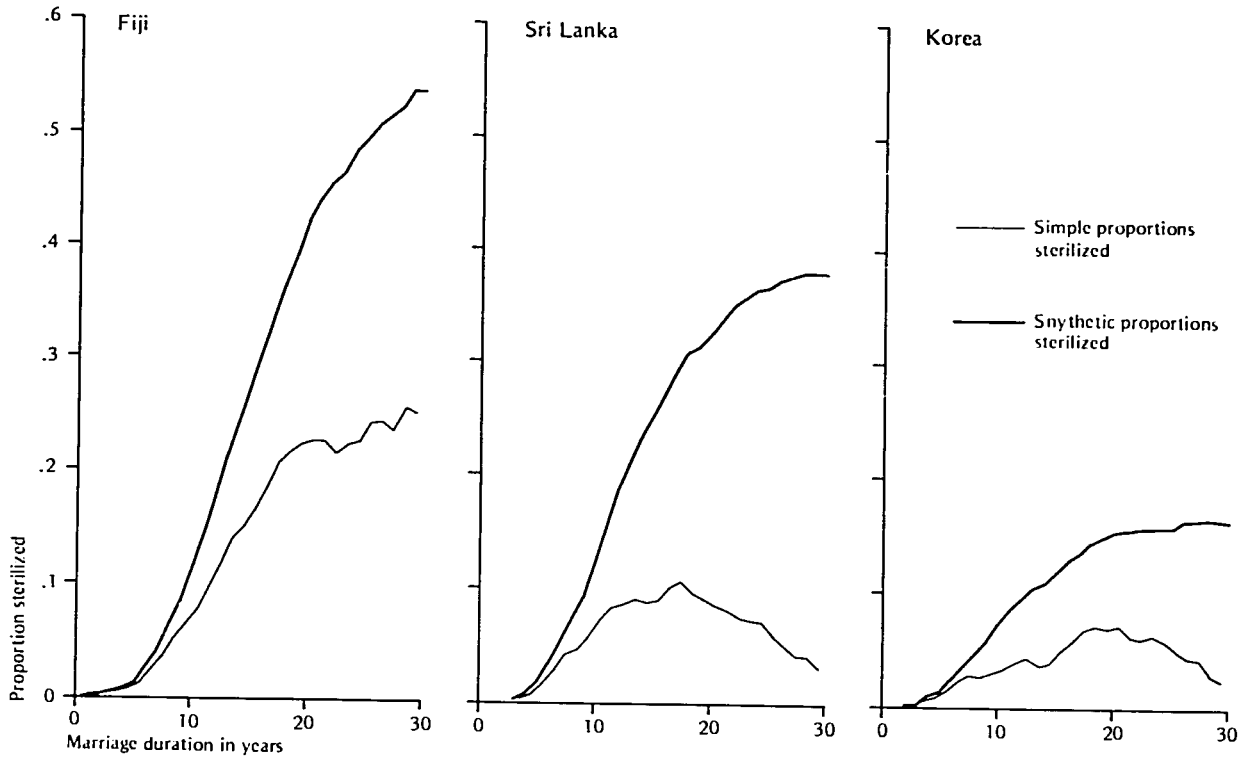
3 The measures requiring estimates of unwanted fertility that were also developed in the WFS report on Panama are not used here because such data were not available in the Fiji survey.

FIGURE 2 Proportions sterilized by marriage duration



Characteristics of the sterilized

Are certain groups in the population more likely than others to elect sterilization? Are any group differentials common to all three countries? These questions are approached in Tables 1 and 2. In Table 1, the percentage sterilized among currently married, fecund women who wanted no more births is calculated for a variety of life-cycle and social characteristics, and is compared with the percentage using other efficient methods of contraception (pill, IUD, diaphragm, other female "scientific" methods, and the condom). This comparison is intended to elucidate the difference between selection of a permanent highly effective method and selection of other highly effective but nonpermanent methods. In Table 2, the cumulative synthetic probabilities of ever married couples becoming sterilized, based on sterilization rates in the most recent five-year period, are shown at five-year intervals for many of the same variables. These synthetic rates offer a more contemporaneous picture of the characteristics associated with sterilization than the simple percentages shown in Table 1. Since Tables 1 and 2 contain a great amount of detail, we will simplify the discussion by focusing initially on Fiji, which had the highest prevalence rates for the period under examination. Because of the longer history of sterilization in Fiji, the structure of associations may be more stable.

We found a direct relationship to exist between the percentage sterilized and the age of women and duration of marriage. This pattern was exactly reversed for the percentage using other efficient methods. Such complementarity simply indicates that women in Fiji used the pill and other methods in the early years and tended to shift to sterilization in the later years. It is important to keep in mind that the denominator in Table 1 is women who wanted no more births.

There was a distinct tendency in Fiji for women who married at older ages (Tables 1 and 2) and for women whose first birth occurred at older ages (Table 1) to experience lower sterilization rates and a slight tendency for such women to rely disproportionately on other efficient methods. This pattern was not simply a function of duration of marriage; the synthetic rates in Table 2 show this association at 20, 25, and 30 years of marriage.

Two fertility variables—number of children ever born and number of births in the first five years of marriage—are included in both tables. The proportions sterilized tend to increase up to parity 5 or 6 and then to flatten out in Fiji and Sri Lanka and to decline in Korea. This nonmonotonic pattern has at least two plausible explanations: Women in the highest parities spent much of their reproductive period during

TABLE 1 Percentage of currently married, fecund women wanting no more births who were contraceptively sterilized or using other efficient methods, by various social and demographic characteristics

Characteristics	Percentage sterilized			Percentage using other efficient methods			Number of women		
	Fiji	Korea	Sri Lanka	Fiji	Korea	Sri Lanka	Fiji	Korea	Sri Lanka
All characteristics	35.6	8.0	17.7	19.6	31.7	42.2	2,057	3,098	3,436
Age of women									
15–19	0.0	*	3.1	23.8	*	41.9	21	1	25
20–24	4.0	0.8	5.6	23.1	15.4	34.8	173	123	280
25–29	25.3	3.2	17.4	23.3	28.2	41.0	387	618	594
30–34	40.1	7.4	20.8	21.0	33.8	34.7	514	849	797
35–39	42.5	9.4	20.5	18.8	39.4	43.3	452	819	814
40–44	42.3	10.4	19.0	17.1	27.6	47.6	345	536	538
45–49	50.3	19.7	13.7	9.7	20.4	55.4	165	152	387
Years of marriage									
0–4	3.6	1.2	4.0	23.2	17.4	33.2	138	327	210
5–9	16.8	6.4	13.6	22.3	31.4	31.6	328	739	645
10–14	35.0	7.6	22.9	25.6	36.0	38.3	434	656	782
15–19	41.0	8.7	19.6	18.9	39.8	45.7	439	653	738
20–24	45.5	11.4	21.2	16.9	29.6	45.6	378	422	563
25–29	48.0	13.6	14.6	14.5	24.7	56.4	227	235	373
30 or more	51.4	13.8	10.3	6.4	21.5	59.6	109	65	124
Age at first marriage									
<15	47.9	6.1	16.6	14.8	26.5	54.0	384	49	530
15–17	37.2	8.8	19.7	18.9	31.1	43.5	725	531	1,007
18–19	33.4	8.5	17.2	19.8	33.9	41.3	470	743	609
20–21	27.3	6.5	16.4	21.9	31.2	38.4	256	794	490
22–24	20.6	7.6	17.2	27.1	29.8	37.3	155	722	425
≥25	28.4	10.4	16.7	26.9	28.6	34.5	67	259	375

Age at first birth									
⩽15	49.2	*	16.7	15.2	*	56.3	244	8	227
16–17	38.4	8.4	18.7	19.1	31.8	50.8	424	107	447
18–19	37.6	11.5	18.3	17.7	32.8	43.0	528	476	677
20–24	30.7	7.0	17.8	22.0	32.6	40.0	701	1,950	1,353
⩾25	21.1	8.8	17.2	23.8	28.4	36.6	128	545	703
Children ever born									
0–1	5.7	0.6	1.6	6.8	6.3	40.1	88	158	187
2	7.5	6.3	4.3	27.1	32.1	36.9	199	495	432
3	14.8	9.5	15.1	28.2	32.7	38.5	284	698	564
4	32.7	9.7	19.1	20.6	36.3	40.8	306	647	565
5	41.1	7.2	23.6	21.7	30.6	43.9	314	461	472
6	51.8	10.5	24.7	15.7	36.6	42.2	255	305	383
7	51.4	7.8	22.7	16.7	32.2	44.1	216	180	287
8	46.6	6.7	19.2	13.7	24.4	49.3	146	90	234
⩾9	52.2	1.6	24.6	14.5	27.0	50.8	249	63	311
Births in first 5 years									
0	33.9	*	12.1	15.2	*	51.5	118	16	123
1	31.4	10.1	13.5	17.3	29.3	60.6	341	710	676
2	35.5	17.8	17.3	22.2	35.3	43.5	785	1,538	1,602
3	43.7	15.1	26.5	18.0	38.3	33.3	538	337	729
⩾4	48.2	*	25.3	16.8	*	37.5	137	15	78
Contraceptive history									
Used efficient method	27.5	5.9	15.0	na	na	na	1,174	2,093	851
Used only inefficient method	36.8	8.4	13.9	na	na	na	288	166	885
Never used	50.9	13.1	20.7	na	na	na	595	873	1,720
Wanted status of last child									
Wanted	36.9	7.0	8.2	18.5	30.8	42.1	1,302	1,708	1,719
Not wanted	33.4	9.1	9.5	21.6	32.7	41.8	751	1,390	1,678

TABLE 1 *(continued)*

Characteristics	Percentage sterilized			Percentage using other efficient methods			Number of women		
	Fiji	Korea	Sri Lanka	Fiji	Korea	Sri Lanka	Fiji	Korea	Sri Lanka
Current residence									
Urban	36.6	9.6	22.7	21.1	31.7	33.4	795	1,855	662
Rural	35.1	5.5	16.2	18.5	31.6	42.8	1,256	1,243	2,480
Literacy									
Yes	31.5	9.2	19.1	20.5	32.2	36.8	1,430	2,574	2,540
No	44.9	5.7	13.7	17.7	29.3	58.0	621	522	894
Years of education[a]									
None	46.0	7.4	14.0	15.5	30.5	58.0	530	594	753
1–5	40.3	4.4	17.4	21.9	34.4	45.0	397	366	1,410
6–9	30.9	6.1	19.5	20.1	33.7	32.6	964	1,310	860
⩾10	18.1	12.8	21.4	24.1	28.2	24.4	166	822	413

* Percentage not calculated because of small number of cases in this category.

na—not applicable.

a Categories only approximately equal across countries.

TABLE 2 Synthetic cumulative probability of contraceptive sterilization by years since first marriage, for ever married women by selected characteristics

Country and characteristic	Years since first marriage					
	5	10	15	20	25	30
FIJI						
All characteristics	.011	.111	.275	.422	.493	.539
Place of residence						
Suva	.006	.080	.238	.345	.386	.466
Other urban	.029	.178	.350	.539	.594	.665
Rural	.006	.098	.261	.403	.485	.514
Age at marriage						
<15	.000	.030	.167	.369	.508	.574
15–17	.004	.109	.303	.470	.547	.579
18–19	.007	.131	.332	.466	.506	.533
20–21	.010	.106	.251	.376	.395	.409
⩾22	.026	.105	.171	.245	.274	.274
Births in first 5 years						
<2	.000	.022	.092	.212	.293	.387
2	.002	.081	.282	.469	.538	.578
>2	.054	.265	.449	.571	.633	.637
Children ever born						
0–2	.001	.013	.020	.041	.070	.070
3–4	.020	.131	.231	.308	.345	.390
⩾5	.438	.519	.557	.594	.594	.594
Years of education						
None	.078	.217	.425	.527	.625	.663
1–4	.010	.133	.287	.467	.529	.599
5–7	.013	.104	.245	.386	.434	.455
8	.006	.099	252	.407	.430	.458
⩾9	.005	.042	.187	.381	484	.484
Ethnic group						
Fijian	.007	.056	.170	.295	.334	.339
Indian	.015	.163	.372	.533	.619	.674
Other	.000	.000	.128	.322	.382	.382
Religion						
Methodist	.008	.059	.194	.323	.377	.389
Catholic	.000	.014	.065	.155	.155	.155
Hindu	.000	.165	.369	.538	.620	.673
Islam	.036	.153	.366	.495	.598	.658
Other	.020	.116	.281	.493	.532	.532

TABLE 2 *(continued)*

Country and characteristic	Years since first marriage					
	5	10	15	20	25	30
KOREA						
All characteristics	.012	.073	.119	.153	.159	.167
Place of residence						
Urban	.017	.102	.168	.204	.206	.211
Rural	.000	.015	.035	.069	.079	.090
Age at marriage						
<18	.000	.032	.048	.076	.090	.099
18–19	.000	.023	.075	.114	.114	.114
20–21	.003	.059	.103	.134	.134	.156
22–24	.014	.082	.144	.193	.193	.193
⩾25	.035	.166	.206	.206	.206	.206
Births in first 5 years						
<2	.000	.039	.082	.111	.125	.128
2	.016	.078	.130	.164	.164	.183
>2	.013	.111	.131	.201	.201	.201
Children ever born						
0–2	.015	.049	.072	.072	.072	.072
3–4	.007	.082	.148	.181	.193	.193
⩾5	.000	.009	.035	.079	.084	.096
Education						
None	.000	.027	.070	.115	.124	.131
<6	.000	.033	.055	.069	.069	.069
6	.000	.035	.073	.102	.111	.116
7–9	.026	.110	.176	.210	.210	.319
⩾10	.027	.187	.282	.345	.345	.345
Religion						
None	.004	.044	.073	.106	.114	.120
Buddhist	.031	.096	.153	.183	.188	.203
Protestant	.017	.165	.296	.355	.355	.355
SRI LANKA						
All characteristics	.016	.121	.251	.324	.369	.380
Place of residence						
Urban	.030	.161	.344	.415	.453	.460
Rural	.015	.110	.232	.300	.346	.355
Estate	.000	.120	.197	.310	.352	.390

TABLE 2 *(continued)*

Country and characteristic	Years since first marriage					
	5	10	15	20	25	30
SRI LANKA *(continued)*						
Age at marriage						
<15	.007	.087	.207	.308	.356	.375
15–17	.008	.103	.275	.362	.437	.452
18–19	.015	.120	.261	.352	.360	.363
20–21	.004	.135	.276	.342	.362	.362
⩾22	.029	.133	.216	.236	.275	.275
Births in first 5 years						
<2	.000	.039	.118	.170	.208	.211
2	.007	.124	.263	.340	.386	.404
>2	.040	.217	.390	.479	.526	.533
Children ever born						
0–2	.008	.014	.036	.046	.050	.050
3–4	.028	.181	.260	.284	.284	.284
5–6	.000	.132	.353	.419	.447	.456
⩾7	.000	.011	.185	.327	.405	.522
Years of education						
None	.004	.079	.153	.259	.297	.315
1–5	.013	.099	.250	.317	.363	.374
6–9	.008	.135	.293	.350	.407	.410
⩾10	.042	.177	.260	.330	.390	.390
Ethnic group						
Sinhalese	.020	.140	.280	.348	.395	.403
Sri Lanka Tamil	.007	.086	.192	.262	.295	.301
Indian Tamil	.000	.079	.179	.292	.337	.375
Sri Lanka Moor	.021	.053	.130	.203	.241	.261
Religion						
Buddhist	.022	.136	.283	.353	.402	.411
Hindu	.004	.083	.167	.259	.301	.325
Moslem	.020	.051	.131	.202	.238	.256
Christian	.000	.152	.276	.325	.345	.345

years when sterilization rates were low; and women who became sterilized tended to elect the operation before they reached the highest parities, so that women with more than six births may actually have been less interested in terminating fertility than women of lower parity. A more systematic pattern is evident in the number of births during the first five years of marriage. In Sri Lanka, for example, the

synthetic probability of being sterilized within 30 years of marriage (Table 2) rises from 0.21 for women with fewer than two births in the first five years to 0.40 for those with two, to 0.53 for women with more than two births in the early years of marriage.

Whether persons electing to be sterilized for contraceptive reasons are drawn primarily from a population already using contraception or not should be of considerable interest to those working in family planning programs. The evidence (Table 1) indicates that the probability of being sterilized was greater in all three countries for those who had never used any method of contraception. In Fiji and in Korea, but not in Sri Lanka, there is some further evidence that couples using the most efficient methods were less likely to elect sterilization than those using inefficient methods.

There is no evidence that the wanted status of the last birth was related to the decision to be sterilized. Women whose last birth was wanted were just as likely to become sterilized as those whose last birth was unwanted. This appears to be a consequence of the finding that prior to sterilization, sterilized couples had higher rates of both unwanted and wanted fertility than nonsterilized couples.

We also explored the implications of the sex composition of living children and found a slight tendency for Koreans whose last child was male to be more likely to be sterilized or using more efficient methods of contraception. No such relationship existed for Fiji or Sri Lanka. Because of the small number of couples sterilized by 1974 in Korea, we did not undertake a more detailed analysis that would hold constant parity and vary the number of sons.

The data in Tables 1 and 2 suggest that Koreans and Sri Lankans living in rural areas were less likely to be sterilized than those in urban areas, as might be expected from the tendency of medical facilities to be located in urban areas. But in Fiji the lowest sterilization rates were found in the capital city (Table 2). The isolation of rural areas thus appears to depend in part upon the geographic size of the country.

The relationships of literacy (Table 1) and years of education (Tables 1 and 2) to sterilization frequencies show interesting contrasts in the three countries examined. In Korea and Sri Lanka, there was a positive association, with the largest percentages sterilized found among women with more than nine years of education (Table 1). In Fiji, however, higher sterilization rates were associated with less education, uneducated or illiterate women showing the highest rates.

Table 2 includes information on ethnicity and religion. In Fiji,

Indians were twice as likely as Fijians to elect sterilization (by 30 years of marriage), the respective probabilities being 0.67 and 0.34. This ethnic difference may be related to differentials in education; the Indians had a much lower educational achievement than the Fijians. In Sri Lanka, the Sri Lanka Moors showed the lowest sterilization rates and the Sinhalese the highest.

We found no particular pattern by religion across countries. In Fiji, the Hindu and Islamic populations showed the highest sterilization rates and the Catholics the lowest, but in Sri Lanka the Moslems had the lowest and the Buddhists the highest sterilization rates. In Korea, the Protestant minority had the highest rate and those reporting no religion the lowest.

Timing of sterilization

That contraceptive sterilization is a recent phenomenon is indicated in Table 3 by the finding that more than half of the procedures occurred in the first four or five years after 1970. In Sri Lanka, over three quarters of the operations took place after 1970, but the survey occurred approximately a year later there than in the other two countries.

There is a roughly similar pattern across countries in the age at which sterilization was elected, with about two thirds of the couples undergoing the operation when the wife was between ages 25 and 34. Because of the later age at marriage in Korea, fewer Koreans in the youngest age groups, but a higher proportion in the early years of marriage, were sterilized. Furthermore, the parity distribution at the time of sterilization was lower in Korea: parities 3 and 4 were much more common than the higher parities in Korea, whereas in Fiji and Sri Lanka there was an approximately even distribution at higher parities (4 to 7 in Fiji and 3 to 7 in Sri Lanka).

In Fiji and Sri Lanka most sterilizations were postpartum, 71 percent and 64 percent, respectively. In Korea, on the other hand, only 10 percent of the sterilizations were postpartum, another 30 percent occurred in the remaining part of the first year following the last birth, and 43 percent occurred in the next three years. This reversal in Korea was undoubtedly due to the preponderance of vasectomies there (two thirds of all sterilizations being vasectomies).

The last panel in Table 3 indicates that Fijian couples were most likely to opt for sterilization immediately after the birth of the last wanted child.

TABLE 3 Percentage distribution of sterilized couples by timing of contraceptive sterilization

Timing	Fiji	Korea	Sri Lanka
Year of operation			
1970 or later[a]	54.9	58.6	76.6
1965–69	26.4	21.7	17.7
1960–64	16.0	19.3	4.7
1955–59	2.3	0.4	0.9
1950–54	0.4		0.0
All years	100.0	100.0	100.0
Age (women) at sterilization			
<25	13.6	0.8	7.4
25–29	24.3	28.1	30.5
30–34	34.7	43.4	30.8
35–39	19.5	23.3	22.7
≥40	7.9	4.4	8.7
All ages	100.0	100.0	100.0
Years of marriage			
<5	2.3	6.4	5.2
5–9	19.8	32.1	25.9
10–14	33.4	31.7	34.8
15–19	26.0	20.5	19.2
≥20	18.6	9.2	14.9
All years	100.0	100.0	100.0
Parity			
<3	3.1	12.8	4.5
3	5.6	26.5	14.1
4	13.4	26.1	17.0
5	17.2	13.2	18.1
6	18.2	12.4	15.2
7	15.0	6.0	10.9
8	9.2	2.4	7.2
9	7.1	0.4	5.5
≥10	11.3	0.2	7.5
All parities	100.0	100.0	100.0
Interval (months) since last birth[b]			
<1	71.2	10.4	63.8
1–12	13.0	30.1	18.8
13–24	2.9	16.5	4.1
25–36	2.5	14.1	3.6
37–48	1.9	12.4	2.4
49–60	1.6	7.2	2.6
≥61	6.8	9.2	4.7
All intervals	100.0	100.0	100.0

TABLE 3 *(continued)*

Timing	Fiji	Korea	Sri Lanka
Interval (months) since last wanted birth			
0	52.7	30.9	30.0
1–12	10.3	6.4	10.2
13–24	7.6	8.4	10.0
25–36	8.4	11.6	13.0
37–48	5.2	8.8	8.3
49–60	2.7	5.6	7.4
⩾61	13.0	28.3	21.1
All intervals	100.0	100.0	100.0

NOTE: Percentages may not sum to 100 because of rounding.

a The surveys were conducted in 1974 in Fiji and Korea and in 1975 in Sri Lanka; thus the percentages sterilized since 1970 are not precisely comparable.

b Confined to women with at least one birth.

Births averted by sterilization

Of ultimate demographic interest is the effect of sterilization on the fertility rate. The effect depends on several factors, including the extent to which the method is used, the remaining exposure to the risk of pregnancy of those electing the method, and the assumption one makes about what the fertility of sterilized couples would have been in the absence of sterilization. We begin this analysis in Table 4, which compares the fertility of the nonsterilized with that of the sterilized prior to the operation.

Table 4 reveals that, except in Korea, the fertility of those subsequently sterilized was appreciably higher than for couples never sterilized. At the ages of completed fertility (45–49), the mean number of children ever born among sterilized couples in Fiji and in Sri Lanka exceeded by roughly 1.5 to 2.0 births the fertility of those never sterilized. Similarly, at marriage durations of completed fertility, sterilized couples had 1.2 to 1.5 more children than nonsterilized couples in Fiji and Sri Lanka. In Korea, there is only a slight fertility difference between the two groups, with nonsterilized couples generally showing higher fertility than sterilized couples. However, a more refined comparison (years of exposure among women wanting no more children) reverses the difference in Korea and shows higher fertility for the sterilized in all three countries. For sterilized couples, exposure was defined as the interval between the date of first marriage and the date of the operation; for nonsterilized couples, exposure was defined simply as the number of years married.

TABLE 4 Mean number of children ever born to ever married women by current age and years of marriage and to women wanting no more births by years of exposure to the risk of childbearing, for contraceptively sterilized and nonsterilized couples

Country and exposure factor	Sterilized	Nonsterilized	Difference
FIJI			
Current age			
25–29	4.60	2.53	2.07
30–34	5.62	3.85	1.77
35–39	6.59	4.70	1.89
40–44	7.52	5.72	1.80
45–49	7.71	6.26	1.45
Years of marriage			
5–9	4.15	2.47	1.68
10–14	5.11	3.59	1.52
15–19	6.13	4.67	1.46
20--24	6.86	5.28	1.58
25–29	7.69	6.27	1.42
⩾30	8.36	7.14	1.22
Years of exposure (among those wanting no more)			
<5	3.47	1.68	1.79
5–9	4.62	2.95	1.67
10–14	5.86	4.26	1.60
15–19	7.06	5.42	1.64
20–24	8.64	6.31	2.33
⩾25	7.97	7.44	0.53
KOREA			
Current age			
25–29	3.05	2.04	1.01
30–34	3.25	3.41	-0.16
35–39	4.06	4.46	-0.40
40–44	4.93	5.19	-0.26
45–49	5.53	5.90	-0.37
Years of marriage			
5–9	2.87	2.71	0.16
10–14	3.56	3.77	-0.21
15–19	4.00	4.50	-0.50
20–24	4.72	5.20	-0.48
25–29	6.16	5.56	0.50
⩾30	*	6.35	*

TABLE 4 *(continued)*

Country and exposure factor	Sterilized	Nonsterilized	Difference
KOREA *(continued)*			
Years of exposure (among those wanting no more)			
<5	2.19	1.66	0.53
5–9	3.09	2.85	0.24
10–14	4.25	3.90	0.35
15–19	5.45	4.66	0.79
⩾20	5.96	6.05	-0.09
SRI LANKA			
Current age			
25–29	4.22	2.38	1.84
30–34	5.10	3.58	1.52
35–39	5.86	4.74	1.12
40–44	6.92	5.35	1.57
45–49	7.78	5.85	1.93
Years of marriage			
5–9	3.55	2.35	1.20
10–14	4.61	3.59	1.02
15–19	6.03	4.63	1.40
20–24	7.03	5.59	1.44
25–29	8.17	6.34	1.83
⩾30	8.36	6.90	1.46
Years of exposure (among those wanting no more)			
<5	2.79	1.31	1.48
5–9	3.93	2.74	1.19
10–14	5.39	3.85	1.54
15–19	7.03	4.88	2.15
20–24	8.63	5.83	2.80
⩾25	8.53	6.69	1.84

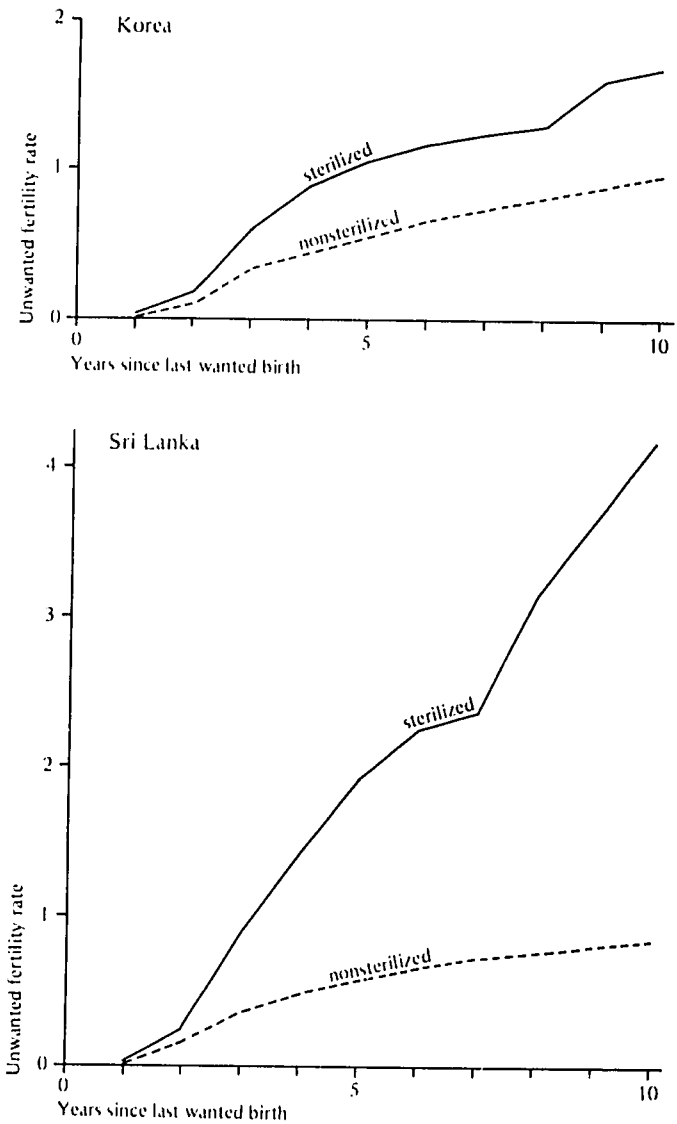
NOTE: For sterilized couples exposure is defined as years married at the time of the operation; for couples not sterilized, exposure is simply number of years married.

* Average not calculated because of small number of cases in this category.

It appears from these comparisons that couples who chose contraceptive sterilization were self-selected for high fertility. Further evidence for this hypothesis is shown in Figure 3, which indicates a higher rate of unwanted fertility[4] for Korea and rather dramatically

4 The definition of unwanted fertility used in this study and the procedures for measuring it are described in Westoff et al. (1979) and in Westoff (forthcoming).

FIGURE 3 Cumulative unwanted fertility rate per nonsterilized exposure, by duration since last wanted birth, for sterilized and nonsterilized women



for Sri Lanka among women subsequently sterilized. (Because of inadequate measures of unwanted fertility, this analysis could not be undertaken for Fiji.) In Sri Lanka, the number of unwanted births ten years after the last wanted birth exceeded four among sterilized couples, compared with less than one unwanted birth among nonsterilized couples. (The comparison is based on unwanted fertility rates in the most recent five-year period).[5] Another analysis for Sri Lanka (not shown) indicates that both wanted and unwanted fertility was higher for the sterilized. For example, among Sri Lankan women with at least 25 years of exposure to the risk of childbearing (see previous paragraph for definition of exposure), the sterilized had 6.7 wanted and 1.9 unwanted births. In contrast, nonsterilized women with the same exposure had 5.6 wanted and 1.1 unwanted births.

That Korean sterilized couples showed much less selectivity for higher fertility than Fijian and Sri Lankan couples turns out to be, at least in part, the result of the extensive reliance of Koreans on abortion. When the comparison in Table 4 is made for women reporting ever or never having had an abortion, higher fertility for sterilized couples emerges clearly among those without a history of abortion. For example, among couples without reported abortions, the sterilized couples had an average of 0.60 births (the unweighted mean across years of exposure) more than nonsterilized couples, compared with an excess for sterilized couples of only 0.10 births among those reporting at least one abortion. In fact, an analysis of more recent Korean data from 1976 and 1978 surveys currently under way indicates that sterilization has a significant potential for averting abortions.

Although couples who chose sterilization had higher fertility at the same exposure intervals than couples who had not been sterilized, this finding does not answer the question of whether sterilized couples would have continued to experience higher fertility if they had not been sterilized. One could argue that their motivation to elect sterilization might have been transferred to other effective methods and consequently the assumption that their high fertility would have continued leads to an exaggeration of the number of births averted by sterilization.

The assumption used in our estimates of births averted (Table 5 and Figure 4) is that the sterilized couples would have experienced the

5 We have made the same calculation for Panama with a similar result: The number of unwanted births per nonsterilized exposure interval ten years after the last wanted birth was 2.9 for sterilized couples and 1.2 births for nonsterilized couples.

TABLE 5 Births averted per woman by years since first marriage, based on sterilization rates and birth rates in the most recent five-year period

Years since marriage	Cumulative births averted		
	Fiji	Korea	Sri Lanka
1	0.00	0.00	0.00
5	0.01	0.01	0.00
10	0.08	0.06	0.09
15	0.27	0.15	0.29
20	0.52	0.22	0.51
25	0.69	0.27	0.66
30	0.78	0.30	0.71

same marriage duration-specific fertility as observed for nonsterilized couples, in the absence of sterilization. These duration-specific fertility rates resulted from the combination of contraceptive and noncontraceptive practice actually observed in the population of nonsterilized couples. Although this assumption seems more defensible than some earlier methodologies, which assume a constant natural fertility schedule in the absence of sterilization, it has the drawback that some of the births occurring to nonsterilized couples are wanted births and sterilization theoretically can avert only unwanted births. The implication of this assumption is that the resulting estimates of births averted may be too high. On the other hand, the selectively high fertility of the sterilized may compensate for this overestimate.

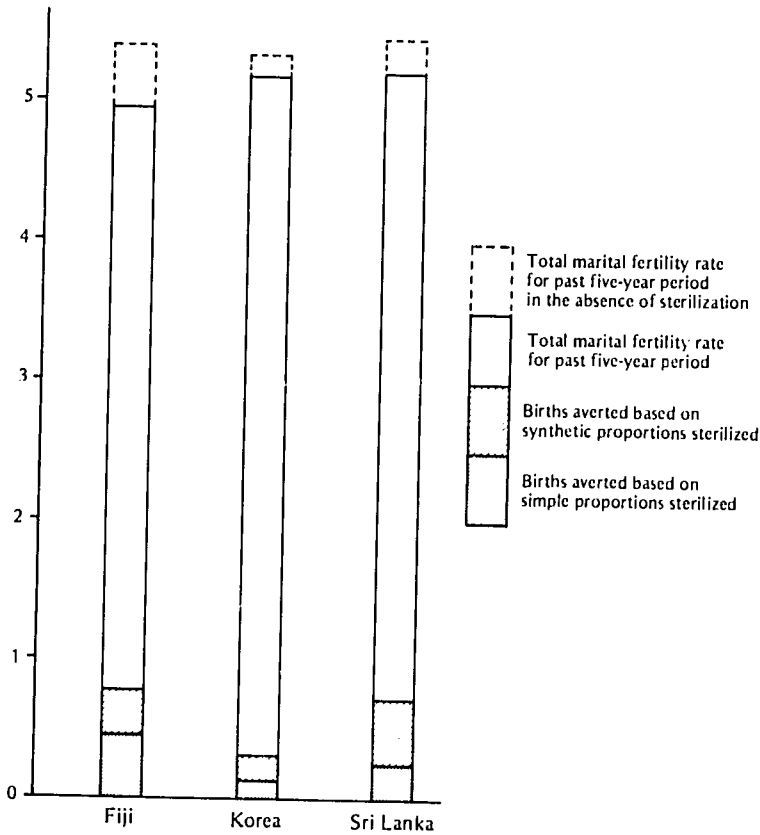
An alternative assumption is that, in the absence of sterilization, sterilized couples would have experienced the unwanted birth rates of nonsterilized couples who wanted no more births. However, the unwanted birth rates shown in Figure 3 indicate that this assumption would result in a large underestimate of births averted, because couples who eventually were sterilized appear to have been less successful at controlling their fertility than other couples. We have estimated the number of births averted for Korea and Sri Lanka using both sets of assumptions (it was not possible to calculate unwanted birth rates for Fiji). Estimates based on marriage duration-specific birth rates are presented in Table 5 and Figure 4; estimates based on unwanted birth rates are discussed briefly below. It is likely that the "true" estimate of the number of births averted falls somewhere between these two measures.

The estimates presented in Table 5 are based on the assumption that women were subject to recent fertility rates and sterilization rates (those of the last five-year period) throughout their reproductive careers. The results for Fiji and Sri Lanka are similar. In both countries, sterilization is estimated to have averted approximately three-quarters of a birth per woman by 30 years of marriage. In Korea, as a result of the low sterilization rates observed for the 1969–74 period, less than one-third of a birth theoretically would have been averted by the end of a woman's reproductive span.

The demographic implications of contraceptive sterilization are summarized in Figure 4. The measure of births averted based on the simple proportion of women sterilized indicates the amount by which the total marital fertility rate would have been higher in the most recent five-year period had no sterilizations occurred in the past. (The total marital fertility rate is defined as the sum of the marriage duration-specific birth rates during a specified period, calculated for all ever married women.) The measure of births averted based on the synthetic proportion of women sterilized represents the number of additional births that a cohort would have by the end of its reproductive career (30 years of marriage) were it subject to both the sterilization rates and the marital fertility rates of the most recent five-year period. Because sterilization rates have been increasing in all three countries, the second measure of births averted is consistently greater than the first.

The total height of each bar in Figure 4 indicates the hypothetical size of the total marital fertility rate in the absence of sterilization. As described above, it equals the sum of the estimate of births averted based on the actual proportions sterilized (the bottom segment of each bar) and the observed total marital fertility rate (the height of the bar excluding the dotted segment). The simple measures of births averted by 30 years of marriage equal 0.4, 0.1, and 0.2 for Fiji, Korea, and Sri Lanka, respectively. Expressing these measures differently, we note that, in the absence of sterilization, the total marital fertility rates for the five-year periods prior to the surveys would have been approximately 9 percent, 3 percent, and 3 percent higher, respectively. The synthetic measures of births averted yield somewhat higher estimates–0.8, 0.3, and 0.7 births averted per woman for Fiji, Korea, and Sri Lanka, respectively. These measures, which are based on the assumption that the sterilized would have experienced the marriage duration-specific birth rates of the nonsterilized in the absence of sterilization, are considerably greater than the corresponding measures

FIGURE 4 Births averted and total marital fertility rate in the past five years, after 30 years of marriage



based on the assumption that the sterilized would have experienced the unwanted birth rate of women who wanted no more births. Specifically, the latter assumptions yield synthetic measures of births averted by the end of a woman's reproductive career of only 0.1 for Korea and 0.3 for Sri Lanka. There is no way to determine which of these procedures provides a more realistic estimate of what must remain a largely theoretical calculation. Nevertheless, the calculations presented here provide a range of estimates useful for program planning purposes.

SUMMARY

We have examined the early (1970–75) experience of three countries—Fiji, Korea, and Sri Lanka—with contraceptive sterilization, a method of fertility regulation that promises to spread rapidly throughout the world. The data for these countries are from the World Fertility Survey; the methodology was developed in an earlier illustrative analysis of WFS data from Panama.

Our analysis reconstructs annual sterilization rates and calculates the cumulative probability of sterilization by duration of marriage for synthetic marriage cohorts, reflecting the experience of the five years preceding the survey. It is clear that sterilization spread earlier in Fiji, somewhat later in Sri Lanka, and even later in Korea, although subsequent studies indicate a very rapid growth in Korea in more recent years. The rates of the early 1970s imply, for ever married couples, an ultimate probability of becoming sterilized of 0.54 in Fiji, 0.38 in Sri Lanka, and 0.17 in Korea. Only in Korea do male sterilizations figure prominently; the large increase that has occurred in Korea in the last few years, however, has been largely in female sterilizations.

In all three countries, couples electing contraceptive sterilization tended to have higher fertility, especially in the early years of marriage, to live in urban areas, and never to have used contraceptive methods. Other correlates vary by country. The most interesting of these is education, which was positively related to sterilization in Korea and Sri Lanka, but negatively related in Fiji. In Fiji, the Indian population showed a much higher probability of electing sterilization than the Fijians, a difference related to the finding that educational achievement was much lower in the former group.

Analysis of the timing of sterilization shows a similar age distribution in the three countries, with about two-thirds of the operations occurring when the wife was 25–34. Most sterilizations were postpartum in Fiji and in Sri Lanka, but in Korea (where vasectomies predominated) the timing was spread over several years after the last birth.

The main demographic interest in sterilization is in assessing its significance for the reduction of fertility. At the core of this problem is the nature of the assumption that one makes about the unknown (and unknowable) level of fertility that sterilized couples would have had in the absence of sterilization. On the one hand, our analysis clearly indicates that the past fertility of sterilized couples was appreciably higher than that of other couples, at all intervals of exposure to risk. On the other hand, one could argue that the high level of motivation that led to sterilization might have led to the use of other effective

methods if sterilization had not been available. These two assumptions have opposite implications for estimates of births averted. The procedure actually followed assumes that sterilized couples would have had the same fertility as those not sterilized. One type of calculation combines the marriage duration-specific sterilization and fertility rates of the past five years and produces estimates of births averted for synthetic marriage cohorts, assuming a continuation of such rates. The numbers of births averted by these estimates were 0.8, 0.3, and 0.7 for Fiji, Korea, and Sri Lanka, respectively.

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