Strength of Fertility Motivation: Its Effects on Contraceptive Use in Rural Sri Lanka

Rates of contraceptive use are high and indicate that the contraceptive revolution is well on its way to completion

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Although questions on family size desires have been included routinely in fertility surveys for several decades, questions that attempt to assess the strength of those desires have been much less common. For example, neither the World Fertility Surveys nor the Contraceptive Prevalence Surveys included

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such questions. The on-going round of Demographic and Health Surveys include questions on strength of fertility motivation, but analyses of the effect of strength of motivation on contraceptive use have not yet been reported.

Quite recently, the effects of strength of fertility motivation on contraceptive use have been analyzed by Retherford, Tuladhar and Thapa (1988), based on data from Nepal's 1986 Fertility and Family Planning Survey.

The authors found that after selected demographic and socio-economic characteristics were controlled, the effect of strength of fertility motivation on current contraceptive use was still substantial and highly statistically significant. However, they also found that the background variables largely captured the effect of motivational strength on current use when motivational strength was deleted from the model, inasmuch as measures of global fit declined only slightly as a consequence of the deletion.

The analysis indicated that respondents' demographic and socio-economic background characteristics affect motivational strength, so that motivational strength does not have a large independent effect on use.

Because rates of contraceptive use are very low in Nepal, it is of interest to replicate the Nepal analysis in a population with higher rates of use. In this article, the replication for Sri Lanka is carried out based on data from Sri Lanka's 1985-86 Rural Family Planning Survey.

Essentially the same questions on strength of fertility motivation that were included in Nepal's 1986 Fertility and Family Planning Survey were also included in Sri Lanka's 1985-86 Rural Family Planning Survey.

Data and methodology

Sri Lanka's 1985-86 Rural Family Planning Survey (RFP Survey) was fielded during the period August 1985 to February 1986 by the Family Planning Association of Sri Lanka in collaboration with Family Health International.

The survey utilized a two-stage stratified random sample design with probability proportional to size. Eligible respondents were defined as currently married women under 45 years of age. Ultimately 3,253 interviews were successfully completed.

However, the sample, which covered 30 rural villages, is not completely representative of rural Sri Lanka. Because of political disturbances, it was decided to exclude some districts in the north-eastern part of the country.

Moreover, the sample was limited to Sinhalese, who constitute about three-fourths of Sri Lanka's population.

The sample covered three of the six socio-economic and ecological zones, as defined by the Sri Lanka Department of Census and Statistics (1978), and 17 of the 24 districts of Sri Lanka.

The analysis was limited to currently married women aged 20-44 who were fecund and currently non-pregnant at the time of the survey, including those who were unsure about whether they were pregnant. Fecund women are subjectively defined as those who thought it physiologically possible for them to have another child, as far as they knew. Pregnant women were excluded from the analysis because their strength of motivation to have another child was likely to be influenced by the perception of being already pregnant.

Sterilized women were also excluded, because they were not asked the questions on strength of fertility motivation. The exclusion of sterilized women represents selection on the dependent variable of contraceptive use, which probably biases the results of our analysis. Since women who very strongly do not want another child are especially likely to get sterilized, the nature of the bias is probably to reduce the measured effect of strength of fertility motivation on use of modern contraceptive methods. Therefore, the results reported in this article probably err on the conservative side in terms of magnitude of reported effects.

The sample was further limited by screening for consistency of responses to the question on desire for additional children. Some women whose desired number of children was fewer than or equal to the number of their living children nevertheless said that they wanted more children. And some women whose desired number of children was greater than the number of their living children nevertheless said that they wanted no more children. Women who gave inconsistent responses of this kind, numbering 152, were also omitted. The final sample on which the analysis is based numbers 1,548 women.

The dependent variable in our analysis is current use of contraception, including both modern and traditional methods. The RFP Survey made special efforts to collect data on traditional methods of contraception, because of evidence that traditional methods account for a substantial proportion of contraception in Sri Lanka (see, for example, Caldwell *et al.,* 1986). Traditional use comprises mainly the safe-period method, which is the indigenous version of the calendar rhythm method, and withdrawal. The analysis of current use excludes sterilized women, who were not asked the questions on strength of fertility motivation.

The principal independent variable is strength of fertility motivation. This variable, which is called relative preference intensity (RPI), is based on two questions intended to assess how strongly respondents felt about having or not having another child.

Women who answered "yes" to the question: "Do you want to have any/another child sometime?" were then asked: "Would you say that your desire to have children/more children is not very strong, strong, or very strong?" Women who answered "no" to the first question were asked: "Would you say that your desire not to have any more children is very strong, strong, or not very strong?"

Responses were coded into relative preference intensity scores as follows:

Response	RPI score
Want another child	
Very strongly	+3
Strongly	+2
Not very strongly	+1
Undecided	0
Want no more children	
Not very strongly	-1
Strongly	-2
Very strongly	-3

In our analysis of the determinants of contraceptive use, RPI is only one of several explanatory variables. The multivariate analysis includes additional demographic and socio-economic variables because we wish to know whether RPI contributes to explanation over and above the effect of demographic and socio-economic variables usually considered important in analyses of the determinants of contraceptive use.

The control variables comprise variables known or thought to influence contraceptive use. They include respondent's age, number of living children, marital duration, age at first marriage, work status, a couple wealth index, and an areal measure of the level of economic and social development.

Most of these variables are self-explanatory; however, the couple wealth index and the areal measure of development require further explanation. The couple wealth index is computed as a sum of household amenities, where a given

amenity is scored as 1 if the amenity is present and 0 otherwise. The amenities selected for inclusion in the index are electricity, cement floor, tile/asbestos roof, brick or cement wall, permanent toilet and indoor tap-water. Therefore, the index ranges from 0 to 6. The scores are grouped into low (0,l), medium (2, 3) and high (4, 5, 6). A composite variable was used instead of separate items because of problems of collinearity among the individual items.

The areal development variable refers to a classification of geographic zones, based on multiple socio-economic and ecological characteristics, as defined by the Sri Lanka Department of Census and Statistics (Sri Lanka Department of Census and Statistics, 1978). As already mentioned, the RFP Survey covers three of the six zones of the country, namely Zones 2, 3 and 6. Zone 3 is inland in the southeastern part of the country and is characterized as being low in its level of development. Zone 6 is upcountry in the north-central part of the country and is characterized as at a medium level of development. Zone

Table 1: Mean desired family size by demographic and socio-economic characteristics for currently married, fecund, non-pregnant women aged 20-44 who report relative preference intensity (RPI): Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Mean	SD	N
Demographic			
Respondent's age (years)			
20-24	2.8	0.81	246
25-29	3.0	0.95	408
30-34	3.2	1.06	373
35-39	3.3	1.21	320
40-44	3.7	1.43	201
Living children (number)			
0-1	2.5	0.87	349
2	2.8	0.75	486
3	3.3	0.71	334
4	3.9	0.93	182
5+	4.6	1.36	197
Marital duration (years)			
Up to 5	2.7	0.88	383
6-9	3.0	0.86	405
10-15	3.2	1.03	386
15+	3.9	1.35	283

(Table 1 - *Continued*)

Characteristic	Mean	SD	N
Age at first marriage (years)			
Up to 17	3.5	1.29	297
18-20	3.3	1.13	438
21-24	3.1	1.03	485
25+	2.8	0.94	327
Socio-economic			
Respondent's education (years)			
0-5	3.5	1.24	558
6-9	3.1	1.07	509
10+	2.9	0.91	481
Couple's education (years)			
Both 0-5	3.6	1.24	279
Both 6-9	3.1	1.02	255
Both 10+	2.8	0.91	321
Wife < husband	3.3	1.23	392
Husband < wife	3.1	0.99	287
Couple's work status			
Wife-domestic/husband-farmer	3.5	1.22	387
Wife-domestic/husband-non-farmer	3.0	0.99	766
Wife-non-domestic/husband-farmer	3.6	1.22	158
Wife-non-domestic/husband-non-farmer	3.1	1.07	237
Couple's wealth index			
Low	3.3	1.13	884
Medium	3.2	1.11	442
High	2.9	1.04	222
Areal development level			
Low	3.5	1.22	500
Moderate	3.1	1.07	489
High	3.0	1.01	559
Overall	3.2	1.12	1,548

Notes: Numbers of cases (N) for some variables do not add to the total because of missing values;

SD = standard deviation.

2 is coastal in the neighbourhood of Colombo and is characterized as being high in level of development. In this context, low, medium and high are comparative designations, not absolute ones.

In its simplest form, the dependent variable, current contraceptive use, is dichotomous (1 if using, 0 otherwise). Therefore, logistic regression is used to analyze the determinants of overall contraceptive use. In addition, use is subdivided into traditional methods and modern methods, in which case the dependent variable has three categories. For this part of the analysis, multinomial logistic regression is used.

Results

Bivariate analysis

We begin our analysis with an investigation of how desired family size (number of children) varies by respondent characteristics in this data set. Results are shown in table 1, which shows that desired family size increases substantially with age, number of living children and marital duration. Moreover, those who marry earlier tend to desire larger families. The more education a woman has, the lower the desired family size. The tabulations by couple's education, when compared with the tabulations by the woman's education, indicate that the husband's education has only a very small effect on the wife's desired family size. Desired family size decreases with both wealth and the level of areal development.

Table 2 complements table 1 by showing the distribution of the sample on each variable in table 1 as well as on contraceptive method and RPI. The RPI variable is noteworthy in that the category for RPI = 0 contains only 18 cases. These are women who disproportionately expressed fatalistic or "don't know" responses to the questions on strength of fertility motivation.

Table 3 shows contraceptive use rates for broad categories of methods, for the respondent characteristics in tables 1 and 2. Interestingly, overall use (the "traditional or modern" column) varies little by age, number of living children (except for women with 0-1 child, who have a markedly lower rate of use), marital duration and age at first marriage. Education has a larger effect, with those with six or more years of education having markedly higher rates of use than those with five or fewer years of education. Couple's work status has a moderately large effect on use; couples where the husband has nonfarm employment and the wife works outside the home have a markedly higher rate of use than couples where the husband is a farmer and the wife does not work outside the home. Contraceptive use varies little by couple wealth. It varies somewhat more, but irregularly, by level of areal development.

Table 2: Demographic and socio-economic characteristics of currently married, fecund, non-pregnant women aged 20-44 who report relative preference intensity (RPI): Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Percentage or mean	N
Demographic		
Respondent's age (years)		
20-24	15.9	246
25-29	26.4	408
30-34	24.1	373
35-39	20.7	320
40-44	13.0	201
Mean (SD)	31.4 (6.3)	
Living children (number)		
0-1	22.5	349
2	31.4	486
3	21.6	334
4	11.8	182
5+	12.7	197
Mean (SD)	2.7 (1.7)	
Marital duration (years)		
Up to 5	24.7	383
6-9	26.2	405
10-15	24.9	386
15+	18.3	283
Mean (SD)	9.7 (6.3)	
Age at first marriage (years)		
Up to 17	19.2	297
18-20	28.3	438
21-24	31.3	485
25+	21.1	327
Mean (SD)	21.3 (4.3)	
Socio-economic		
Respondent's education (years)		
0-5	36.0	558
6-9	32.9	509
10+	31.1	481
Mean (SD)	6.9 (3.4)	

(Table 2 - *Continued*)

Characteristic	Percentage or mean	N
Couple's education (years)		
Both 0-5	18.0	279
Both 6-9	16.5	255
Both 10+	20.7	321
Wife < husband	25.3	392
Husband < wife	18.5	287
Mean for husband (SD)	7.4 (3.2)	
Mean for wife (SD)	6.9 (3.4)	
Couple's work status		
Wife-domestic/husband-farmer	25.0	387
Wife-domestic/husband-non-farmer	49.5	766
Wife-non-domestic/husband-farmer	10.2	158
Wife-non-domestic/husband-non-farmer	15.3	237
Couple's wealth index		
Low	57.1	884
Medium	28.6	442
High	14.3	222
Areal development level		
Low	32.3	500
Moderate	31.6	489
High	36.1	559
Contraception and fertility preference		
Contraception currently used		
None	29.5	456
Traditional	54.5	844
Modern temporary	16.0	248
Relative preference intensity		
-3	24.3	376
-2	15.4	239
-1	8.9	137
0	1.2	18
1	23.8	369
2	15.6	241
3	10.9	168

Notes: In the couple work status variable, "domestic" means "housewife" or "working in the home", numbers of cases (N) for some variables do not add to the total because of missing values; SD = standard deviation,

Table 3: Percentage of women currently using contraceptive methods by demographic, socio-economic and fertility preference (characteristics): Currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Tradi-tional	Modern temporary	Tradi-tional or modern	No method
Demographic				
Respondent's age (years)				
20-24	54.9	13.8	68.7	31.3
25-29	49.3	21.1	70.3	29.7
30-34	51.2	17.2	68.4	31.6
35-39	60.6	12.8	73.4	26.6
40-44	61.2	11.4	72.6	27.4
Living children (number)				
0-1	48.4	10.9	59.3	40.7
2	55.8	19.6	75.3	24.7
3	59.0	16.5	75.5	24.6
4	57.1	15.9	73.1	26.9
5+	52.3	15.7	68.0	32.0
Marital duration (years)				
Up to 5	50.7	16.7	67.4	32.6
6-9	55.1	15.8	70.9	29.1
10-15	57.8	16.1	73.8	26.2
15+	55.1	15.6	70.7	29.3
Age at first marriage (years)				
Up to 17	56.6	17.9	74.4	25.6
18-20	52.3	16.2	68.5	31.5
21-24	51.8	18.4	70.1	29.9
25+	59.9	10.7	70.6	29.4
Socio-economic				
Respondent's education (years)				
0-5	50.5	15.6	66.1	33.9
6-9	55.6	18.9	74.5	25.5
10+	58.0	13.5	71.5	28.5

(Table 3 – *Continued*)

Characteristic	Tradi-tional	Modern temporary	Tradi-tional or modern	No method
Couple's education (years)				
Both 0-5	50.9	15.4	66.3	33.7
Both 6-9	58.4	18.8	77.3	22.8
Both 10+	58.3	12.8	71.0	29.0
Wife < husband	52.0	16.3	68.4	31.6
Husband < wife	54.7	16.7	71.4	28.6
Couple's work status				
Wife-domestic/husband-farmer	50.9	15.5	66.4	33.6
Wife-domestic/husband-non-farmer	55.2	16.2	71.4	28.6
Wife-non-domestic/ husband-farmer	55.1	15.2	70.3	29.8
Wife-non-domestic/ husband-non-farmer	57.8	16.9	74.7	25.3
Couple's wealth index				
Low	52.8	17.2	70.0	30.0
Medium	55.9	16.3	72.2	27.8
High	58.6	10.8	69.4	30.6
Areal development level				
Low	52.4	13.2	65.6	34.4
Moderate	53.4	20.9	74.2	25.8
High	57.4	14.3	71.7	28.3
Fertility preference				
Relative preference intensity				
-3	54.8	16.5	71.3	28.7
-2	61.5	15.9	77.4	22.6
-1	64.2	14.6	78.8	21.2
0	50.0	0.0	50.0	50.0
1	58.0	19.2	77.2	22.8
2	47.7	15.4	63.1	36.9
3	38.7	11.9	50.6	49.4
Overall average	54.5	16.0	70.5	29.5

Note: Number of cases (N) for some variables may not add to the total because of missing values.

Use shows greater variation by RPI. If one ignores the category for which RPI equals zero, use remains high at 71-78 per cent for RPI values ranging from - 3 to +1, and then drops off to 63 and 51 per cent for RPI values of 2 and 3, representing a desire for another child that is either strong or very strong. As mentioned previously, the category of RPI equals zero contains only 18 cases. These are disproportionately women who gave fatalistic responses regarding desire for another child. It is therefore not surprising that contraceptive use is comparatively low for these women. This category of women also showed a comparatively low rate of contraceptive use in the Nepal study cited previously (Retherford, Tuladhar and Thapa, 1988).

The separate columns for traditional methods and modern temporary methods in table 3 are interesting in that they show that the overall increase in contraceptive use that occurs with more education and wealth is due to an increase in the use of traditional methods, not modern methods. Use of modern temporary methods actually decreases as education and wealth increase. Of course, these are bivariate relationships that may not hold up when other variables are controlled, a question that will be returned to later.

Table 4: Zero-order correlations between current contraceptive use (dependent variable) and demographic, socio-economic and fertility preference characteristics (independent variables): Currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86 Rural Family Planning Survey

	Current contraceptive use		
Independent variable	**Traditional**	**Modern temporary**	**Traditional or modern**
Respondent's age	.079**	-.063**	.036
No. of living children	.036	.009	.046*
Marital duration	.046*	-.025	.030
Age at first marriage	.027	-.058*	-.017
Respondent's education	.0.51*	-.007	.050*
Couple wealth index	.043*	-.053*	.004
Areal development level	.042*	.010	.054*
Relative preference intensity	-.090***	-.012	-.108**

Notes: * denotes p < .05; ** denotes p <.01; and *** denotes p <.001.

The independent variables were all treated as continuous for purpose of calculations.

Table 4 extends the bivariate analysis by showing bivariate correlation coefficients between contraceptive use and each of the independent variables included in the previous tables. (For purposes of computing correlations, all variables are treated as continuous, which means, for example, that the couple wealth variable takes on possible values of 1, 2, or 3.) A striking aspect of this table is that for five out of the eight independent variables, there appears to be a trade-off between modern temporary methods and traditional methods. For example, age is positively related to use of traditional methods, but negatively related to use of modern temporary methods. A similar pattern is apparent for marriage duration, age at first marriage, education and the couple wealth index.

Another striking feature of this table is that the correlations are very low, reinforcing the impression of a remarkable uniformity in contraceptive use across demographic and socio-economic characteristics, already apparent from table 3. Of the independent variables considered, RPI shows the highest correlation with contraceptive use, at about 0.11 for all methods combined. Interestingly, table 3 shows that most of the systematic variation in use with RPI is due to traditional methods, not modem methods.

Table 5 shows the bivariate correlation matrix for the independent va-

Table 5: Zero-order correlations between demographic, socio-economic and fertility preference characteristics (independent variables): currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86 Rural Family Planning Survey

Variable	AGE	LVC	MRD	AFM	EDU	CWI	DEV	RPI
AGE	1.000	.522***	.746***	.336***	-.038	.183***	.170***	-.434***
LVC		1.000	.716***	-.288***	-.264***	-.073**	-.095***	-.576***
MRD			1.000	-.320***	-.215***	.042	-.058***	-.477***
AFM				1.000	.286***	.202***	.282***	.098***
EDU					1.000	.386***	.238***	.077**
CWI						1.000	.248***	-.035
DEV							1.000	-.073**
RPI								1.000

Notes: * denotes p < .05; ** denotes p < .01; and *** denotes p <.001.

Age = respondent's age; LVC = number of living children; MRD = marital duration; AFM = age at first marriage; EDU = respondent's education; CWI = couple's wealth index; DEV = areal development level; RPI = relative preference intensity. The variables were all treated as continuous for purposes of calculating correlations.

riables. Age, number of living children, and marital duration correlate in the range of 0.5 to 0.7. RPI correlates with age, number of living children, and marital duration in the range of -0.4 to -0.6. The other correlations in the table tend to be considerably lower.

Multivariate analysis

The multivariate analysis begins with an analysis of contraceptive use without distinguishing particular methods. Thus, the dependent variable is 1 if using any method of contraception, and 0 otherwise. An appropriate statistical model is logistic regression.

The results of this analysis are shown in tables 6 and 7. In table 6, the number of living children, number of living children squared, age at first marriage, and woman's education are entered as continuous independent variables. The quadratic term for number of living children is included because previous studies have indicated that the relationship between contraceptive use and number of living children often resembles an inverted U. All remaining independent variables are treated as categorical and are represented in the underlying logistic regressions by sets of dummy variables. Age and marital duration are excluded from the models because of collinearity with number of living children.

Table 6 includes two alternative models, Iabelled Model 1 and Model 2. Model 1 omits relative preference intensity (RPI), whereas Model 2 includes it. The remaining independent variables, treated here as control variables, are included in both models. The two-model design enables one to address the question of whether the control variables capture the effect of motivational strength on current use of contraception when motivational strength (RPI) is deleted from the model.

Table 6: Logistic regression estimates of odds ratios for current use of contraception, by demographic and socio-economic characteristics of women: Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Model 1	Model 2
Number of living children	1.590 (5.22)	1.376 (3.15)
Number of living children squared	.954 (-4.51)	.967 (-3.23)
Age at first marriage	.986 (-0.99)	.983 (-1.13)
Woman's education	1.043 (2.20)	1.042 (2.08)

(Table 6 – *Continued*)

Characteristic	Model 1	Model 2
Couple work status		
Wife domestic, husband farmer	1.000	1.000
Wife domestic, husband non-farmer	1.118 (0.76)	1.132 (0.82)
Wife non-domestic, husband farmer	1.184 (0.80)	1.420 (1.62)
Wife non-domestic, husband non-farmer	1.358 (1.56)	1.424 (1.77)
Couple wealth index		
Low	1.000	1.000
Medium	.957 (-0.31)	.961 (-0.28)
High	.804 (-1.21)	.840 (-0.94)
Areal development level		
Low	1.000	1.000
Medium	1.502 (2.72)	1.596 (3.06)
High	1.268 (1.57)	1.213 (1.25)
Relative preference intensity		
-3		2.025 (2.98)
-2		2.683 (3.96)
-1		2.887 (3.73)
0		.762 (-0.52)
1		3.206 (5.59)
2		1.542 (2.06)
3		1.000
R^2	.013	.031
-2 log likelihood		
Model containing intercept only	1874	1874
Full model	1827	1783
Difference	47	91
Degrees of freedom	11	17
p-value for difference	.000	.000

Notes: Sterilized women are excluded from the regressions. Odds ratios are calculated as exp(b), where B is the corresponding logistic regression coefficient. (In the case of living children, however, exp(B) in the table is not interpretable as an odds ratio, because of the quadratic term, as explained in the text.) t-ratios are shown in parentheses after odds ratios. (The t-ratios actually pertain to the logistic regression coefficients that underlie the odds ratios.) The R^2 statistic is somewhat similar to R^2 ordinary least squares multiple regression, but it is calculated quite differently, and it cannot be used in tests of significance like an ordinary R^2 (Harrell, 1983). The p-values in the bottom row of the table indicate that each model differs very significantly from a model containing only the intercept term. The two models also differ significantly from each other, at $p < .001$, as explained in the text.

Table 6 presents odds ratios instead of the underlying logistic regression coefficients, because odds ratios are easier to interpret. (Odds ratios are calculated from the underlying coefficients, B, as exp(B).) For example, the odds ratio of 1.043 for woman's education means that the odds of using contraception are increased by a multiplicative factor of 1.043 with each additional year of education. The odds ratio of 0.986 for age at first marriage means that the odds of using contraception are decreased by a factor of 0.986 with each one-year increase in age at first marriage. From these examples, it is evident that, for continuous variables, an odds ratio is interpreted as the multiplicative effect of a one-unit increase in the variable on the odds of using contraception, holding constant other independent variables included in the model.

The interpretation of the table entries for number of living children is different, because of the squared term. If the woman has, say, one living child, the effect of a one-child increase in the number of living children is to increase the odds of using contraception by a factor of $(1.590)\ (0.954)^{(2)(1)} = 1.447$. If the woman has five living children, the effect of a one-child increase in the number of living children is to decrease the odds of using contraception by a factor of $(1.590)\ (0.954)^{(2)\ (5)} = 0.993$.

In the case of a categorical variable, the reference category has an odds ratio of 1.000, corresponding to an underlying logistic regression coefficient of zero. For example, in the case of the couple wealth index, the reference category is "low". The "medium" category has an odds ratio of 0.957, meaning that the odds of current use for those with medium wealth are 0.957 of the odds of current use for those with low wealth in the reference category. Similarly, the "high" category has an odds ratio of 0.804, meaning that the odds of current use for those with high wealth are 0.804 of the odds of current use for those with low wealth in the reference category.

Quantities in parentheses following the odds ratios are t-ratios. They are calculated from the corresponding underlying logistic regression coefficients and their standard errors, which are not shown. A t-ratio greater than about 2 indicates that the odds ratio differs significantly from unity at the 5 per cent level of significance.

The R^2 statistic in table 6 is somewhat similar to R^2 in ordinary least-squares multiple regression, in that it has a lower bound of zero and an upper bound of one. However, its sampling distribution is unknown, which makes tests of its statistical significance impossible. The log likelihood statistics, to which we shall return later, are used instead for significance testing.

We are primarily interested in Model 2 in table 6, since it includes RPI, which is our principal explanatory variable. Relative to the reference category

of RPI = 3, it is seen that the effect of smaller values of RPI on the odds of contraceptive use is large. For RPI values of 1, -1, -2 and -3, the odds of use are multiplied by factors ranging between 2 and 3. These are net effects after controlling for the other independent variables in the model.

The category for RPI = 0 is an outlier with a very low odds ratio, which, however, is not statistically significant, owing to the very small number of cases, only 18 women. Despite the lack of statistical significance, a low odds ratio is expected, given that women in this category disproportionately give fatalistic responses to questions on fertility motivation. A very low odds ratio for the RPI = 0 category was also found in the Nepal study cited previously (Retherford, Tuladhar and Thapa, 1988).

The effect of the control variables on the odds of contraceptive use do not differ much between Models 1 and 2, and they are mostly consistent with the simple bivariate findings examined previously in table 3. Number of living children tends to increase the odds of use, at least at lower numbers of living children. Age at marriage has a very slight negative effect, which is statistically non-significant. Woman's education has a positive effect which is statistically significant at about the 5 per cent level. Couple wealth appears to reduce the odds of contraception, but the effect is statistically non-significant. The level of economic and social development of one's geographic zone of residence tends to increase the odds of use, but the effect is statistically significant only for medium relative to low level of development.

Table 7, which is calculated from Model 2 in table 6, has the advantage of being easier to interpret than table 6. Table 7 shows estimates of the probability of using contraception by each independent variable, controlling for

Table 7 : Logistic regression estimates of the probability of using contraception by demographic and socio-economic characteristics of women: Sri Lanka 1985-86 Rural Family Planning Survey (probabilities expressed as adjusted percentages)

Characteristic	Adjusted percentage
Number of living children	
0	60.1
1	66.7
2	71.3
4	75.8
6	75.1
8	68.8

(Table 7 – *Continued*)

Characteristic	Adjusted percentage
Age at first marriage (years)	
15	73.7
20	72.1
25	70.3
30	68.5
Woman's education (years)	
0	65.6
2	67.4
4	69.1
6	70.9
8	72.5
10	74.1
Couple work status	
Wife domestic, husband farmer	68.4
Wife domestic, husband non-farmer	71.1
Wife non-domestic, husband farmer	75.5
Wife non-domestic, husband non-farmer	75.6
Couple wealth index	
Low	72.4
Medium	71.5
High	68.7
Areal development level	
Low	67.0
Medium	76.4
High	71.1
Relative preference intensity	
-3	70.5
-2	76.0
-1	77.3
0	47.4
1	79.1
2	64.5
3	54.1

Notes: Adjusted values of the probability of use, P (expressed as a percentage), were calculated from a multivariate logistic regression equation with independent variables specified as in table 6. The effects of any given independent variable on use were computed by holding the other independent variables constant at their mean values in the entire sample.

the remaining independent variables by holding them constant at their mean values in the sample. The estimated probabilities are presented in the form of adjusted percentages, where "adjusted" means that remaining independent variables are held constant at their means.

Table 7 shows that number of living children tends to increase contraceptive use up to about four living children and to decrease it at higher numbers of living children. These effects are highly statistically significant, as seen previously in table 6. Thus, the results show the inverted U-shaped pattern found in many earlier studies (see, for example, Cleland, Little and Pitaktepsombati, 1979). The causation underlying this pattern is unclear for the women with higher numbers of living children. Because these women are nearing the end of their reproductive age, they may perceive themselves as no longer fecund. They may also be more traditional in their views and may be more likely to view contraception as inappropriate behaviour.

Table 7 shows that age at first marriage has a very small negative effect on contraceptive use, seen previously in table 6 to be statistically non-significant. Woman's education increases contraceptive use, from about 66 per cent for women with no education to about 74 per cent for those with 10 years of education. Couple work status tends to increase contraceptive use, but the effects are statistically non-significant, as seen previously in table 6. Couple wealth tends to reduce use, but again the effects are statistically non-significant. A medium as opposed to a low level of areal development boosts use from 67 to 76 per cent.

The contrasts are greater by level of RPI, the main variable of interest here. For RPI categories with adequate numbers of cases, use varies from 54 per cent for RPI = 3 (very strongly wants another child) to 79 per cent for RPI = 1 (not very strongly wants another child). Use levels are rather similar for RPI values of 1, -1, -2 and -3. As mentioned previously, the category for RPI = 0, which is based on only 18 cases, is an outlier, with a use rate of 47 per cent.

We now return to the question of whether Models 1 and 2 in table 6 differ significantly from each other. This test is based on the -2 log likelihood statistic. The difference between the two models in this statistic is distributed as chi-square with degrees of freedom equal to the difference between the two models in the number of coefficients to be estimated. We see that 1,827 - 1,783 = 44 with 17 - 11 = 6 degrees of freedom differs significantly from zero at $p < .001$, which is highly significant. Thus the effects of RPI on contraceptive use are not captured to any great extent by the background variables when RPI is deleted from the model. R^2 is very low in both models, reflecting the fact that contraceptive use tends not to vary much across the independent variables.

Table 8: Multinomial logistic regression coefficients and p-values for choice of contraceptive method: Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Contraceptive method	
	Modern	**Traditional**
Number of living children	.668 (3.66)	.253 (2.44)
Number of living children squared	-.081 (-3.52)	-.026 (-2.48)
Age at first marriage	-.047 (-2.15)	-.009 (-0.56)
Woman's education	.047 (1.71)	.041 (2.03)
Couple work status		
Wife domestic, husband farmer	0.	0.
Wife domestic, husband non-farmer	.112 (0.53)	.117 (0.74)
Wife non-domestic, husband farmer	.282 (0.91)	.387 (1.71)
Wife non-domestic, husband non-farmer	.366 (1.32)	.318 (1.52)
Couple wealth index		
Low	0.	0.
Medium	-.137 (-0.69)	-.007 (-.047)
High	-.590 (-2.08)	-.084 (-0.44)
Areal development level		
Low	0.	0.
Medium	.889 (4.16)	.328 (2.05)
High	.310 (1.38)	.134 (0.83)
Relative preference intensity		
-3	.556 (1.58)	.751 (3.00)
-2	.688 (1.86)	1.065 (4.08)
-1	.666 (1.60)	1.160 (3.92)
0	–	–
1	1.151 (3.69)	1.164 (5.30)
2	.388 (1.19)	.440 (1.97)
3	0.	0.

Notes: The reference category for the dependent variable is non-use of contraception. In the body of the table, numbers in parentheses are t-ratios. There is no entry for RPI = 0, because this cell contained only 18 cases, none of whom used modern methods. Because no one used modern methods, MLOGIT would not run. Our solution to this problem was to omit the 18 cases for whom RPI = 0 and rerun MLOGIT without the category for RPI = 0.

Tables 8 and 9 extend Model 2 of the logistic regression analysis to a multinomial logistic regression analysis of the determinants of three categories of contraceptive use: modern, traditional and no method. Because odds ratios are less meaningful in multinomial logistic regression than in simple binary logistic regression, table 8 presents multinomial logistic regression coefficients instead of odds ratios. Also shown are t-ratios, which provide an indication of level of statistical significance. Table 9, which is derived from table 8, shows expected probabilities of use of each method by each independent variable, again controlling for the other independent variables in the model by setting them at their means. We shall restrict discussion to table 9, since it is easier to interpret than table 8.

In table 9, use of modern methods tends to rise with number of living children, then to fall at larger family sizes. But use of traditional methods increases at least up to eight children, which is the largest family size considered in the table. This finding supports the earlier hypothesis that older women tend to be more traditional than younger women in their attitudes about contraception.

Earlier, in the binary logistic regression analysis, the effects of age at marriage on use were found to be statistically non-significant. In the multinomial logistic regression analysis in tables 8 and 9, however, age at first marriage has a statistically significant negative effect on use of modern methods and a statistically non-significant positive effect on the use of traditional methods. This anomalous finding indicates that women who tend to be more modern in their marriage behaviour, by marrying late, tend to be more traditional in their use of contraception.

Table 9 : Multinomial logistic regression estimates of the probabilities of using specified methods of contraception: Sri Lanka 1985-86 Rural Family Planning Survey (probabilities expressed as adjusted percentages)

Characteristic	Contraceptive method		
	Modern	Traditional	No method
Number of living children			
0	8.2	51.9	40.0
1	12.3	54.3	33.4
2	16.1	55.4	28.6
4	19.5	56.5	24.0
6	15.7	58.9	25.4
8	7.9	59.9	32.2

(Table 9 – *Continued*)

Characteristic	Contraceptive method		
	Modern	Traditional	No method
Age at first marriage (years)			
15	19.2	54.6	26.2
20	16.2	55.8	28.0
25	13.6	56.7	29.7
30	11.3	57.2	31.4
Woman's education (years)			
0	13.7	51.5	34.8
2	14.2	52.9	32.9
4	14.7	54.2	31.0
6	15.2	55.5	29.3
8	15.7	56.7	27.5
10	16.3	57.9	25.9
Couple work status			
Wife domestic, husband farmer	14.9	53.6	31.5
Wife domestic, husband non-farmer	15.4	55.6	29.1
Wife non-domestic, husband farmer	15.2	60.7	24.2
Wife non-domestic, husband non-farmer	16.9	58.2	24.9
Couple wealth index			
Low	17.0	55.3	27.7
Medium	15.2	56.3	28.4
High	10.7	57.8	31.5
Areal development level			
Low	12.0	55.3	32.7
Medium	21.0	55.4	23.6
High	14.6	56.3	29.1
Relative preference intensity			
-3	14.8	55.5	29.7
-2	13.8	62.0	24.2
-1	12.7	64.3	22.9
0	–	–	–
1	19.1	59.7	21.2
2	15.1	49.1	35.9
3	13.2	40.6	46.2

Notes: Adjusted values of the probability of use, P (expressed as a percentage), were calculated from multinomial logistic regression equations with variables specified as in table 8. The effects of any given variable on method-specific use were computed by holding the other independent variables constant at their mean values in the entire sample. The category for RPI = 0 was omitted from the MLOGIT run for this table; see note to table 8.

This pattern is not observed, however, in the case of education. The more education a woman has, the more likely she is to use both modern methods and traditional methods. However, the positive effect of education on use of modern methods is not statistically significant at the 5 per cent level, whereas the positive effect of education on use of traditional methods is statistically significant.

The anomalous finding for age at marriage reappears in the case of couple wealth. Couple wealth has a statistically significant negative effect on use of modern methods, and a statistically non-significant positive effect on use of traditional methods. By contrast, level of areal development has an erratic effect on use of modern methods and only a small, statistically non-significant positive effect on use of traditional methods.

The effect of RPI, controlling for the other independent variables, is greater for traditional use than for modern use. Indeed, the effect of RPI on modern use is statistically significant only for RPI = 1, as shown in table 8. In contrast, the effects of RPI on traditional use tend to be considerably larger and highly statistically significant. In table 9, which shows this pattern more clearly than does table 8, rates of use of modern methods by RPI range from 15 to 19 per cent, whereas rates of use of traditional methods by RPI range from 41 to 64 per cent. As in the binary logistic regressions, the percentage using traditional methods tends to be comparatively low, at 40-49 per cent for RPI values of 3 and 2 and considerably higher, at 56-64 per cent for RPI values of 1, -1, -2 and -3. The category RPI = 0 is omitted from this analysis for reasons explained in the footnote to table 8.

Conclusion

The picture that emerges from this analysis is that this comparatively homogeneous rural Sinhalese sample shows remarkably uniform rates of contraceptive use across demographic and socio-economic variables. Rates of contraceptive use are high and indicate that the contraceptive revolution is well on its way to completion. Rates of contraceptive use would be even higher had it been possible to include sterilized women, who were excluded because they were not asked the questions on strength of fertility motivation. Uniformly high rates of contraceptive use towards the end of fertility transition are not unexpected in culturally homogenous populations. Such populations tend to show a convergence of differential fertility towards the end of the fertility transition (Retherford, 1985).

The analysis shows that neither the strength of motivation variable (relative preference intensity, or RPI) nor the control variables account for much of the variability in contraceptive use. The effects of RPI on contraceptive use are nevertheless substantial and statistically significant. Rates of contra-

ceptive use are uniformly high among women who either do not want another child or who want another child but do not feel very strongly about it. They are considerably lower, but still fairly high, among those who feel strongly or very strongly that they want another child. The effects of RPI are stronger for use of traditional methods of contraception than for use of modern methods of contraception. The fact that the rates are still fairly high for those who strongly want another child indicates widespread use of family planning for birth spacing. The effects of the RPI variable hardly change when demographic and socio-economic background variables are controlled, indicating that the effect of RPI on contraceptive use operates largely independently of the background variables.

The exclusion of sterilized women from the analysis introduces some selection on the dependent variable of contraceptive use. This exclusion introduces bias, but the bias is conservative in that the effects of RPI on use of modern methods of contraception would probably have been larger had it been possible to include sterilized women. Presumably, most of these women feel very strongly that they do not want another child.

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