NEPAL FURTHER ANALYSIS

Factors Responsible for the Rapid Decline of Fertility in Nepal—An Interpretation

Further Analysis of the 2006 Nepal Demographic and Health Survey

This report presents findings from a further analysis study undertaken as part of the follow up to the 2006 Nepal Demographic and Health Survey (NDHS). Macro International Inc. provided technical assistance for the project. Funding was provided by the U.S. Agency for International Development (USAID) under the terms of Contract No. GPO-C-00-03-00002-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

This report is part of the MEASURE DHS program, which is designed to collect, analyze, and disseminate data on fertility, family planning, maternal and child health, nutrition, and HIV/AIDS.

Additional information about the 2006 NDHS may be obtained from Population Division, Ministry of Health and Population, Government of Nepal, Ramshahpath, Kathmandu, Nepal; Telephone: (977-1) 4262987; New ERA, P.O. Box 722, Kathmandu, Nepal; Telephone: (977-1) 4423176/4413603; Fax: (977-1) 4419562; E-mail: info@newera.wlink.com.np. Additional information about the DHS project may be obtained from Macro International Inc., 11785 Beltsville Drive, Calverton, MD 20705 USA; Telephone: 301-572-0200, Fax: 301-572-0999, E-mail: reports@macrointernational.com, Internet: http://www.measuredhs.com.

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Further Analysis of the 2006 Nepal Demographic and Health Survey

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Tables and Figures

1 Introduction

The total fertility rate (TFR) in Nepal in mid-1976 was estimated at 6.3 births per woman, contraceptive use among currently married women was low (3 percent) and the proportion married was high (MOH, 1977). Given these demographic parameters, no immediate change in the fertility rate in Nepal seemed plausible. In recent years however, several researchers have noted that a fertility transition has been underway in Nepal (Thapa et al., 1998; Collumbien et al., 2001). Data from the 2006 Demographic and Health Survey (NDHS) show an unprecedented decrease in the TFR of 3.1 births per woman in 2006 (MOHP, New ERA and Macro International Inc, 2007) from 4.1 births per woman in 2001 (MOH, New ERA and ORC Macro, 2002). Many factors—socioeconomic and biological—may have contributed to this precipitous decline in fertility. However, actual levels and rates of change in fertility are less certain because they also depend on the quality of data and the accuracy of measurements used. Ideally, it would have been better to re-examine the levels and trends of fertility from the survey data with earlier surveys, as has been carried out by Retherford R. D. and Thapa, S. (1999 and 2004). Instead, the focus of this paper is on examining the possible factors underlying the recent unprecedented declines in fertility. The principal measure of fertility in this part of the analysis is the TFR.

The paper is organized into three main parts. The first part deals with fertility levels, trends and differentials. The second part discusses the role of intermediate or proximate factors and the final part deals with the contextual or antecedent factors affecting these intermediate factors.

Survey data are used to analyze the proximate determinants of fertility decline. The results of the analysis provide quantitative estimates of the contribution of changes in contraceptive use, marriage, breastfeeding and postpartum insusceptibility to the observed decline.

2 Data

This study of fertility in Nepal is primarily based on data from the NDHS 2001 and 2006. However, for the purpose of comparisons, data from NDHS 1996 (Pradhan et al, 1997), Nepal Fertility Survey 1976 (MOH, 1977) and population census 2001 (CBS and UNFPA, 2002) have also been used. All four surveys are nationally representative. Interviews were conducted with 5,940 ever-married women age 15-49 in 1976 and the corresponding figures were 8,429 in 1996 and 8,726 in 2001. In 2006, however, 10,793 women age 15-49, regardless of marital status, were interviewed. In order to understand the factors influencing Nepal's fertility decline, changes in TFR are examined between 2001 and 2006 by several background variables. Also, for the first time fertility differentials have been looked at by major caste and ethnic groups[1]. Bongaarts's model (1978) is used here to determine the contribution to fertility of the proportion of women who are married, who use contraception, and who are not susceptible to pregnancy due to postpartum abstinence or amenorrhea, and reduced exposure to the risk of pregnancy due to absentee husbands.

3 Quality of data

Accurate reporting of ages of women and children is essential for accurate estimation of fertility from survey data. The first step in assessing the quality of age reporting is to visually examine the distribution of the population by age. An examination of the age distributions for females (since age-specific fertility rates are calculated for women) in the three surveys 1996, 2001, and 2006 provide some important insights.

[1] An earlier study on fertility differential by caste/ethnicity (Tuladhar, J. 1989) was limited to only three broad groups, namely, Bahun, Mongoloid and others using data from the Nepal Fertility Survey 1976 (MOH, 1977). Besides, fertility was measured in terms of children ever born and not with respect to TFR.

Typically, the most serious source of misreporting take the form of displacement of age and birth date of women out of the eligibility range for interviewing (age 15-49), and of children under five years of age from the series of health-related questions. Another serious source of misreporting is omission of births, and especially of births related to children who have since died. This could be particularly severe in the case of children who died at a very young age, or soon after birth, or of deaths that occurred further back in time. In addition, female deaths may be more likely to be omitted than male deaths in a society that values male children as opposed to female children.

In each of the three surveys, the proportion of infants (children below one year of age, i.e., age 0) is higher than the proportions of children age 1, 2, 3, or 4 and these proportions are considerably higher in 1996 and 2006 than in 2001. This may occur not only because of population growth and the cumulative effects of infant and child mortality over successive ages, but also because of emphasis during the training of interviewers on the importance of complete and accurate identification of infants for purposes of computing infant mortality rates and other health indicators for infants. This proportion age 0 is especially small, relative to the proportions at the next higher ages, in the 2006 survey. Also the proportions of children age 1, 2, 3, or 4 in 2006 are considerably lower than those in 1996 and 2001. All these indicate continuous decline of fertility in the last fifteen years. In general, the distribution of children below age 5 by single years of age varies considerably between the two surveys.

Age distribution of females in 1996 showed heaping on age 9 which is not typical. The 1996 survey shows no heaping at all on ages 10 and 50, which is surprising, inasmuch as most surveys in developing countries show considerable heaping on these ages. A plausible interpretation of this finding is that, in the 1996 survey, the training of interviewers placed more than the usual amount of emphasis on the importance of accurate age reporting. Indeed, the moderate heaping on ages 9 and 49 in the 1996 survey suggests a tendency on the part of interviewers to overcompensate by moving some girls reported as ages 10 to age 9 in order to avoid heaping on age 10, and some women reported as age 50 to 49 in order to avoid heaping on age 50. Discussions with personal at New ERA, the agency that collected the data for Nepal Demographic and Health Surveys, confirm that the training on how to collect accurate age data was much more intensive in the 1996 survey than in earlier similar surveys which New ERA has conducted.

Also considerable age heaping on ages 10 and 12 in the 2001 survey and on ages 10 and 13 in the 2006 survey were found by looking at the age distribution of females. Heaping on ages 8, 10, and 12 is commonly observed in south Asian countries (Retherford, R. D. and Alam, I., 1985), and in this respect the 2001 NDHS is typical. The heaping on age 13 in the 2006 NDHS is not typical. At ages 20 and above, there is a consistent pattern of heaping on ages ending in digits 0 or 5 in the 2001 survey, but not at all in the 2006 survey. The 2006 survey shows no heaping at all on ages ending in 0 or 5, which is surprising, and could be interpreted as resulting from the rigorous training of interviewers.

Indeed, after age 10, heaping on ages ending in numbers which are not multiples of 5 in the 2006 survey suggests a tendency on the part of interviewers to overcompensate by moving some women who reported ages ending in multiples of 5 to ages which are not multiples of 5, in order to avoid heaping on ages ending in numbers which are multiples of 5.

In general, age reporting was considerably more accurate in the 1996, 2001 and 2006 surveys than in the 1976 and 1991 surveys analyzed by Retherford and Thapa (1999) not only for children but also for adults. The more accurate age reporting in the three DHS surveys compared to the earlier surveys could be attributed to several factors: (1) better management and implementation of the recent surveys, (2) use of separate interviewers for the household and individual interviews, and (3) respondents' rising educational levels or improved knowledge of their own ages.

The trend in the sex ratios at birth is another useful indicator of data quality. Because there is considerable preference for sons in Nepal, women who forget to mention children who have died or moved away are more likely to omit girls than boys. If such omissions are a problem, then one

expects the sex ratio at birth, as ascertained from the birth histories, to become progressively more male (greater than one) in earlier years when omissions are more likely to occur. The sex ratio at birth is largely biologically determined and is usually close to 1.05 male births for every female birth. If female births are omitted, the ratio should be higher than 1.05.

Table 1 shows that overall in all three surveys the sex ratio at birth does not become progressively more male in earlier years. For the 15-year period preceding each survey, the sex ratio at birth ranges from 1.03 to 1.05, the difference is not large and they are not higher than 1.05. In 1996 and 2001, the sex ratios were less than 1.05 which means that a few births during this period were omitted by respondents. In the 2001 survey the sex ratio at birth rises from 0.98 in the 0-4 years before the survey to 1.09 in the 10-14 years before the survey. In the 15 years as a whole, however, the sex ratio at birth is only 1.03. These results from the 2001 survey suggest displacement but not omission of births and indicate that male births tend to be displaced backward in time to a greater extent than female births.

The evidence of displacement of births from data collected in the 2001 survey suggests that the estimated TFR for the period 1998-2000 (three years preceding the survey), may be underestimated. In 2006, the sex ratio at birth in the 10-14 years preceding the survey is lower than the sex ratio at birth in 5-9 years preceding the survey implying that some births in recent years were displaced. However, since the sex ratio at birth for the 0-4 years preceding the survey is within the expected range, TFR estimates based on the three years preceding the 2006 survey are unlikely to have been underestimated.

Table 1 Male births, female births, and the sex ratios at birth in the 15 years preceding the 1996 NDHS, 2001 NDHS and 2006 NDHS, Nepal

Survey and time period	Male births	Female births	Sex ratio at birth (males to females)
1996 NDHS			
10-14 years preceding the survey	3,059	2,999	1.02
5-9 years preceding the survey	3,582	3,406	1.05
0-4 years preceding the survey	3,698	3,574	1.03
0-14 years preceding the survey	10,339	9,979	1.04
2001 NDHS			
10-14 years preceding the survey	3,152	2,881	1.09
5-9 years preceding the survey	3,568	3,499	1.02
0-4 years preceding the survey	3,450	3,528	0.98
0-14 years preceding the survey	10,170	9,908	1.03
2006 NDHS			
10-14 years preceding the survey	2,846	2,838	1.00
5-9 years preceding the survey	3,174	2,812	1.13
0-4 years preceding the survey	2,817	2,728	1.03
0-14 years preceding the survey	8,837	8,378	1.05

The consistency of the data can also be verified by computing the sex ratios of the live births in the four years before the survey by the mother's age to ascertain if older mothers are more likely than younger mothers to omit reporting child deaths and especially female deaths. The sex ratios of births by the mother's age for the 1996, 2001 and 2006 NDHS surveys are shown in Table 2. These sex ratios fluctuated somewhat by the mother's age and showed no trend, but except for the 2001 survey, the overall sex ratio was close to the expected value of 1.05. Furthermore, because some variation in sex ratios by age is expected due to the small sample size, this test shows no clear deficiencies in the 1996, 2001 and 2006 data on numbers of births by sex.

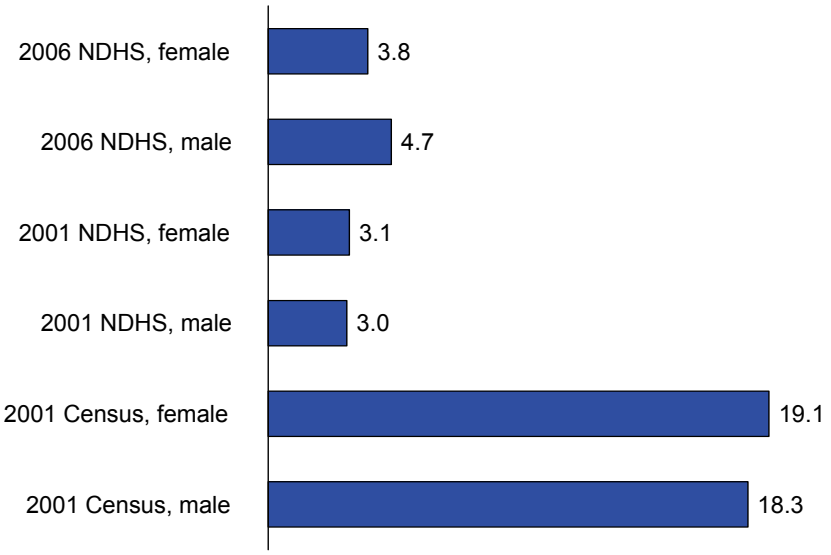
Table 2 Male births, female births, and sex ratios at birth, by mother's age, during the five years preceding the 1996, 2001 NDHS and 2006 NDHS, Nepal

	1996			2001 NDHS			2006 NDHS		
Mother's age	Male births	Female births	Sex ratio at birth (males to females)	Male births	Female births	Sex ratio at birth (males to females)	Male births	Female births	Sex ratio at birth (males to females)
15-19	280	224	1.25	202	224	0.90	170	198	0.86
20-24	1,082	1,081	1.00	1,041	1,057	0.98	967	964	1.00
25-29	1,037	1,072	0.97	1,032	1,102	0.94	918	824	1.11
30-34	701	618	1.13	632	634	1.00	420	365	1.15
35-39	364	383	0.95	338	331	1.02	214	251	0.85
40-44	172	158	1.09	156	135	1.16	97	99	0.98
45-49	60	38	1.58	48	45	1.07	31	27	1.15
Total	3,696	3,574	1.03	3,449	3,528	0.98	2,817	2,728	1.03

The number of children ever born by woman's age is another useful indicator of data quality. Women may forget to mention some children (e.g., children who have died or moved away), and one expects this to occur more frequently among older women than among younger women. Such omissions are sometimes reflected in a mean number of children that declines with age after about age 40. Graphs of mean children ever born against women's age for the three surveys suggest that omissions are not a serious problem in any of the three surveys, inasmuch as the mean number of children ever born attains a maximum at age 49 in all three surveys. In all three surveys too, the mean number of children ever born at age 49 is considerably higher than the TFR, consistent with fertility decline having occurred in the last 15 years.

Quality of age reporting can also be assessed by applying Myers' Blended Index which measures the extent of digit preference (Myers, R. J., 1940). This index was calculated for NDHS 2001 and NDHS 2006 data and the results were compared to the index calculated using the 2001 population census data (Karki, , 2002). According to this index the absence of age heaping would result in an index value of about zero. Figure 1 shows high index values for the census data, implying that the accuracy of age reporting in Nepal's 2001 Census was low. However, the values for both males and females in the 2001 and 2006 NDHS data are low, implying that age heaping was very low and therefore the accuracy of age data in both the surveys was high.

Figure 1 Myer's Index, 2001 Census, 2001 NDHS, and 2006 NDHS, Nepal



Source: Karki, Y. B. (2002), MOH, New ERA and ORC Macro (2002) and MOHP, New ERA, and Macro International Inc. (2007)

4 Fertility levels, trends, and differentials

The decline in the total fertility rate from 4.6 in the three years preceding the 1996 Nepal Family Health Survey (NFHS) to 3.1 in the three years preceding the 2006 NDHS is concomitant with the decline in the fertility preference of Nepalese women. There has been a steady decline in the mean ideal number of children among currently married women over the last ten years, from 2.9 children in 1996 to 2.6 children in 2001 and to 2.4 children in 2006. Similarly, data over the years show a steady increase in the proportion of currently married women who want to stop childbearing from 59 percent in 1996 to 66 percent in 2001 and to 71 percent in 2006. Combined with the steady increase in contraceptive use, the trends in fertility preferences suggest that the observed decline in fertility has been driven by a desire among couples to limit their fertility. This situation appears to have been accentuated by increasing out-migration of males and increasing age at marriage. The population of Nepal is characterised by out-migration of males to other countries, including India, in search of short and long term employment. The sex ratios for the 15-44 age groups range from 63 to 82 in 2006, and over the years the sex ratio for the total population has consistently declined from 93 in 1996 (Pradhan et al, 1997), to 90 in 2001 (MOH, New ERA and ORC Macro, 2002) and still further to 88.6 in 2006 (MOHP, New ERA and Macro International Inc, 2007).

4.1 Fertility levels and trends

The estimated TFRs in Nepal between 1976 and 2005 are shown in Table 3.

Table 3 TFR, Nepal 1976-2006

Reference year/period	TFR	Source
1976	6.3	Goldman, N., et al (1979)
1981	5.9	MOH (1983)
1986	6.0	MOH (1987)
1991	5.1	MOH (1993)
1993-95	4.6	Pradhan, et al (1997)
1998-00	4.1	MOH, New ERA and ORC Macro (2002)
2003-05	3.1	MOHP, New ERA, and Macro International Inc. (2007)

The main sources of data for TFR estimates in Nepal are demographic and health surveys carried out every five years. These surveys also collect other data related to fertility including use of family planning and other proximate determinants of fertility and fertility preferences. As shown in Table 3, the average annual linear decline of directly estimated TFR from mid 1994 to mid 1999 was about 0.1 births per woman. Direct estimates based on survey data for the three-year period preceding the 2006 DHS survey showed a TFR of 3.1. The average annual linear decline from mid 1999 to mid 2004 was 0.2 children per woman. These figures show that the pace of fertility decline during the five years preceding the 2006 survey was faster than the earlier five-year period.

4.2 Trends in age-specific fertility rates

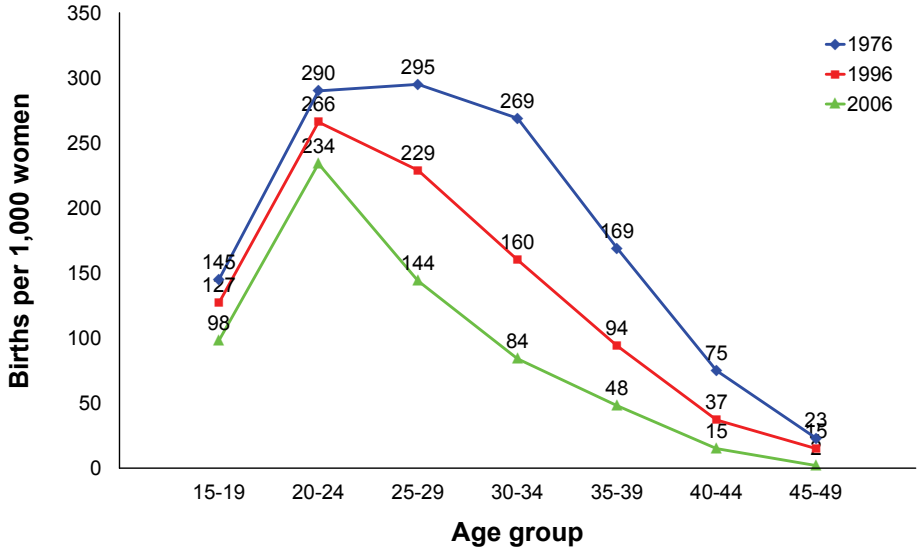
Generally, the rate of childbearing starts from zero at about age 15, rises to peak in the late 20's, and then tapers off to zero again at about age 49. Table 4 and Figure 2 show the age-specific fertility rates in Nepal for three periods in the past 30 years.

Table 4 Number of births per 1,000 women and changes in fertility rates, Nepal 1976, 1996, and 2006

Age group	1976	1996	2006	Percent change 1976-1996	Percent change 1996-2006	Cumulative percent change 1976-2006
15-19	145	127	98	-12.4	-22.8	-32.4
20-24	290	266	234	-8.3	-12.0	-19.3
25-29	295	229	144	-22.4	-37.1	-51.2
30-34	269	160	84	-40.5	-47.5	-68.8
35-39	169	94	48	-44.4	-48.9	-71.6
40-44	75	37	15	-50.7	-59.5	-80.0
45-49	23	15	2	-34.8	-86.7	-91.3
TFR	6.3	4.6	3.1	-27.0	-32.6	-50.8

Source: Goldman, N., et al. (1979), Pradhan, A, et al. (1997), and MOHP, New ERA, and Macro International Inc. (2007)

Figure 2 Age Specific Fertility Rates, Nepal, 1976, 1996, and 2006



Source: Goldman, N., et al. (1979), Pradhan, A, et al. (1997), and MOHP, New ERA, and Macro International Inc. (2007)

An examination of changes in the age-specific fertility rates over time can provide insight into the overall changes in fertility. Between the 1976 and 1996 surveys, the smallest percentage decline occurred in the 20-24 age group followed by the 15-19 age group (Table 4). The largest decline was observed in the 40-44 age group. Between the 1996 and 2006 surveys, the pattern of change in the age-specific fertility rates is somewhat similar. As in the earlier period, the smallest percentage decline occurred in the 20-24 age group, followed by the 15-19 age group. Unlike the earlier period, however, the largest decline between the 1996 and 2006 surveys occurred among the 45-49 age group. From the 25-29 age group, the percentage declines grow increasingly larger with each older cohort. These data show that childbearing in Nepal is becoming increasingly concentrated among women in their early 20's as fertility rates have fallen faster among women age 25-49 than among women age 15-24. It is interesting to note that by the 2006 survey, the age-specific fertility rates among women age 30-34 are lower than those among women age 15-29.

Information from birth histories in the 2006 NDHS allows the calculation of ASFRs for specified reference periods before the survey; these ASFRs provide further evidence of a recent fertility decline. However, if the timing of births is not reported correctly, trends in fertility could be

distorted. Furthermore, ASFRs are progressively truncated over time. Nevertheless, the results presented in Table 5 indicate that the largest decline (31 percent) in fertility among women age 15-29, from 3.6 births to 2.5 births per woman during the 15-19 years before the survey, occurred during the 0-4 years before the survey. The second largest decline in fertility (20 percent) took place between 5-9 and 0-4 years before the survey. Fertility declined by 11 percent between 10-14 and 5-9 years before the survey and by only 4 percent between 15-19 and 10-14 years before the survey.

Table 5 ASFRs for five-year periods preceding the 2006 NDHS, by mother's age at child's birth, Nepal 2006

	Number of years preceding the survey			
Mother's age at birth	0-4	5-9	10-14	15-19
15-19	106	144	143	142
20-24	233	260	302	303
25-29	152	206	244	271
30-34	92	136	177	[229]
35-39	55	75	[126]	
40-44	23	[47]		
45-49	[3]			

Note: Age-specific fertility rates are per 1,000 women. Estimates in brackets are truncated. Rates exclude the month of interview
Source: MOHP, New ERA, and Macro International Inc. (2007)

4.3 Fertility differentials

In this paper differential fertility is examined with respect to residence, ecological zone, development region, education, and caste/ethnicity and religion. Examining changes in fertility by these background characteristics provides a better understanding of the context for the fertility decline in Nepal.

4.4 Fertility by residence

According to Nepal's 2001 Population Census, about 86 percent of the population of Nepal resides in rural areas (CBS and UNFPA/Nepal, 2002)[2]. Although the remaining 14 percent of the total population are classified as urban residents, many of them do not exhibit urban characteristics.

The urban TFR in Nepal calculated from both the 2001 and 2006 surveys was 2.1 births per woman (Table 6). In contrast the TFR in rural areas declined by 24 percent, between the 2001 and 2006 surveys. This finding indicates that the fertility declines observed in the national TFR were primarily due to changes in rural areas. As with the national TFR, in the rural areas, the age group with the smallest percentage decline in rural areas was 20-24. Percentage declines were largest among the oldest age groups.

[2] Although according to the 1991 census of Nepal, the proportion of urban population was 9.2 percent; by the end of 1997 this proportion had changed to 12.7 percent because of the reclassification of some rural areas as urban centres (Bastola, July 2000). In 1991 there were 33 municipalities, but at the beginning of 1992 an additional 3 areas were designated as urban areas. Further, at the beginning of 1997, 15 more areas were designated as urban, and at the end of 1997 still another 7 more areas were designated as urban areas.

Table 6 Estimated ASFR and TFR by urban versus rural residence for the three years preceding the 2001 and 2006 NDHS surveys, Nepal

	Urban			Rural		
Age group	2001	2006	Percent change	2001	2006	Percent change
15-19	72	72	0.0	114	103	-9.6
20-24	153	168	9.8	261	248	-5.0
25-29	102	113	10.8	217	151	-30.4
30-34	60	40	-33.3	146	93	-36.3
35-39	28	25	-10.7	87	52	-40.2
40-44	2	8	300.0	38	17	-55.3
45-49	0	1	*	8	2	-75.0
TFR	2.1	2.1	0.0	4.4	3.3	-25.0

Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)
* The percent change cannot be calculated for urban women age 45-49.

4.5 Fertility by ecological zones

Nepal is characterized by three distinct geographic areas running east to west, referred to as the mountains, the hills and the terai. The mountain areas above 16,000 feet in altitude account for almost 35 percent of the total land area of the country and about 7 percent of the country's total population. The fertility level in the mountain zone has remained high. In 2001 the TFR was estimated at 4.8 (Table 7), almost 20 percent higher than the national rate of 4.1 (Table 3), and in 2006 the corresponding figures were 4.1 and 3.1, respectively.

The hills account for 44 percent of the total land of the country and about 44 percent of the total population. The hills have the lowest fertility level; the TFR was 4.0 in 2001 and 3.0 in 2006.

Slightly more than one-fifth of the total land area and about 48 percent of the total population are located in the terai. The TFR in the terai was estimated at 4.1 in 2001 and 3.1 in 2006 (Table 7). Fertility declines were observed in all three ecological zones, but the decline has been slowest in the mountain zone. As a result, the difference between the TFR in the mountains and the rest of Nepal is larger in 2006 than it was in 2001. The increase in the age specific fertility rate among women 15-19 in the mountain zone (93 to 102) calls for special attention, especially given that fertility declined among this age group in the hills and the terai. In all ecological zones, 50 percent or more births were to women age 20-29.

Table 7 Estimated ASFR and TFR by ecological zone for the three years preceding the 2001 and 2006 NDHS surveys, Nepal

	Mountain			Hill			Terai		
Age group	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change
15-19	93	102	9.7	95	83	-12.6	125	111	-11.2
20-24	247	245	-0.8	225	213	-5.3	269	251	-6.7
25-29	234	190	-18.8	205	137	-33.2	202	145	-28.2
30-34	200	127	-36.5	137	94	-31.4	128	71	-44.5
35-39	107	99	-7.5	90	53	-41.1	70	36	-48.6
40-44	63	39	-38.1	37	15	-59.5	28	13	-53.6
45-49	15	17*	13.3	8	1	-87.5	4	1	-75.0
TFR	4.8	4.1	-14.6	4.0	3.0	-25.0	4.1	3.1	-24.4

* Age-specific rate of women age 45-49 is based on less than 125 woman-years of exposure.
Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

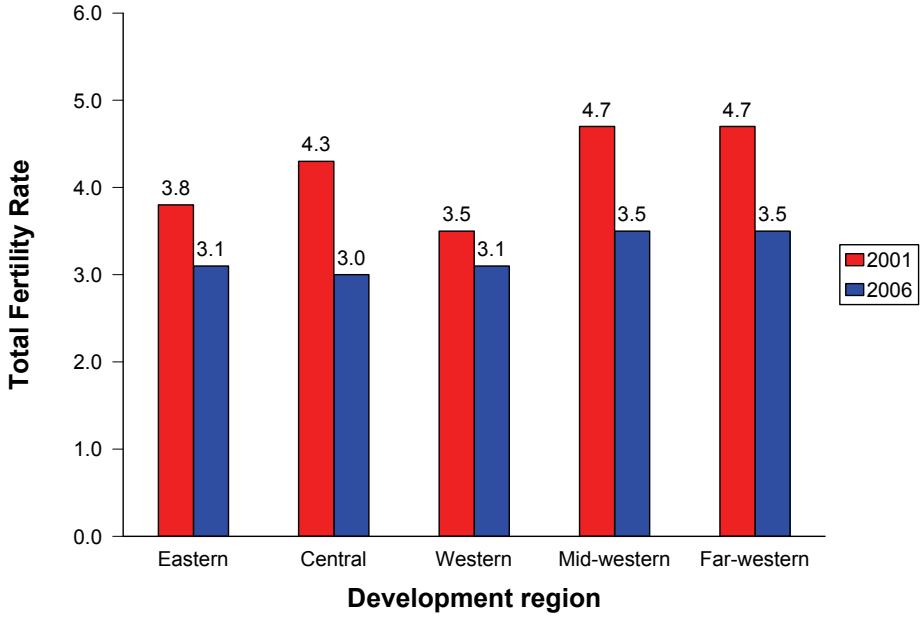
4.6 Fertility differentials by development regions

Among the five development regions of Nepal, in general, the level of social and economic development is highest in the Eastern region, followed by the Central, Western, Mid-western and Far-western regions.

For example, the human development indices for the Far-western region (0.404) and the Mid-western region (0.402) were lower than for the Western (0.491), Central (0.490), and Eastern regions (0.493) (United Nations Development Program, 2004). One would therefore expect fertility rates to be lowest in the east and highest in the mid-west and far-west. TFR is also comparatively lower in the Central region primarily because this is where the three big cities in the Kathmandu Valley (Kathmandu, Patan and Bhaktapur) are located. Total fertility rates for each development region have been estimated for the three years preceding the 2001 and 2006 NDHS surveys (Figure 3).

Fertility levels declined in all development regions between 2001 and 2006. The regions with the highest fertility rates according to the 2001 survey experienced the greatest declines, resulting in smaller differences in fertility rates among the five development regions in 2006. The decline was the greatest in the Central development region; the TFR in this region (3.0) was the lowest in the country (Figure 3). The age pattern of fertility was similar in all five development regions in 2001 and 2006 in that it peaked at age 20-24. However, fertility rates were higher for age 15-19 in 2006 than in 2001 in the Eastern and Mid-western development regions (data not shown).

Figure 3 Total Fertility Rate by Development Region, Nepal 2001 and 2006

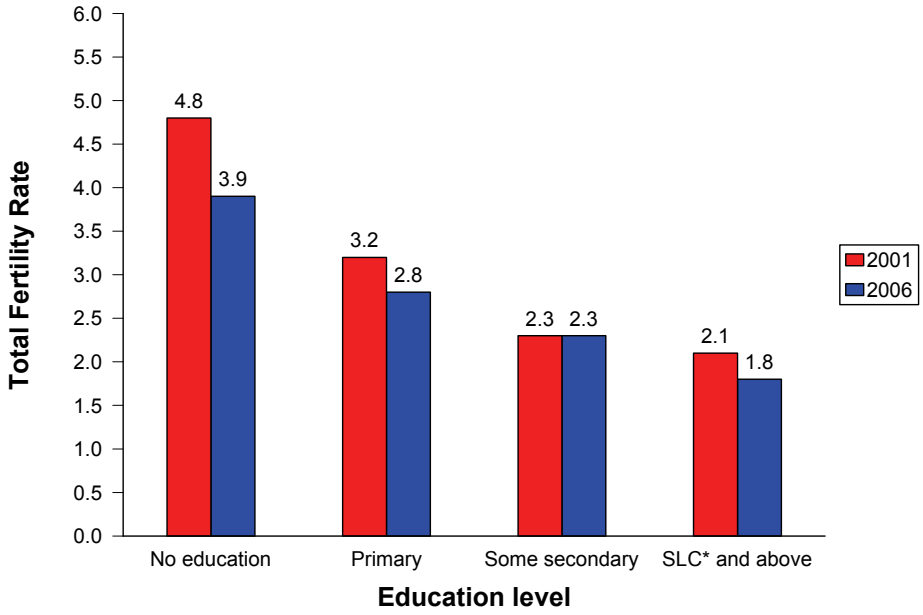


Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

4.7 Fertility differentials by education

In general, fertility is inversely related to education. Both the 2001 and 2006 surveys showed that women with no education had the highest fertility. Between the 2001 and 2006 surveys, fertility declined among women in every educational level, with the exception of women with some secondary education (Figure 4). The greatest percentage decline occurred among women with no education.

Figure 4 Total Fertility Rate by Education Level, Nepal 2001 and 2006



Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)
* School Leaving Certificate, i.e., completed 10 years of schooling

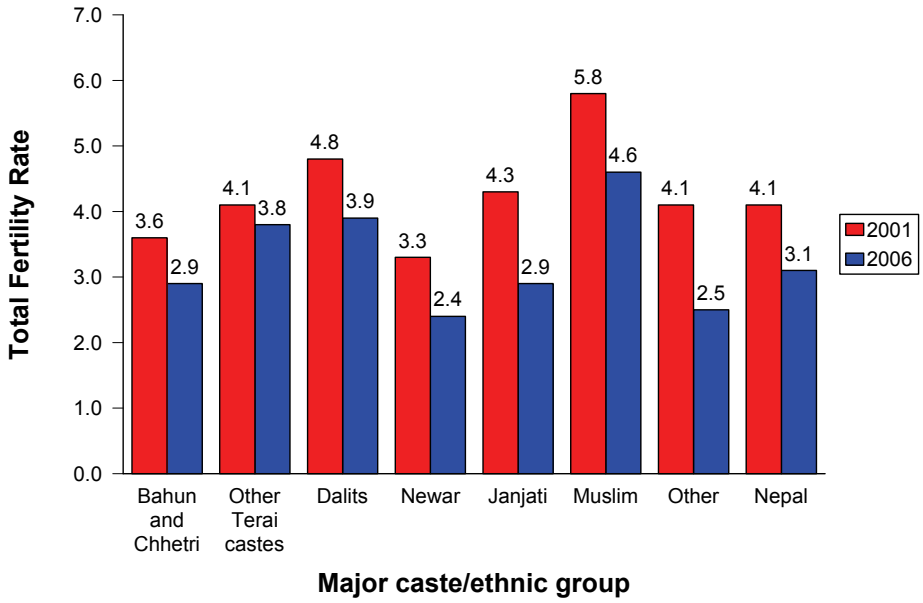
The fertility gaps between women with no education and those with primary or secondary education narrowed between 2001 and 2006. However, women with SLC and above continue to have a TFR that is less than half that of women with no education. Compared to the 2001 survey data, the 2006 data showed an increase in fertility among women age 15-19 with primary or no education, whereas fertility decreased among educated women (data not shown).

4.8 Fertility differentials by castes/ethnicity and religion

Although the 2001 Population Census identified 100 castes or ethnic groups in Nepal (Central Bureau of Statistics and United Nations Population Fund, 2002), 90 of these groups represent less than 2 percent of the total population. Because the number of cases in many of these castes and ethnic groups is small, fertility cannot be estimated for them. However, TFRs have been estimated for the larger groups.

Figure 5 shows TFRs for the major caste/ethnic groups. Fertility was highest among Muslim women. The Bahun (Brahmin) and Chhetri caste group had the second lowest TFR (3.6) in 2001; this group also had a low TFR (2.9) in 2006. "Other terai castes" comprises 25 different castes. Their TFR was 4.1 in 2001 and 3.8 in 2006. This group experienced the slowest decline (-7 percent) in fertility among all major castes and ethnic groups. Fertility among Dalit women was nearly 5 in the three years preceding the 2001 survey, but declined by nearly one child in the three years preceding the 2006 survey. Dalit women had the second highest fertility rate after Muslim women, and their pace of decline (-19 percent) was the second slowest after the other terai group. Newar women had the lowest TFR in 2001 (3.3) and 2006 (2.4). The Janjati group comprises 23 groups. The TFR of Janjati women was 4.3 in the three years preceding the 2001 survey; their TFR declined by 32 percent to 2.9 in the three years preceding the 2006 survey. Both the 2001 and 2006 surveys showed that Muslim women had the highest TFR of the seven major caste and ethnic groups. However, fertility declined among Muslim women between 2001 and 2006. Women in the "other" category had a TFR of 4.1 in 2001 and 2.5 in 2006.

Figure 5 Total Fertility Rate of Major Caste and Ethnic Groups, Nepal 2001 and 2006



Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

5 Intermediate determinants of fertility

5.1 Marriage and exposure to the risk of pregnancy

Marriage marks the point in a woman's life when childbearing becomes socially acceptable. Age at first marriage has a major effect on childbearing because women who marry early have, on average, a longer period of exposure to the risk of becoming pregnant and a greater number of lifetime births. The median age at first marriage among women age 20-49 over the last ten years has increased steadily from 16.4 years in 1996 (Pradhan, A., et al, 1997) to 16.6 years in 2001 (MOH, New ERA and ORC Macro 2002) and further to 17.2 years in 2006 (MOHP, New ERA and Macro International Inc 2007). The increase was particularly noticeable between the 2001 and 2006 surveys.

Age at first marriage can also be assessed by calculating the percentage of women age 15-19 who had ever married. Table 8 shows the proportion of women ever married by age. The proportion of women age 15-19 who had ever married decreased from 40 percent in 2001 to 32 percent in 2006. This pattern supports the conclusion that age at marriage has risen in Nepal, as suggested by the data on median age at first marriage.

Table 8 Percentage of women age 15-49 who have ever been married and who have had sex in the past four weeks, by age, Nepal 2001 and 2006

	Ever married			Had sex within the past 4 weeks		
Age group	2001	2006	Ratio: 2006/2001	2001	2006	Ratio: 2006/2001
15-19	40.3	32.3	0.80	68.6	22.0	0.32
20-24	82.9	82.1	0.99	67.0	51.6	0.77
25-29	95.5	95.6	1.00	70.8	62.6	0.88
30-34	97.5	98.4	1.01	76.7	67.2	0.88
35-39	98.1	98.6	1.01	76.5	71.0	0.93
40-44	98.9	98.8	1.00	70.8	70.3	0.99
45-49	98.6	98.8	1.00	62.0	58.7	0.95
Total	82.1	80.1	0.98	70.4	53.4	0.76

Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

The surveys also included questions on recent sexual activity, although responses to this question might not be completely reliable because of the sensitivity and privacy associated with the issue. An assessment of these data can be used to determine whether out-migration of males from Nepal was associated with decreased exposure to pregnancy risk between 2001 and 2006 and, thus, with the decline in fertility during this period. Overall, 53 percent of all women reported having had sex in the last four weeks in 2006, compared to 70 percent in 2001 (Table 8). More substantial changes occurred among younger women. Overall, 24 percent fewer women reported having had sex in the past four weeks in 2006 than in 2001. The decline was highest among women age 15-19, who also accounted for the largest contribution to fertility reduction in 2006.

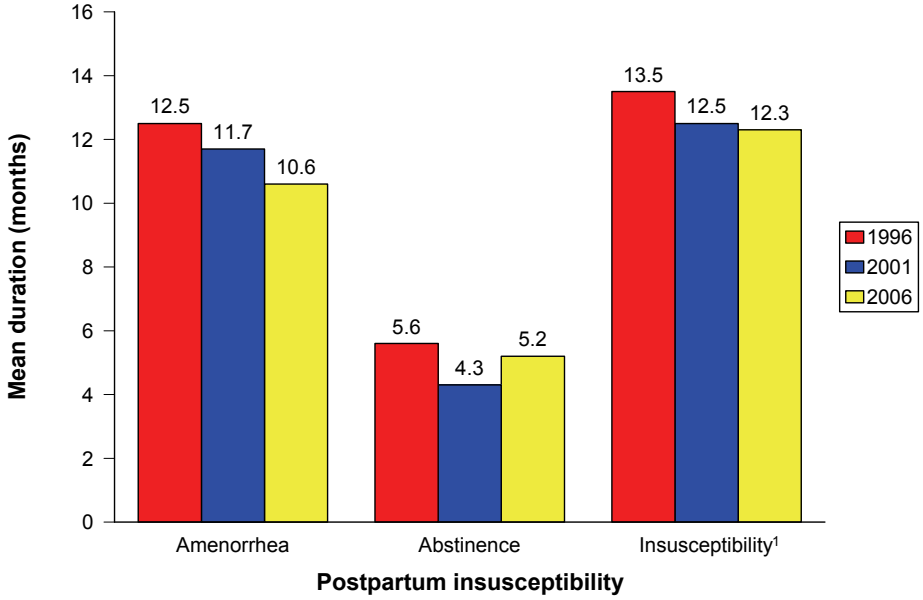
The proportion of currently married women whose husbands were away from home increased from 22 percent in 2001 to 26 percent in 2006 (data not shown). Among women who were living with their husbands at the time of the survey, 85 percent in 2001 and 88 percent in 2006 had been sexually active in the last four weeks. In contrast, 19 percent of women whose husbands were not residing with them reported having had sex in the past four weeks in 2001; the corresponding rate was 18 percent in 2006. Ninety-eight percent of women whose husbands were away and who reported having had sex in the past four weeks in 2006 were away for less than one month. Corresponding data for the 2001 survey are not available.

Labour migration and the displacement of individuals as a result of the internal conflict may have contributed to the increase in the proportion of women not marrying and the proportion of married couples living apart. For example, during the period from mid 2002-2006, some 517,000 Nepalese left Nepal, nearly all of whom were males, to seek employment in other countries (Ministry of Labour and Transport Management, 2007). Similarly, the People's War of the Communist Party of Nepal Maoists lasted from February 13, 1996 (Karki, 2004) to April 24, 2006. During the insurgency, thousands of people died, many became homeless or displaced, and thousands fled their place of residence. Reliable data on the displaced population are not available but according to the Informal Sector Service Centre (2005), in 2004 alone 12,157 persons were displaced internally due to the conflict.

5.2 Postpartum insusceptibility

In addition to marriage, a woman's exposure to the risk of pregnancy is influenced by postpartum factors. Postpartum amenorrhea—which is largely determined by the duration and intensity of breastfeeding—and postpartum abstinence, are the two determinants of the duration of postpartum insusceptibility to becoming pregnant. The mean duration of insusceptibility has decreased steadily in Nepal from 13.5 months in 1996 to 12.5 months in 2001 and 12.3 months in 2006 (Figure 6). The duration of postpartum amenorrhea decreased from 12.5 months in 1996 to 11.7 months in 2001, and 10.6 months in 2006. The duration of postpartum abstinence declined from 5.6 months in 1996 to 4.3 months in 2001 but it then increased to 5.2 months in 2006. These changes imply that women in Nepal experienced slightly shorter periods of insusceptibility to the risk of pregnancy following a birth in 2006 than in earlier years.

Figure 6 Mean Duration (Months) of Postpartum Amenorrhea, Abstinence, and Insusceptibility to Pregnancy Risk, Nepal 1996, 2001, and 2006



[1] Amenorrheic or abstaining
Source: Pradhan, A., et al. (1997), MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

5.3 Abortion

Until recently abortion was illegal in Nepal. In March 2002, Nepal's Parliament approved legislation to permit abortion on request during the first 12 weeks of pregnancy for any reason. Abortion also became legal during the first 18 weeks of pregnancy in cases of rape or incest, and up to any gestation in case of disability, risk to the woman's life or fetal deformity (Thapa, S. 2004).

To provide safe abortion services, Nepal's parliament developed and passed the 2002 National Safe Abortion Policy and Procedural Process (MOH, Annual Report 2003/2004). The first Comprehensive Abortion Care (CAC) unit was started in 2004 at the Maternity Hospital, Kathmandu. From mid July 2004 to mid July 2007, cumulatively 132,205 first trimester abortions have been performed in the country. Seventy-one of Nepal's 75 districts (with the exception of Kalikot, Terathum, Rolpa, Rukum and Salyan) have at least one CAC service centre.

The total abortion rate can be used to assess the relationship between induced abortions and fertility. This rate is equivalent to the TFR but includes only induced abortions (rather than births) in the numerator. Information about pregnancy outcomes was collected in the 2001 and 2006 NDHS surveys. In 2001, 92 percent of pregnancies resulted in a live birth and 8 percent ended in a non-live birth—2 percent in a stillbirth, 5 percent in a spontaneous abortion, and 0.7 percent in an induced abortion. In 2006, the corresponding figures were 90 percent resulting in a live birth and 10 percent in a non-live birth; of the non-live births, 2 percent were stillbirths, 5 percent were spontaneous abortions, and 2.4 percent were induced abortions. The total induced abortion rates based on this information are 0.03 abortions per woman in 2001 and 0.09 in 2006. These figures appear to under represent the true abortion rate and were therefore not used in calculating the abortion index.

Information from other sources indicates that induced abortion is commonly practiced in Nepal (Thapa et al, 1992; Tamang et al., 2000; Thapa and Paddhya, 2001; Bird et al., 2005; Malla et al., 2006). Data collected by the government on the number of abortions reported since 2004 are provided in Table 9.

Table 9 Number of induced abortions in Nepal, mid-2004 to mid-2007

Dates	Number of abortions
Mid July 2004 to mid July 2005	11,521
Mid July 2005 to mid July 2006	47,210
Mid July 2006 to mid July 2007	73,474
Total	132,205

Source: MOHP. Annual Report 2005/06 and MOHP/FHD and Ipas. 2007. CAC Status of Nepal: From 5th March 2004 - mid June 2007. Department of Health Services and Ipas. Teku. Kathmandu. Personal communication.

Based on the number of registered abortions and the number of women age 15-44, the abortion rate was 0.25 abortions per woman[3]. The abortion service statistics are for first-trimester abortions only. Also, because 2001 data are not available for comparison purposes, they were not included in the proximate determinants equation.

5.4 Application of the model of proximate determinants of fertility

The proximate determinants of fertility refer to the behavioral and biological mechanisms by which fertility is reduced below its biological maximum. Bongaarts (1978, 1982) identified four proximate determinants that accounted for the majority of variation in fertility levels observed across populations: marriage, contraception, induced abortion and postpartum infecundability (referred to in this paper as postpartum insusceptibility). The model is written as:

$$TFR = TF \times C_m \times C_c \times C_a \times C_i,$$

where TFR = total fertility rate; TF = total fecundity rate; C_m = index of marriage; C_c = index of contraception; C_a = index of abortion; and C_i = index of insusceptibility.

The index of marriage, C_m, is simple to estimate. As Bongaarts has shown, the index is equal to the ratio of the total fertility rate to the total marital fertility rate. The index of marriage equals one when all women of reproductive age are in a union and zero when no women are in a union. Marriage in this context refers to both formal marriage and consensual unions. Implicit in the use of the index is the assumption that only women in union are exposed to the risk of childbirth. This assumption holds reasonably well in Nepal where childbearing outside of marriage is virtually non existent.

The index of contraception, C_c, incorporates both prevalence of contraceptive use and estimated effectiveness of the mix of methods used. It equals one if no form of contraception is used and zero if all fecund women use modern methods that are 100 percent effective.

The index of insusceptibility, C_i, is calculated using the mean number of months of postpartum insusceptibility. It equals one in the absence of breastfeeding and postpartum abstinence and zero when infecundability is permanent.

When all indices equal one, fertility is at its biological maximum. Based on studies of historical populations with the highest recorded fertility, Bongaarts recommends using 15.3 as the maximum number of births per woman; this is referred to as the total fecundity rate (Bongaarts, 1978

[3] The total abortion rates from the 2001 and 2006 NDHS survey data were estimated using pregnancy outcomes data collected over the ten years preceding the surveys. In 2001, the number of abortions each year was estimated using an induced rate of 0.7 percent. This induced rate was the numerator and the number of women age 15-44 was the denominator in the following equation: 30*number of annual abortions ÷ number of women age 15-44. The same procedure was used for the 2006 data.

and 1982). This value is the theoretical number of births that a woman would have if she were continuously married from age 15 to 44, did not use contraceptives, did not breastfeed and did not abort any pregnancies. Multiplying all of the indices together by the total fecundity rate of 15.3 produces the predicted TFR for the population. The predicted TFR will typically differ from the observed TFR because of the underreporting of births; misreporting of behaviors measured by the indices; or omission of proximate factors that help determine fertility levels in the population under study, such as induced abortions.

Table 10 presents the predicted TFR using the indices of marriage, contraception, and postpartum insusceptibility for 2001 and 2006. The predicted TFR of 4.9 in 2001 and 4.3 in 2006 are higher than the observed rates of 4.1 and 3.1 respectively. One possible reason for this discrepancy is that the index of marriage might overestimate the proportion of married women exposed to the risk of pregnancy because it does not take into account the proportion of married women not residing with their husbands.

Table 10 Proximate determinants model indices, Nepal 2001 and 2005

Indexes	2001	2006	Percent change
Index of marriage, C_m	0.81	0.75	-7.4
Index of contraception, C_c	0.62	0.54	-12.9
Index of postpartum insusceptibility, C_i	0.65	0.65	0.0
Index of exposure, C_e	0.84	0.80	-4.8
Total fecundity rate	15.30	15.30	na
Predicted fertility using $C_m \times C_c \times C_i$	4.9	4.3	-12.2
Predicted fertility using $C_m \times C_c \times C_i \times C_e$	4.1	3.2	-22.0
Observed fertility (three-year rate)	4.1	3.1	-24.4

na = Not applicable

Accounting for the effect of women's separation from their husbands on fertility requires detailed data on women's living arrangements and corresponding fertility history but such data are not available. Alternatively, as previous literature states, an index of exposure can be estimated to examine the effect of spousal separation on fertility (Blanc, 2004). A ratio between the total fertility rate and the marital fertility rate that includes only women who are residing with their spouses can give some indication of the spousal separation effect on fertility. Table 10 shows the predicted TFR for 2001 and 2006 with the addition of the index of exposure (which was 0.84 in 2001 and 0.80 in 2006). These values yield predicted fertility rates of 4.1 for 2001 and 3.2 for 2006. The predicted rate matches the observed rate in 2001. However, the predicted TFR is slightly higher than the observed TFR in 2006.

The index of marriage reflects a decrease in the proportion of women married between 2001 and 2006. This decline might be due to one or more of three changes in marriage patterns:

1. An increase in the median age at marriage;
2. An increase in the proportion of women who never marry; and
3. An increase in the dissolution of marriages.

Any of these three changes in marital patterns can reduce total fertility by lowering women's exposure to the risk of becoming pregnant. As seen in Table 8, the only change in the proportion of women married between the 2001 and 2006 surveys is in the 15-19 age group. The reduction in the marriage index was most likely entirely due to later age at marriage. The decrease in the marriage index relative to changes in other proximate determinants was second largest (7 percent) (Table 10). Therefore, the change in the percentage of married women accounts for a large proportion, but not all the decline in predicted TFR between 2001 and 2006.

Table 10 clearly shows that contraception, postpartum insusceptibility, marriage, and reduced risk of exposure to pregnancy contribute to fertility reduction in 2001 and 2006. In the last five years between 2001 and 2006, however, contraception had the largest impact, followed by the indices of marriage and then exposure.

The index of postpartum insusceptibility indicates that the long duration of breastfeeding in Nepal has a substantial influence on fertility. The small decrease in average duration of postpartum insusceptibility from 2001 to 2006 was not large enough to result in an increase in the index of postpartum insusceptibility; that index remained unchanged from 2001 to 2006. The lack of change in the index indicates that postpartum insusceptibility is not responsible for any of the decline in predicted TFR from 2001 to 2006. Reduced exposure to pregnancy due to spousal separation is playing an increasing role in depressing fertility in Nepal. Because the index of exposure was lower in 2006 than in 2001, it is clear that increasingly fewer women are exposed to the risk of pregnancy due to the increasing out-migration of males and the population's displacement during the insurgency.

5.5 TFR and contraceptive prevalence rate (CPR)

Research elsewhere has shown that a strong correlation exists between TFR and the contraceptive prevalence rate (CPR) at the country level (Rossand Frankenberg, 1993). In Nepal, national data on TFR and CPR have been available since 1976. Table 11 shows that TFR and CPR are strongly correlated in Nepal.

Table 11 CPR using any method, CPR using the modern method, and TFR by DHS survey year, Nepal 1976-2006

Survey year	CPR any method	CPR modern method	TFR	Source
1976	3.0	2.3	6.3	Goldman, N., et al (1979)
1981	6.8	6.8	5.9	MOH, 1983
1886	15.1	15.1	6.0	MOH, 1987
1991	25.1	24.1	5.1	MOH, 1993
1996	28.5	26.0	4.6	Pradhan et al, 1997
2001	39.3	35.4	4.1	MOH, New ERA and ORC Macro (2002)
2006	48.0	44.2	3.1	MOHP, New ERA and Macro International Inc (2007)

The correlation coefficient between TFR and CPR was -0.955, and it was significant at the $p<0.01$ level. A linear regression of the TFRs and CPRs produces the following equation:

$$TFR = 6.648 - .068 * (CPR) \ (r^2=0.955)$$

Using this equation, the predicted TFR for 2006 was 3.4 while the observed TFR was 3.1. When Nepalese data is used with the above equation, the result is close to the linear regression result based on data from about 100 surveys in developing countries (TFR = 7.29-.070*[CPR]). Results from these surveys have shown that a 15-percent increase in the CPR is generally associated with a one-child decline in TFR (Ross and Frankenberg, 1993). This relationship between the expected decline in TFR concomitant with an increase in CPR is also consistent with the findings reported by the World Bank (1993). Some differences between the regression equation from Nepal and that generated from the data of 100 surveys in developing countries should be noted. First, the predicted TFR for Nepal in 2006, assuming no contraceptive use, would be 6.648 . This is lower than the 7.3 children per woman from the 100 surveys. Second, the r^2 value for the regression equation from 100 surveys is 0.88, compared to 0.955 for Nepal. This shows that the relationship between contraceptive use and fertility is stronger in Nepal than in other countries.

In the Nepal model, the increase in contraceptive use explains roughly 95 percent of the decline in fertility. This means that changes in other determinants of fertility have had very little effect. To understand the fertility decline in Nepal, therefore, it is appropriate to examine factors related to the increase in contraceptive use.

5.6 Trends in contraceptive use

The level of modern contraceptive use in Nepal has risen steadily over the last ten years (Table 12). Current use of contraception among currently married women increased from 29 percent in 1996 to 39 percent in 2001 and 48 percent in 2006. The increase in current use of modern contraceptives among currently married women was slightly higher (38 percent) in 1996-2001 than in 2001-2006 (22 percent). The proportion of contraceptive users who use modern methods (sterilization, injection, condom, pill, or intrauterine device [IUD]) has remained consistently high over the past 10 years, with only 8 to 10 percent using traditional methods such as withdrawal and abstinence. High levels of modern method use could help explain why the correlation between contraceptive use and fertility in Nepal is stronger than in the 100 surveys analyzed by Ross and Frankenberg (1993). Although male and female sterilization accounted for the largest share of modern contraceptive use in the 1996, 2001, and 2006 NDHS surveys, the proportion of contraceptive users undergoing sterilization has declined from 61 percent in 1996 to 51 percent in 2006. The proportion of contraception users using spacing methods (injection, condom, pill, implant, and IUD) increased from 30 percent in 1996 to 36 percent in 2001 and 41 percent in 2006.

Table 12 Percentage of currently married women age 15-49 currently using a contraceptive method by survey year and method, Nepal 1996, 2001, and 2006

			Modern Method							Any tradi-	Traditional method				
Survey year	Any method	Modern method	Female steriliza-tion	Injec-tions	Male steriliza-tion	Condom	Pill	Im-plants	IUD	tional method	Periodic absti-nence	With-drawal	Other	Not using	Number
1996	28.5	26.0	12.1	4.5	5.4	1.9	1.4	0.4	0.3	2.5	0.9	1.4	0.2	71.5	7,982
2001	39.3	35.4	15.0	8.4	6.3	2.9	1.6	0.6	0.4	3.9	1.1	2.6	0.3	60.7	8,342
2006	48.0	44.2	18.0	10.1	6.3	4.8	3.5	0.8	0.7	3.7	1.2	2.6	0.0	52.0	8,257

Source: Pradhan, A, et al. (1997), MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

Table 17 shows that the use of family planning methods by age has an inverted "U" shape, with use being lower among younger and older women than among those at intermediate ages. Between 2001 and 2006, changes in contraceptive use were greatest (33.3 percent) among women age 15-19, followed by women age 20-24 (30.6 percent) and women age 40-44 (22 percent). The percent change in the use of contraceptives was low among women age 30-39 and 45-49.

Table 13 Percentage distribution of currently married women using contraceptives by age and urban or rural residence, Nepal 2001 and 2006

	Nepal			Urban			Rural		
Age group	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change
15-19	12.0	16.0	33.3	24.5	37.6	53.5	11.2	13.3	18.4
20-24	23.4	30.6	30.8	48.7	48.1	-1.2	20.7	27.4	32.2
25-29	40.2	48.4	20.4	58.8	57.6	-2.0	38.1	46.5	22.1
30-34	53.4	63.1	18.2	79.2	69.0	-12.9	50.4	62.0	23.0
35-39	56.3	64.8	15.1	80.0	71.4	-10.8	53.5	63.7	19.1
40-44	51.8	63.2	22.0	63.2	71.5	13.1	50.6	61.7	22.0
45-49	40.0	45.9	14.8	58.7	59.6	1.5	38.1	43.9	15.3
Total	39.3	48.0	22.1	62.2	60.0	-3.5	36.9	45.9	24.2

Source: MOH, New ERA, and ORC Macro (2002) and MOHP, New ERA, and Macro International Inc. (2007)

The change in contraceptive use between 2001 and 2006 was highest (54 percent) among urban women age 15-19, followed by women age 40-44 (13 percent). In urban areas, contraceptive use declined among women age 20-39 between 2001 and 2006 (Table 13). In rural areas, contraceptive use increased in all age groups between 2001 and 2006, with the greatest change (32 percent) occurring among women age 20-24. Except for women age 45-49, contraceptive use has increased in women in Nepal between 2001 and 2006.

Of Nepal's three ecological zones, the hill zone had the highest overall increase (25 percent) in contraceptive use among women between 2001 and 2006, followed by the mountain (21 percent) and terai zones (20 percent)(Table 14). Women age 15-19 were the only group that experienced a decline in contraceptive use in the mountain region; women in all other age groups in all three zones experienced an increase in contraceptive use between 2001 and 2006. Interestingly, increases in contraceptive use among women age 25-39 were low but much higher than among women age 20-24 and 40-49. In the hills, increases in contraceptive use were large among young women age 15-24. Although the increase in contraceptive use was substantial among terai women in all age groups, the increase was greatest among women older than 25 (Table 14).

Table 14 Percentage of currently married women using contraceptives by age and ecological zone, Nepal 2001 and 2006

	Mountain			Hill			Terai		
Age group	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change
15-19	14.3	11.4	-20.2	13.4	21.4	59.4	10.6	12.9	21.9
20-24	19.4	26.7	37.5	21.5	33.4	55.2	25.3	28.8	13.6
25-29	31.1	35.9	15.6	38.8	44.4	14.5	42.5	53.1	24.8
30-34	46.0	50.0	8.7	46.6	56.3	20.8	60.6	70.7	16.8
35-39	47.3	51.7	9.3	52.4	60.8	15.9	60.3	70.1	16.3
40-44	38.5	55.1	43.3	48.6	56.4	16.0	55.9	69.8	24.9
45-49	25.4	38.9	53.3	34.4	39.4	14.4	47.8	52.7	10.3
Total	31.8	38.5	21.1	36.6	45.6	24.6	42.6	51.1	20.0

Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

Compared to 2001, in 2006, there was a substantial increase (35 percent) in the use of family planning methods among women with no education and this increase is noticeable among all age groups but much higher among younger than older women (Table 15). Increased use of contraception is also noticeably higher among women who have primary education but the increase was less than 10 percent between 2001 and 2006. Use of contraception among women with some secondary or higher education was lower in 2006 than in 2001 (Table 15).

Table 15 Percent distribution of currently married women by family planning method currently used, according to age by education in 2001 and 2006

	No education			Primary			Some secondary			SLC and above		
Age group	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change
15-19	6.0	7.9	31.7	15.1	18.2	20.5	17.5	23.2	32.6	46.7	24.0	-48.6
20-24	17.4	26.3	51.1	23.0	30.2	31.3	36.2	35.3	-2.5	44.8	37.5	-16.3
25-29	33.7	48.6	44.2	47.7	50.2	5.2	63.1	43.2	-31.5	53.0	51.7	-2.5
30-34	47.3	60.7	28.3	63.7	65.3	2.5	78.6	71.1	-9.5	83.0	65.7	-20.8
35-39	52.6	62.9	19.6	71.3	68.5	-3.9	76.9	70.1	-8.8	90.5	79.1	-12.6
40-44	49.6	61.6	24.2	62.1	74.3	19.6	84.0	64.7	-23.0	80.0	76.9	-3.9
45-49	36.8	44.1	19.8	62.7	60.7	-3.2	64.7	56.0	-13.4	75.0	75.0	0.0
Total	36.6	49.3	34.7	41.7	45.5	9.1	48.5	42.9	-11.5	57.5	53.1	-7.7

Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

The Far Western region showed the highest percent increase in contraceptive use (66 percent) between 2001 and 2006, followed by the Midwestern region (28 percent), Central region (25 percent), Western region (11 percent) and Eastern region (9 percent, Table 16).

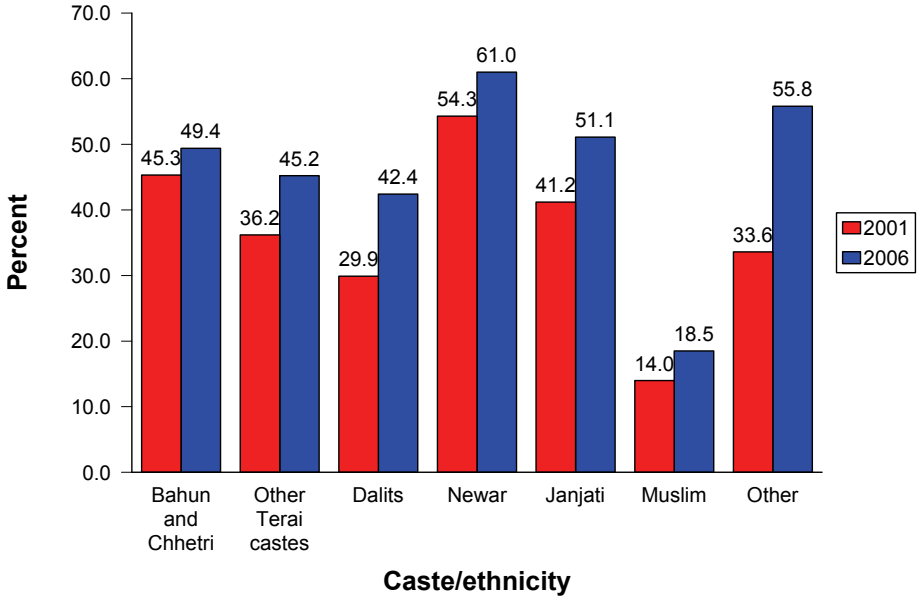
Table 16 Percent distribution of currently married women by family planning method currently used, according to age by development region in 2001 and 2006

	Eastern Development Region			Central Development Region			Western Development Region			Mid-western Development Region			Far-western Development Region		
Age group	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change	2001	2006	Percent change
15-19	18.2	16.6	-8.8	11.0	16.0	45.5	13.6	15.1	11.0	5.6	17.9	219.6	7.2	14.0	94.4
20-24	25.9	30.9	19.3	24.6	33.6	36.6	22.0	26.0	18.2	24.5	27.5	12.2	16.8	31.6	88.1
25-29	41.8	48.7	16.5	42.8	49.8	16.4	38.1	40.8	7.1	39.6	42.3	6.8	31.8	58.0	82.4
30-34	60.1	69.3	15.3	57.7	66.3	14.9	45.6	53.5	17.3	49.5	57.7	16.6	45.5	64.2	41.1
35-39	62.6	65.7	5.0	58.4	66.7	14.2	54.5	56.0	2.8	50.0	67.7	35.4	43.6	70.1	60.8
40-44	57.4	65.6	14.3	52.0	63.6	22.3	48.9	54.5	11.5	47.2	68.2	44.5	45.6	66.2	45.2
45-49	48.0	52.0	8.3	40.0	47.4	18.5	36.8	38.8	5.4	36.7	38.8	5.7	33.3	46.9	40.8
Total	45.7	49.9	9.2	40.1	50.0	24.7	37.0	41.0	10.8	35.6	45.4	27.5	31.2	51.8	66.0

Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

Newar women had the highest contraceptive prevalence rate (CPR) in 2001 (54 percent) and 2006 (61 percent – Figure 7). In 2001, CPR was second highest among Bahun/Chhetri women. In contrast in 2006, CPR was second highest among Janjati women (51 percent). CPR was lowest among Muslim women in both 2001 and 2006.

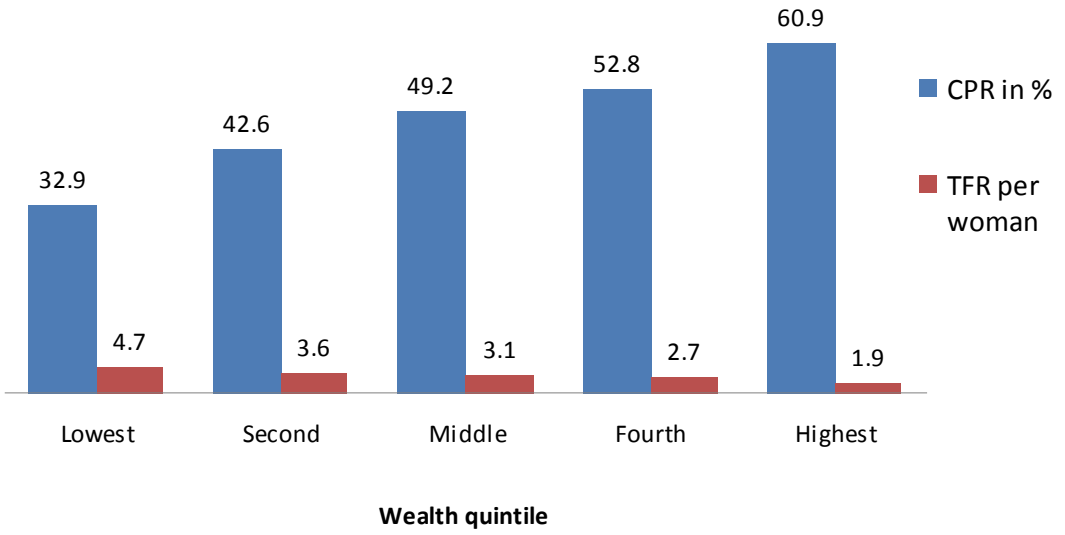
Figure 7 Percent of Currently Married Women of Different Caste/Ethnic Groups Using Contraception, Nepal 2001 and 2006



Source: MOH, New ERA, and ORC Macro (2002), and MOHP, New ERA, and Macro International Inc. (2007)

Data from the 2006 NDHS shows that wealth exerts a positive influence on contraceptive use, increasing as household wealth increases, from 33 percent among currently married women in the lowest wealth quintile to 61 percent among those in the highest wealth quintile. Wealth however exerts negative influence on fertility. Practice of contraception is low among poor women resulting in high fertility. As wealth increases contraceptive use increases too while fertility decreases (Figure 8).

Figure 8 TFR and CPR by Wealth Quintile, Nepal 2006



Source: MOHP, New ERA and Macro International Inc. (2007)

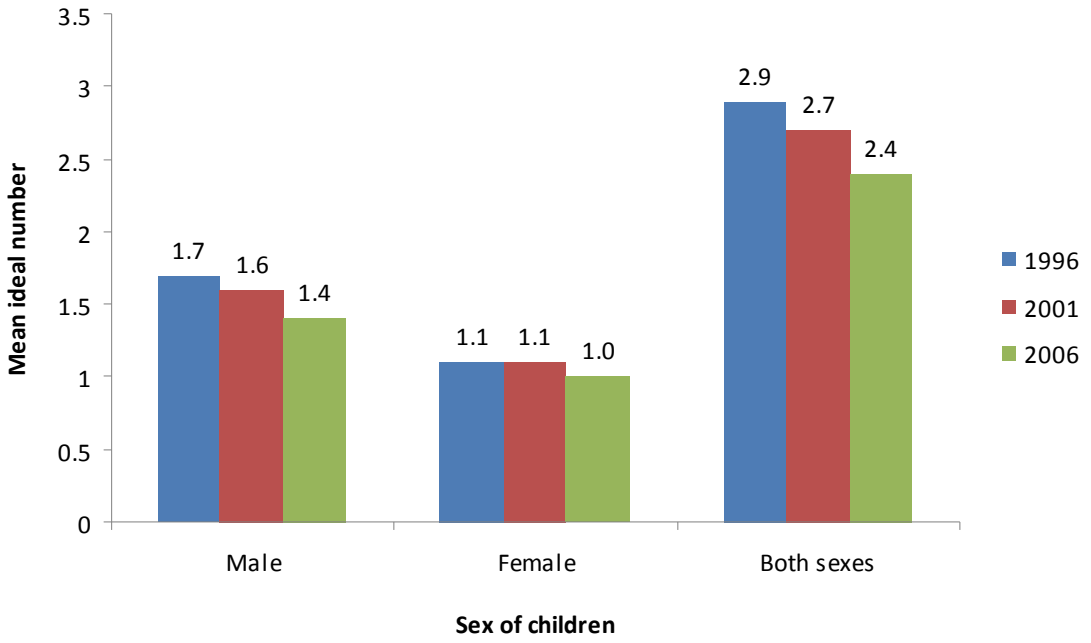
6 Antecedent factors affecting the intermediate determinants

Besides proximate determinants of fertility other contextual factors affect fertility indirectly. Fertility rates are affected by a number of factors including women's education, child mortality; cultural factors such as son preference and women's empowerment; urbanization, modernization, level of poverty, and male literacy; accessibility, affordability and availability of health services. The relative importance of each factor holding the influence of other factors constant, calls for multivariate analysis which has not been attempted here. However, recent data on many of these factors do indicate that some of these variables exert some independent influence on fertility.

Within the context of Nepalese society, fertility is inversely related to the level of female education, urban residence and wealth (Figure 4) (MOHP, New ERA and Macro International Inc, 2007). Couples in Nepal face social pressure to bear male children (Stash, S., 1996; Karki, Y. B., 1988) but along with the decline of ideal family size for currently married women over the years from 2.9 in 1996 (Pradhan, A, et al 1997), to 2.6 in 2001 (MOH, New ERA and ORC Macro, 2002) and further to 2.4 in 2006 (MOHP, New ERA and Macro International Inc, 2007), son preference has also declined from 1.7 in 1996 to 1.6 in 2001 and further to 1.1 in 2006 (Figure 9).

Access to public health services may also play a role in reducing fertility, independently of education and income. Apart from direct effects through improved access to contraception, public health services may reduce fertility by enhancing child survival. Substantial increases in antenatal care and vaccination coverage were recorded along with some increases in skilled attendance at delivery and the nutritional status of young children. For instance, the proportion of mothers who received antenatal care from a skilled birth attendant (SBA) was 44 percent in 2006, compared with 28 percent in 2001. Similarly, the proportion of women who made four or more antenatal visits during their pregnancy tripled during the last 10 years, from 9 percent in 1996 to 14 percent in 2001 and 29 percent in 2006 (MOHP, New ERA and Macro International Inc, 2007).

Figure 9 Mean Ideal Family Size by Number of Male and Female Children, Nepal 1996, 2001 and 2006



Source: MOH, New ERA and ORC MACROMOHP, New ERA and Macro International Inc. (2007)

In addition, the proportion of children age 12-23 months who are fully immunized almost doubled from 43 percent in 1996 to 83 percent in 2006. Both infant and under-five mortality rates declined considerably. The infant mortality rate fell from 79 deaths per 1000 live births in the mid 1990s to 48 deaths in the five-years preceding the 2006 survey. Similarly the under-five mortality rate fell from 118 deaths per 1000 births to 61 deaths during the same period. These lower rates of infant and child mortality are quite likely contributing to lower fertility as shown by other studies (Dreze, J., and M. Murthi, 2001).

7 Summary and conclusions

Nepal stands out among many developing countries in the world for its rapid decline in fertility over a relatively short period of time. TFR declined from 4.1 births per women during the three years preceding the 2001 survey to 3.1 births per woman in the three years preceding the 2006 survey representing a decline of one child within a five-year period. The analysis presented here shows that the actual level of fertility might be slightly higher than 3.1. However, this requires further research.

Attempts have been made here to examine the rapid decline in fertility that occurred between 2001 and 2006 using data from the two nationally representative demographic and health surveys. Of the four factors responsible for the decline in fertility in Nepal, contraceptive use stands out as the most important contributory factor for the fertility decline. Reduction in marriage rates or increase in the age at first marriage is the second most important factor in reducing fertility in the last five years. Fertility has declined in all age groups particularly among women age 25-49. Similarly ideal family size has declined which has contributed to lower total fertility rate. In recent years decline in coital frequency due mainly to out migration of husbands to work outside the country has contributed to the reduction in the exposure to pregnancy. The effect that family separation and out-migration has on

lowering fertility needs to be emphasized, also. The decade-long "People's War" has most likely contributed to the volume and pace of out-migration. It has been estimated, based on the 2006 Nepal DHS, that about 3.5 million people have been away from their homes for at least 6 months in 2000 (Thapa, S. 2008). The separation may have contributed to lower fertility particularly in the districts severely affected by the People's War. This aspect needs to be further analyzed in greater detail.

According to a recent estimate, contraceptive use averted between 562,000 and 617,000 births in the year 2001 in Nepal. This represents 67-73 percent of the reduction of total number of potential births **(**Liu L., Becker, S., Tsui, A. and Ahmed, S. Forthcoming). Since the mid 1970s to 2006, the most important factor contributing to fertility reduction in Nepal was found to be contraceptive use. Still the rate of increase in the use of modern contraceptive methods in the 2001-2006 survey period was slower (1.76 percentage point) than in the previous 5-year period (1.88 percentage point). The increase in CPR although impressive has still much room to expand. An analysis of the relationship between TFR and CPR by background characteristics shows that in general lower fertility is associated with higher CPR. In addition, a very clear pattern emerges between economic status, fertility and contraceptive use.

The rise in the proportion of unmarried women is also a factor in contributing to the decline in fertility between the 2001 and the 2006 surveys. Because non-marital fertility is minimal in Nepal, marriage plays an important role in influencing fertility. The median age at first marriage among women age 20-49 has increased steadily from 16.4 years 1996 to 16.6 years in 2001 and further to 17.2 years in 2006; the increase was particularly noticeable in the last five years.

Another factor that may have had a lesser impact on fertility decline is perhaps abortion. Although abortion has been in existence for a long time in Nepal it has been legalised only recently, and since 2004 the government of Nepal has started publishing clinic recorded abortion data. However, as the data were not in the form needed for making any calculations, no attempt was made to assess the extent to which abortion may have influenced fertility decline.

Data from the 2006 survey shows improvements in several health indicators since the mid 1990s. Increased access to and utilization of public and private health services and its subsequent impact on the decline in maternal and child mortality and demand for children, could contribute to further fertility decline. The changing political climate in Nepal and the move towards more a more stable government could mean that the decline in fertility is likely to be sustained and could eventually reach replacement level, and this may happen relatively soon.

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