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Levels and Trends in Fertility and Mortality in South Asia: A Review of Recent Evidence

Andrew Kantner and Shi-Jen He

Andrew Kantner is a Senior Fellow and Shi-Jen He is a Project Assistant in the Program on Population, East-West Center, Honolulu, Hawaii.

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Introduction

A general perception has emerged in recent years that countries in South Asia are undergoing rapid transitions to low fertility and mortality. The most spectacular decline in fertility has apparently occurred in Bangladesh, a country generally not considered to have experienced rapid socioeconomic transformation. However, substantial declines have also been recorded in India and Nepal over the past 10-15 years, and some evidence of recent fertility decline has been noted in Pakistan. In addition, impressive reductions in infant and child mortality have been reported from the region since the early 1980s. For example, current estimates indicate that infant mortality rates have now fallen to well below 100 infant deaths per 1,000 births in all South Asian countries.

The statistical information currently at hand provides encouraging evidence that a demographic transition is well underway in South Asia. Much of this evidence comes from surveys (primarily national demographic and health surveys) and sample registration data. Unlike earlier periods (e.g., the 1960s and 1970s), population censuses have been somewhat neglected of late as a source of information on demographic trends. In what follows, a brief review of the evidence will be presented in order to reach more definitive conclusions about the consistency and reliability of current demographic information from South Asia.

The Current Demographic Situation in South Asia

While there is evidence that population growth has recently decelerated in South Asia, there is certainly no doubt that South Asian population growth has been unprecedented over the past 45 years. Population estimates compiled by the United Nations Population Division (based largely upon official country statistics) indicate that all major countries in South Asia, with the exception of Sri Lanka, have seen their populations grow approximately 300 percent since 1951 (see Table 1). As of mid-year 1997, India is estimated to have the region's largest population (960.1 million), followed by Pakistan (144.2 million), Bangladesh (122.3 million), Nepal (22.6 million) and Sri Lanka (18.3 million).

These rapid gains in population size have been driven by high fertility, declining mortality, and the momentum of very young age structures. During the 1960s and 1970s, annual rates of natural increase were well above 2.00 percent throughout the region (see Table 2). United Nations estimates suggest that annual population growth only began to fall below 2.0 percent in India and Bangladesh during the 1990s. The populations of Nepal and Pakistan are still growing substantially above 2.00 percent over the period 1990-95.

The issue that requires further study is whether the fertility and mortality data reported by the United Nations are actually very reliable. As can be seen in Table 3, there is some inconsistency in vital rate estimates and total population projections compiled by the United Nations and the International Population Center of the United States Bureau of the Census, differences that are particularly notable in the case of Bangladesh and Pakistan. Such results naturally lead one to inquire about the range

of data sources available in each country, whether they are consistent, and whether diagnostic measures give one confidence in the reliability of vital rate estimates. More critically, is contrarian evidence that may raise doubts about the direction and tempo of South Asia's demographic transition being ignored? To address these questions, it is necessary to critically review the primary data sources available in each of the major countries in South Asia rather than rely upon secondary data compilations and notional projections.

Estimates of Fertility and Infant Mortality from Recent Census, Survey, and Sample Registration Data in South Asia

The range of data sources that measure fertility and mortality varies considerably in the South Asian region. Since 1981, Bangladesh has probably developed the most extensive variety of data sources. At the present time, the Bangladesh Bureau of Statistics implements decennial population censuses, a nationally representative sample vital statistics registration system, and a Health and Demographic Survey (BHDS) that collects information on morbidity and mortality, disease incidence, and coverage and treatment patterns for major health interventions. In addition, an extensive array of national surveys has been implemented since 1981 through the National Institute of Population Research and Training (NIPORT), Ministry of Health and Family Welfare; namely, biennial contraceptive prevalence surveys between 1981 and 1991, the 1989 Bangladesh Fertility Survey, and the 1993/94 and 1996/97 Bangladesh Demographic and Health Surveys. Responsibility for conducting these surveys was devolved to private-sector research firms in 1983 and constitutes an unusually successful collaboration between public and private-sector agencies in data collection and program evaluation. In addition to these resources, the International Centre for Diarrhoeal Disease Research (ICDDR,B) has maintained a complete registration system of births and deaths in Matlab thana for the past two decades (the Demographic Surveillance System - DSS) and a sample registration system (SRS) in extension project areas maintained by ICDDR,B.

In India, the Office of the Registrar General (ORG)/Census Office implements national population censuses every 10 years and conducts an annual national sample registration system (the SRS) that provides the only national vital rate time series for the country. Recently, a second major resource became available with the release of results from the 1992/93 India National Family Health Survey (NFHS). This survey, implemented by the International Institute for Population Sciences in Bombay in collaboration with 18 regional Population Research Centers (PRCs), provides information very similar in content and style to demographic and health surveys supported in other countries (e.g., in Bangladesh, Nepal, Pakistan, and Sri Lanka) by Macro International. A follow-on NFHS is planned for 1998. In addition, the Operations Research Group (ORG) in Baroda has implemented three rounds of an all-India family planning survey - the latest round taking place in 1988-89. In 1994, the National Council of Applied Economic Research in Delhi also implemented a national demographic and health survey. To date, only results from rural areas have been publically released.

Nepal is also reasonably data rich, having conducted three national surveys over the past decade - the 1986 National Fertility Survey (NFS), the 1991 Fertility, Family Planning, and Health Survey (NFHS) and the 1996 Nepal Demographic and Health Survey. In addition, Nepal has kept to

schedule in conducting and disseminating results from decennial population censuses in 1981 and 1991. However, Nepal's efforts to develop a vital statistics registration system have not been successful, possibly owing in part to an early decision to design a logistically more onerous total rather than sample registration system for the country.

In Pakistan, data resources appear to be somewhat less plentiful. Pakistan has not generated any census data since 1981. Pakistan does have a little-noticed sample registration system, but it is not clear whether this information is very reliable. Much of the information that is available on demographic and health conditions comes from national contraceptive prevalence surveys (the 1984-85 and 1994-95 Pakistan Contraceptive Prevalence Surveys), the 1990/91 Pakistan Demographic and Heath Survey (PDHS), and the 1988 Pakistan Demographic Survey.

Sri Lanka also appears deficient in data resources of late, which is no doubt a reflection of the political turmoil that has engulfed the country over the past decade. The latest available census is from 1981, and the last survey on population and health conditions is the 1993 Sri Lanka Demographic and Health Survey (SLDHS) - an inquiry that was not nationally representative owing to the civil war in the northeast of the country. However, Sri Lanka is generally considered to have a reasonably reliable vital statistics registration system, although it does not appear that any evaluation of this system has been undertaken in recent years.

Given this broad array of data sources, what can be concluded about recent levels and trends in fertility and mortality and how much faith should one place in the numbers that are currently on offer. We start with a brief assessment of each country's total fertility rate and infant mortality rate estimates, and then attempt to construct a regional synthesis based on the evidence at hand.

Bangladesh

In Bangladesh, data from national surveys provide the most consistent evidence of a rapid fall in fertility since 1981. When linking the 1989 Bangladesh Fertility Survey (BFS) and 1993/94 Bangladesh Demographic and Health Survey (BDHS) time series, fertility appears to have fallen from around 6.7 in 1981 to 3.4 in 1991-93 (see Table 4). This is an unprecedented rate of decline, not just for South Asia, but for any region of the world. It is somewhat disquieting to note that BDHS fertility estimates for the three-year period before the survey (1991-93) actually drop below estimates from the BBS Sample Registration System (SRS) for the same years. In Bangladesh, demographers have tended to view SRS estimates as lower bound estimates, so some observers initially tended to dismiss the BDHS figures as falling outside a plausible range. However, a validation study of the Bangladesh DHS conducted in Matlab thana during April, 1994 found that the DHS birth history questionnaire, when compared with data from the ICDDR,B Demographic Surveillance System, appeared to be generating remarkably accurate fertility estimates. On the other hand, there was some evidence that infant deaths were under reported, especially for periods more than five years prior to the date of interview (see Bairagi et al. 1997).

Adding more uncertainty to the Bangladesh picture were results from the 1991 Population Census.

The age-sex distribution from the census produced a surprisingly high count in the 0-4 age group and pronounced deficits among 10-14 and 15-19 year olds. Fertility estimates derived by reverse surviving the census age-sex distribution using various mortality assumptions were consistently well above survey and sample registration estimates. For example, the average three-year TFR for the period from mid-1988 thru mid-1991 was 5.7 - compared to survey results of between 4.3 and 4.5 for the same period (see Kantner, Lerman, and Yusuf 1994). These results obviously produced considerable consternation among demographers and family planning program mangers alike.

At present, it is not clear what implications can be drawn from the 1991 census. The quality of age reporting is not very good in this enumeration, and comparisons with age-sex distributions from survey household listings (e.g., the 1989 BFS) suggest substantial coverage error in the census. In addition, the attribution procedures employed by BBS when age information on census forms was missing or illegible have never been adequately clarified. While it is not possible to have great confidence in the reliability of the 1991 census age-sex distribution (or the fertility estimates it generates), it is also not possible to totally dismiss the message the census may have been trying to send; namely, that fertility, while declining, may still be significantly higher than current survey and sample registration data suggest. Only time and a reasonably reliable census will be able to completely dispel this demographic disquiet.

Survey-based estimates of infant mortality suggest a decline from approximately 120 deaths per 1,000 births in 1981 to around 90 by 1991 (see Table 5). A recent national estimate generated by the 1995 BBS Health and Demographic Survey suggests that the infant mortality rate (IMR) may have fallen to 78 by mid-decade. The 1991 Contraceptive Prevalence Survey is the only data source that appears to have produced mortality estimates substantially lower than other sources of information. It is also interesting to note that 1993/94 BDHS and sample registration data produce reasonably consistent infant mortality levels and trends over the 1981-1991 period. However, since the validation study in Matlab did find some evidence that the DHS birth history was underreporting infant deaths, the BDHS may be producing infant mortality rates that are a little low, especially for periods more than five years prior to the survey date.

India

Since 1984, the Indian Sample Registration System has reported a significant decline in fertility. Between 1984 and the three-year period 1990-92, the TFR apparently fell from 4.5 to 3.6 births (see Table 4). The 1992/93 NFHS reports a TFR of 3.4 for the 1990-92 period, a figure very similar to SRS estimates for the same period. NFHS fertility rates for earlier periods are not yet available (either from the birth history or household listing), so it is not possible to assess how consistent these two data sources are over time.

Unlike Bangladesh, with its multitude of national surveys providing independent consistency checks, India must currently rely primarily on only two national data sources, the SRS and 1992/93 NFHS, for measuring national levels and trends in vital rates. A survey conducted in 1994 by the National Council of Applied Economic Research has also produced preliminary rural fertility estimates, which

tend to be somewhat higher than rural SRS and NFHS estimates, especially in the states of Bihar, Uttar Pradesh, Rajasthan, and West Bengal (Shariff 1996). However, little is currently known about the quality of the survey (e.g., field operations, data processing and tabulation, and analysis). An earlier all-India family planning survey conducted by the Operations Research Group (ORG) in Baroda during 1988-89 did not report conventional total fertility rates or infant mortality rates, so findings from this effort are not included in this review.

The 1991 Indian Population Census should also be a national resource for evaluating results reported by the SRS and NFHS. Unfortunately, as of this writing, the age-sex distribution from the 1991 census has still not been released, so it is not possible to determine whether the census age structure provides confirmation that India's fertility transition is well underway. Without knowing what secrets the census holds, one cannot be totally confident about the reliability of demographic scenarios depicted by the SRS and NFHS. In addition, there do not appear to have been any systematic evaluations of SRS data quality in recent years.

Both the SRS and NFHS report falls in infant mortality between the early 1980s and 1988-92 (see Table 5). However, NFHS estimates are slightly lower than SRS results, especially for periods more than five years prior to interview. This pattern is not unexpected, since recall-lapse problems in birth histories often tend to produce a deterioration in the accuracy of birth and death reporting in more distant time periods. On the other hand, this traditional source of error may be somewhat compromised by the tendency to overstate children's ages in South Asian demographic surveys. In any event, both the SRS and NFHS show clear evidence of falling infant mortality, probably from around 115 deaths per 1,000 live births in 1981 to about 86 during the period 1988-92.

Nepal

According to the Nepal Central Bureau of Statistics, fertility remained invariant at around 6.3 births per woman throughout the 1970s. As can be seen in Table 4, results from the 1986 Nepal Fertility Survey (NFS) and the 1991 Nepal Fertility, Family Planning, and Health Survey (1991 NFHS) indicate that fertility declined to 6.0 in 1986 and to 5.1 in 1991. Reverse survival estimates based upon the 1991 Nepal Population Census suggest an even more rapid rate of decline, with the total fertility rate (TFR) falling to around 4.7 for the three year period from mid-1988 to mid-1991. However, possible underenumeration in the 0-4 age group may be biasing this estimate to the low side. Preliminary findings from the 1996 Nepal Demographic and Health Survey (1996 NFHS) show that the TFR may have declined to 4.6 over the three year period from 1994-96.

The 1991 NFHS reports that infant mortality fell from 123 in 1981 to 80 as of 1987-91 (see Table 5). This is one of the more rapid IMR declines reported in South Asia since 1981. Unfortunately, preliminary results from the 1996 NFHS confuse rather than clarify the picture since an IMR decline similar to that found in the 1991 NFHS is reported. These new results imply that 1991 NFHS estimates for the five year period prior to the survey (from 1987 to 1991) were seriously underestimated. Between 1987-91, the 1996 NFHS reports an IMR of 108 rather than 80. If one compares 1991 and 1996 NFHS estimates for the five-year period prior to each survey (1987-91 for

the 1991 NFHS and 1992-96 for the 1996 NFHS), then both surveys generate an estimate of 80, implying that there has been no change in infant mortality between the late 1980s and the mid-1990s. This depiction is very speculative however, and must await further diagnostic assessment before reaching firm conclusions. If the apparent IMR declines in both surveys are due in part to the overstatement of children's ages, then it may prove very difficult to make definitive judgements about the course of infant mortality in Nepal.

Pakistan

National surveys provide the principal evidence of recent fertility and mortality change in Pakistan. It can be seen in Table 4 that the 1984-85 Contraceptive Prevalence Survey (PCPS) and the 1990/91 Pakistan Demographic and Health Survey (PDHS) report a TFR decline from 6.0 in 1984 to 5.4 over the six-year period from 1985-91. However, the 1990/91 PDHS estimate was later adjusted up to 6.1 based upon a post-enumeration check of the original survey. In addition, the 1988 Pakistan Demographic Survey produced a far higher estimate; namely, 6.9 for the period 1984-88. Therefore, the picture for Pakistan through the early 1990s is somewhat confused. The 1994/95 Contraceptive Prevalence Survey has produced a provisional TFR estimate of 5.7 for the period 1991-1993/4, which may be consistent with the recent rise in contraceptive prevalence reported by the same source.

The 1990/91 PDHS indicates that infant mortality appears to have fallen from 97.4 in 1978-84 to 90.5 in 1985-9, a rather modest decline in comparison with other countries in the South Asian region (see Table 5). However, these figures are called into question by a 1984 IMR estimate of 107 from the 1986 PCPS (a figure lying outside the range provided by the PDHS). There is apparently no additional national survey information available on infant mortality levels and trends since the release of the 1991 PDHS.

Sri Lanka

As Table 4 indicates, the principal national vital rate data available for Sri Lanka is from the vital statistics registration system. This data series reports a slow gradual decline in fertility during the 1980s, resulting in a TFR of 2.3 by 1991 (the last year available to this review). The last national survey was the 1993 Sri Lanka Demographic and Health Survey (SLDHS), which reported an average TFR of 2.3 for the period 1988-1993 - a figure consistent with vital statistics registration data. However, this is not a nationally representative estimate since the survey was not able to operate in the northeast of the country owing to the on-going civil war. A previous DHS survey in 1987 also produced a TFR estimate that was closely consistent with registration data for the same time period.

Table 5 shows that infant mortality appears to be quite low in Sri Lanka. The last available IMR estimate from the vital statistics registration system is 17.9 for the year 1991, a level considerably below all other countries in the region. It is not clear to what extent adult mortality may have been affected by the civil disturbances that have plagued Sri Lanka for the past two decades. At the very

least, there has probably been a stall in the improvement of adult mortality (and overall life expectancy) in recent years.

Conclusions

The fertility and mortality data described above provide much of the supporting evidence for the speed and direction of the demographic transition in South Asia. The picture that emerges from these data is that fertility is falling throughout South Asia. Bangladesh and India appear to have experienced the most rapid declines in fertility since 1981, but preliminary results from the 1996 Nepal DHS suggest that the pace of fertility decline may now be accelerating there as well. Fertility decline may also have commenced in Pakistan, but the speed and direction of this change is far from clear.

Most countries in South Asia appear to have achieved reductions in infant mortality - on average, from levels around 110-130 in the early 1980s to between 70-90 in the early 1990s. However, IMR time series across surveys do not always provide consistent evidence of decline (a recent example being the situation in Nepal). An analysis of infant and child mortality across surveys in Bangladesh (see Hill et al. 1996) also noted considerable variation in survey results, but was nevertheless able to discern definitive declines over 10-15 year time horizons.

In order to have greater confidence in the levels and trends reported above, it should prove instructive to assess additional demographic determinants in the South Asia region. We begin by examining family planning program performance. Does the use of contraception actually appear to be highly correlated with declines in fertility reported by national survey and registration data?

Family Planning Program Performance in South Asia

Sri Lanka has achieved the highest contraceptive use levels in South Asia. However, over this same period, Bangladesh experienced the most rapid rise in contraceptive prevalence in the region. As can be seen in Table 6, only 7.9 percent of currently married women were using any method of contraception in 1975, but by 1993/94 this figure had risen to 44.6 percent (according to the 1993/94 Bangladesh DHS) and by later in 1994 may have risen to 46.3 percent (based upon results from the 1995 BBS Health and Demographic Survey). Use levels in India nearly doubled during this period, from 21.0 percent in 1975 to 40.7 percent in 1992/93 (the latter figure being based upon 1992/93 NFHS findings). Nepal, and more recently Pakistan, have also recorded some gains in use, but performance levels are still considerably lower than in Sri Lanka, Bangladesh, and India.

Most family planning programs in South Asia are typified by the use of sterilization among older women (e.g., Sri Lanka, India, and Nepal). Since the early 1980s, Bangladesh is the only country in South Asia with major gains in modern temporary methods of family planning (i.e., pills, IUDs, injectables, implants, and condoms). As a result, Bangladesh provides far more contraceptive protection for younger women under the age of 30 than other countries in the region (see Table 7). However, the Bangladesh program is also dominated by methods (primarily the oral pill) that

typically have higher levels of user failure. So, while Bangladesh may have attained higher levels of overall use than India, Bangladeshi women who are using contraception may also be having more accidental pregnancies[1].

A curious feature in South Asia is that fertility rates appear to have declined below levels that might be anticipated from the level of contraceptive use. In India and Pakistan, this feature is especially apparent. Ross and Frankenberg (1994:6), in an assessment of global fertility trends and family planning performance, concluded that the average international relationship between fertility and the contraceptive prevalence rate could be best captured by the following equation TFR=7.2931-(.0700*CPR). As Table 8 suggests, with the exception of the State of Haryana in India, all countries and regions in South Asia report lower fertility rates than is implied by the level of contraceptive use based upon average international experience. In other words, family planning programs appear to be even more effective than anticipated in reducing fertility in South Asia.

Can this be the case? Are family planning programs in South Asia actually more effective (higher use compliance, lower discontinuation, lower user failure, etc.) in reducing fertility than in other parts of the world? Could other proximate determinants (e.g., long breast-feeding durations, abortion, infecundity) be behind this apparent discrepancy? Is the Ross-Frankenberg equation a reliable approximation? Or do the results in Table 8 simply mean that fertility rates are substantially underestimated? It is not possible to provide definitive answers to all of these questions within the bounds of this review. However, the differences between reported and CPR-implied TFR are certainly considerable in many South Asian settings. Regions where this discrepancy is equal to or greater than one full birth include such highly populous areas as Chittagong Division in Bangladesh, the states of Rajasthan, Uttar Pradesh, Bihar, Orissa, Andhra Pradesh, Karnataka, and Tamil Nadu in India, and all of the provinces of Pakistan. Only Nepal and Sri Lanka do not appear to be significantly out of range (i.e., less than a full birth between the reported and CPR-based TFR).

In order to pass some judgement on the possibility of substantial underreporting of fertility in South Asian survey data, it will be necessary to probe somewhat deeper into the issue of data quality. In the regions of South Asia with much lower fertility than would normally be expected given the level of family planning program performance, is it possible to identify systematic error patterns that may be producing serious underestimates in vital rates?

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1. There is currently considerable controversy about the true level of user failure in the Bangladesh family planning program. The 1993/94 BDHS reported exceptionally low levels of user failure after one year of use despite also recording poor levels of use compliance. For example, only 1.7 percent of women using pills reported an accidental pregnancy following 12 months of use. Use failure for modern temporary methods in Matlab appears to be considerably higher (e.g., the 12-month pill user failure rate is reported to be 15 percent), which raises serious questions about how effective the Bangladesh program actually is in preventing unwanted pregnancies (see Bairagi 1996).

Diagnostic Measures from Recent Surveys in Bangladesh, India, and Pakistan

In order to be more confident about the reliability of survey results in South Asia (especially in regions with lower than anticipated fertility rates), it is important to consider whether there is evidence of distortion that may tend to undermine confidence in the reliability of survey findings. Traditionally, demographic censuses and surveys in South Asia have been plagued by serious age misreporting and omission of births (especially among infants and children who subsequently died). In addition, a new concern resulting from the structure of DHS questionnaires is whether interviewers could be intentionally transferring children to older ages in order to avoid asking a lengthy array of child health questions, thereby significantly shortening interview time and reducing work loads. This type of age transference could be causing deficits in the number of young children, thereby producing underestimates of current fertility and mortality levels and producing rates farther back in time that are too high - thereby exaggerating the actual pace of fertility and mortality decline.

In Table 9, standard measures of age misreporting are shown for Bangladesh, India and Pakistan - the three countries in the South Asian region that have suspiciously low national or regional TFR estimates. All data sources listed in Table 9 have some degree of age misreporting (with age heaping most commonly occurring on digits 0 and 5). The 1991 Bangladesh Population Census had highly unreliable age misreporting, while the quality of survey data appears to be considerably better. The 1993/94 Bangladesh DHS apparently has reasonably good-quality age data, while the 1992/93 India NFHS and 1991 Pakistan DHS report greater age misreporting. It is interesting to note that data quality in the 1992/93 NFHS appears to be somewhat better in the southern states of India (Andhra Pradesh is the one glaring exception). States more to the north that appear to have poorer quality age data are Delhi, Haryana, Punjab, Rajasthan, Orissa, and Assam.

Evidence concerning the quality of age reporting does not really get one very far. There does not seem to be any strong correlation between regions with less reliable age reporting and lower than anticipated fertility rates. However further clarification could come from an examination of the annual distribution of births and deaths reported from survey birth histories.

As noted previously, South Asian demographic surveys have shown a tendency to overstate children's ages, thereby creating the effect of fertility decline when in fact there was little change occurring. This clearly happened during earlier periods in Bangladesh. Surveys conducted during the 1960s and 1970s (e.g., the 1961-62 Demographic Survey of East Pakistan, the 1968-69 National Impact Survey, and the 1975 Bangladesh Fertility Survey) reported falls in fertility. Unfortunately, considerable underreporting of births combined with age misreporting (especially the overstatement of children's ages) produced fertility estimates that were too low and fertility trends that proved largely non-existent (National Academy of Sciences 1981:2). Could similar error patterns be distorting our current view of reality?

Table 10 provides information on the annual distribution of births and deaths by the number of years prior to interview as reported by birth histories in the 1994/94 BDHS, the 1992/93 NFHS, and the 1990/91 PDHS. The distribution of births and deaths by year prior to interview is computed from century month codes for children's ages and the date of interview in each region. If the reporting of births and deaths is reasonably accurate in these surveys, one should not expect to see pronounced fluctuations in the number of vital events by single year of occurrence. More critically, one should not see clear evidence of age shifting at the cut-off date for the health sections of DHS-type surveys. In other words, in Bangladesh, one should not expect to see a jump in the distribution of births between years 3 and 4 (all health questions were asked of children aged 0-3) and in India and Pakistan between years 5 and 6 (all health questions were asked of children aged 0-5). While one must be cautious in interpreting the figures in Table 10 owing to variations in sample size, it may still be possible to draw some tentative conclusions from these diagnostics.

In Bangladesh, the annual distribution of births and deaths at the national level appears unremarkable for a country reporting declines in fertility and mortality. However, by region, a different picture emerges. In Barisal and Chittagong Divisions, there is a jump in the number of births and deaths between years 3 and 4 prior to the survey (the cut-off point for implementing the health component of the 1992/93 BDHS). While the size of the Barisal sample is too small to draw any definitive conclusions, it appears that Chittagong may have experienced some shifting of children aged 0-3 to ages 4 and above. Chittagong is also the one division in Bangladesh that reports a fertility rate (based on births three years prior to interview) that is more than a full birth below what one would anticipate from a CPR of 29.3 percent. Since Chittagong is one of the largest divisions in Bangladesh (and accounts for approximately one-third of all births in the 1993/94 BDHS), a poorly functioning birth history in this region could produce some downward bias in the national TFR.

In the 1992/93 India NFHS, several states present clear evidence of age shifting, and as hypothesized, this age transference is most pronounced between years 5 and 6 (the cut-off point for the health questions). States that appear to have experienced systematic age shifting are Orissa, Punjab, Rajasthan, and West Bengal. Other states have annual percentage distributions of births and deaths symptomatic of age overstatement (e.g., Andhra Pradesh, Bihar, Gujarat, Jammu, and Madhya Pradesh), but the patterns are not sufficiently pronounced (or in the case of Jammu based upon enough cases) to reach definitive conclusions. On the other hand, some of India's largest states (e.g., Uttar Pradesh and Maharashtra) do not show any evidence of age displacement.

In the India NFHS, estimates of current fertility were derived from births three years prior to the date of interview. Since much of the age displacement noted in Table 10 appears to be occurring between years 5 and 6, it is possible to argue that current fertility estimates may not have been seriously compromised by the tendency to overstate children's ages. However, in states with very pronounced age shifting (e.g., Rajasthan), this assumption seems a little tenuous.

There is little correlation between Indian states with lower than expected TFRs (based upon the CPR) and suspected age displacement. Among the states judged to have pronounced age shifting, only Orissa and Rajasthan have fertility rates substantially below what might be anticipated from the

level of family planning program performance.

The 1990/91 Pakistan DHS has more evidence of age shifting than the Bangladesh and India surveys. Children born 5 years prior to the survey date are clearly being moved back to year 6 - and probably to higher ages as well. It is doubtful whether birth histories with such distortion can be used to generate reliable estimates of current fertility and infant mortality. The strategy adopted in the 1990/91 PDHS was to average all births over the six-year period from 1985-91 to produce an estimate of current fertility. However, with such extreme age displacement, it is likely that children may have been shifted to 7, 8, 9, or even 10 years prior to the survey rather than just to year 6. Therefore, even taking a six-year average for the "current" TFR estimate may have resulted in a sizeable underestimate.

In conclusion, error patterns in the 1990/91 PDHS raise serious concerns about the reliability of fertility and mortality estimates. In Bangladesh, Chittagong Division may have fallen victim to age shifting between years 0-3 and 4 and above, producing a regional underestimate in fertility that could have biased the national TFR to the low side. Since Chittagong is the only major region in Bangladesh with evidence of age displacement, it is unlikely that national estimates of the TFR have been badly compromised from this source of error (probably by not more than .5 births). In India, it seems that Orissa, Punjab, Rajasthan, and West Bengal experienced significant age displacement, but most of the remaining states are not badly distorted. Therefore, as in Bangladesh, the problem of overstating children's ages was probably not a major factor affecting the quality of national estimates from the 1992/3 NFHS. However, other traditional sources of error (e.g., omission of births, especially children born alive who subsequently died) could still be plaguing the quality of national and regional estimates.

While patterns of error in survey data may sometimes partially account for national and regional differentials in fertility and mortality, other factors may of course be responsible for generating levels and trends in vital rates identified by survey data. This review of recent demographic evidence from South Asia will conclude with a decomposition analysis of fertility using recent survey data from Bangladesh, India, and Pakistan[2].

National and Regional Fertility Determinants in Bangladesh, India, and Pakistan

In an analysis of provincial fertility patterns in Indonesia, Suyono and Palmore (1995) developed a novel procedure for summarizing the determinants of fertility in demographic and health surveys. Their "exposure" analysis attempted to explain why total fertility rates (TFRs) and contraceptive prevalence rates (CPRs) are not highly correlated across provinces in Indonesia. A subsequent analysis of regional fertility in the Philippines utilized the same methodology (see Go et al. 1995).

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2. Recent data files from Nepal and Sri Lanka (the 1996 Nepal Demographic and Health Survey and the 1993 Sri Lanka Demographic and Health Survey) were not available for use in this analysis.

This decomposition approach first deals with the fact that the TFR and CPR are different types of indicators. The TFR is an age-standardized measure and is a "true" rate in the sense that the numerator is a demographic event (births) and the denominator is a measure of women exposed to the risk of experiencing that event. The TFR also has a useful interpretation - it summarizes the fertility experience for a synthetic or hypothetical cohort of women. More precisely, it shows the total number of live births a woman would have if she were subject to a fixed set of age-specific fertility rates and lived throughout the 15-49 age range. On the other hand, the CPR is not age-standardized and does not have a synthetic cohort interpretation. However, Suyono and Palmore were able to calculate age-standardized CPRs (computed in the same manner as a TFR) that measure the number of person-years lived by a synthetic cohort in the state of "currently using contraception". This synthetic cohort definition of contraceptive use is directly comparable to a standard TFR.

Other determinants of fertility can be computed in much the same fashion as an age-standardized CPR. In this analysis of regional fertility, "synthetic cohorts" are constructed that classify women by their exposure and non-exposure to the risk of having children. It is possible to estimate the total percentage of time that women spend in various "exposed" or "non-exposed" states (e.g., as never married, not currently married, infecund, using contraception, and currently pregnant or amenorrheic) if they all live through their reproductive periods (ages 15-49) and are subject to a given (and unchanging) set of exposed and non-exposed states. This decomposition may allow for the identification of demographic, programmatic, and behavioral factors that determine national and regional patterns of fertility in South Asia.

Cross-National Comparisons of Proximate Determinant Measures in Bangladesh, India, and Pakistan

The decomposition of the Bangladesh, India, and Pakistan survey data begins by adding the percentage of person-years lived as never-married and not-currently married (widowed and divorced). These percentages are given in Table 11 and shown graphically in Figure 1. The percentage of person-years lived by women as never married is 20.2 percent in Bangladesh, 12.9 percent in India, and 20.0 percent in Pakistan. Women in Bangladesh and India are more likely to be widowed or divorced (6.9 percent and 6.1 percent) than are women in Pakistan (3.5 percent). Therefore, based on marital status alone, fewer Bangladeshi women are exposed to the risk of childbearing than in India and Pakistan.

Next, the percentage of person-years lived by women who are infecund is added. Infecundity is defined as women who (1) are currently married, (2) not using contraception, and (3) have not had a live birth - all for the last five years. The percentage of person years lived as infecund is 19.3 percent among Pakistani women, compared to 12.5 percent in Bangladesh and 14.8 percent in India. It is important to note that infecundity as measured here could be capturing actual sterility, abortion, or underreporting of fertility. With data currently available, it is not possible to distinguish between these components.

The percentage of person-years lived by women who are using modern temporary contraception,

sterilization, and traditional methods are then added. Bangladesh has the highest level of modern temporary contraceptive use, sterilization is much more prominent in India, and Bangladeshi women are more likely to be using traditional methods.

When all contraceptive methods are considered together (as the percentage of person-years lived using pills, IUDs, injectables, condoms, sterilization, and traditional methods) and added to the person years that women spend as never married, not currently married, or infecund, one can see that more women in Bangladesh fall into one of these categories than in India or Pakistan. In other words, fewer Bangladeshi women are still exposed to the risk of childbearing than in India and Pakistan, which implies that Bangladesh could be expected to have slightly lower fertility than India and substantially lower fertility than Pakistan.

In addition, the percentage of person-years lived as pregnant or ammenhoreic is higher in Pakistan (19.5 percent) and India (12.3 percent) compared to Bangladesh, (6.8 percent), which also suggests that India and Pakistan may still have higher fertility than Bangladesh (especially when one takes into account that Bangladeshi women tend to breast-feed for long periods and have extended periods of postpartum infecundity). This finding again calls into question whether Bangladesh and India could have identical fertility rates; namely TFRs of 3.4 as reported by the 1993/94 BDHS and 1992/93 NFHS.

Regional Decomposition Patterns

Using the synthetic cohort approach, it is possible to determine whether regional differentials in fertility can largely be accounted for by the proximate determinants employed in this decomposition. In Figure 2, divisions in Bangladesh are arranged from lowest to highest levels of fertility (with Rajshahi and Khulna having the lowest and Chittagong the highest levels of fertility). Despite the fact that Chittagong has a higher percentage of women never married, not currently married, and infecund, more women are still exposed to the risk of childbearing since the use of contraception (especially modern reversible methods) is much lower in Chittagong than in other divisions.

Regional decomposition profiles are shown for India in Figure 3a-3d. In India's Northern States, the decomposition profile is able to account for much of the state-level variation in fertility. Only Rajasthan appears to be out of alignment (i.e., more women are exposed to the risk of childbearing than in Haryana), which implies that Rajasthan should have higher fertility than Haryana. Contraceptive use is lower in Rajasthan than in other northern Indian states, but levels of infecundity are considerably greater, which nearly brings the top of Rajasthan's decomposition bar (women no longer exposed to the risk of childbearing) into line with other northern Indian states. In the central and eastern states, the decomposition is able to account for regional differentials in fertility, despite considerable variation in the proximate determinants (e.g., high traditional method use in West Bengal, high infecundity in Orissa, Bihar, and Uttar Pradesh, and a greater percentage of women currently married in Madhya Pradesh). Despite small sample size and considerable regional variation, decomposition profiles for the northeastern states of India are roughly consistent with regional fertility differentials. It is interesting to note that the state of Nagaland has the greatest

infecundity of any state in India, while Tripua and Assam report the highest levels of traditional method use. In the southern and western states, which do not have substantial variations in fertility levels, decomposition profiles again capture regional fertility differentials reasonably well. In this region, Goa is notable for the high percentage of person years lived by women as never married, and Andhra Pradesh and Maharashtra have the highest level of sterilization use in India.

As can be seen in Figure 4, provincial fertility differentials in Pakistan are faithfully portrayed by the decomposition profiles produced by the 1990/91 Pakistan Demographic and Health Survey. The Sindh has lower fertility than other provinces owing to high infecundity, while fertility in Balochistan is higher owing to low percentages of women never married, and nearly non-existent divorce and widowhood among women of reproductive age. Unlike Bangladesh and India, family planning performance in Pakistan does not account for much of the regional variation in fertility.

In general, the regional decomposition profiles presented in Figures 2-4 are able to account for regional patterns of fertility reasonably well. Decomposition profiles for Bangladesh and Pakistan exactly mirror actual regional differentials in fertility. In India, Rajasthan is the only major state that appears out of alignment with other states, which implies that fertility may be substantially underreported in Rajasthan. However, in general, regional differentials in fertility appear to be accurately captured by the decomposition profiles presented for Bangladesh, India, and Pakistan. This result tends to instill greater confidence in the reliability of the three surveys under review.

Summary and Conclusions

This review of demographic data in South Asia (focusing primarily upon fertility and infant mortality) has noted impressive evidence of fertility and mortality decline. While Sri Lanka has attained the lowest levels of fertility and mortality in the region, the most rapid decline in fertility over the past 20 years appears to have been in Bangladesh. All major countries in South Asia have registered reductions in mortality, particularly infant mortality, over the past two decades. By the early 1990s, infant mortality had likely dropped below 100 in Bangladesh, India, Nepal, and Pakistan (although regions within each country may still exceed this level).

Most of the current evidence on fertility and mortality decline in South Asia comes from survey and sample registration data. Unfortunately, population censuses have been neglected in recent years as a source of information on vital rates, most conspicuously in India, Pakistan, and Sri Lanka. The diagnostic data cited in this analysis found that age misreporting is still a problem in South Asian surveys. However, at least in Bangladesh, the quality of survey age data is superior to census information. There is also some evidence of age shifting (overstatement of children's ages) in birth history data from DHS-type surveys. This problem was noted in Chittagong Division in Bangladesh; Orissa, Punjab, Rajasthan, and West Bengal in India; and all of Pakistan's provinces.

It is difficult to say to what extent the problem of birth history age displacement may have affected national vital rate estimates. Since the other three large divisions in Bangladesh (Dhaka, Khulna, and Rajshahi) did not produce any clear evidence of age shifting, it is unlikely that problems in

Chittagong Division alone could have produced substantial under reporting in national vital rates (e.g., more than a half birth in the national TFR estimate). In India, the problem of age shifting in birth history data also appears to be localized in a minority of regions. While it is more difficult to judge the India case, one could reasonably argue that national-level estimates have probably not been seriously compromised. However, in the 1990/91 Pakistan DHS, birth history age displacement is a far larger problem. Vital rate estimates from this survey are probably not very reliable, even when based upon a six year average.

Analysis of regional fertility using a synthetic cohort approach developed by Suyono and Palmore suggests that regional differentials, if not actual fertility levels, in the Bangladesh, India, and Pakistan surveys may be reasonably reliable. With the exception of Rajasthan (which appears to have a TFR below what might be anticipated from the percentage of person-years lived by women not exposed to the risk of childbearing), regional fertility differentials in South Asia generally appear to correspond to the synthetic cohort exposure profiles. While obviously not arresting all concerns about data quality (e.g., the ever-present possibility of omission of vital events in survey data and the apparent inconsistency of fertility and family planning performance measures in some regions), these results do give one more confidence that recent demographic and health surveys in South Asia may be getting much of the demographic story essentially correct.

On the other hand, one's confidence in DHS and DHS-type surveys would be considerably enhanced if more sources of demographic data were routinely available (e.g., population census age distributions) to corroborate survey results. In addition, greater efforts should be made to evaluate and upgrade the reliability of alternative sources of information, especially the sample vital statistics registration systems in the South Asian region. If nothing else, this review of demographic estimates in South Asia should clearly underscore the importance of investing resources in different sources of demographic and program performance information (including KAP and rapid survey approaches) rather than placing the burden of proof on increasingly expensive and unwieldy demographic and health survey operations.

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Table 1: Population Totals in Major South Asian Countries During the Period 1951-1996 (Mid-Year Populations in Thousands)

Year	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1950	41783	357561	7862	39513	7678
1955	45486	395096	8477	44194	8723
1960	51419	442344	9263	49955	9889
1965	58312	495157	10211	57145	11164
1970	66671	554911	11327	65706	12514
1975	76582	620701	12797	74734	13603
1980	88221	688856	14498	85299	14819
1985	99310	767940	16503	101196	16060
1990	109765	850793	18772	119141	17057
1995	118229	929005	21456	136257	17928
1997[1]	122261	960111	22612	144157	18285
2000[1]	128310	1006770	24347	156007	18821

1. Mid-year estimates for 1997 and 2000 are based upon the UN's "medium variant" projection.
Source: United Nations. 1996. *World Population Prospects: The 1996 Revision, Annex II and III: Demogeaphic Indicators by Major Area, Region and Country.* New York: United Nations Population Division, Department for Economic and Social Information and Policy Analysis.

Table 2: Crude Birth Rates in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	**Bangladesh**	**India**	**Nepal**	**Pakistan**	**Sri Lanka**
1950-1955	47.0	44.1	43.0	49.5	38.5
1955-1960	46.8	43.6	44.4	48.8	36.6
1960-1965	46.7	42.0	44.5	48.4	34.7
1965-1970	47.5	40.2	43.6	47.8	31.5
1970-1975	48.5	38.2	45.4	47.5	28.9
1975-1980	47.2	34.7	43.4	47.3	28.5
1980-1985	44.3	33.8	42.0	41.6	26.9
1985-1990	36.9	31.4	39.8	42.3	21.6
1990-1995	26.7	27.5	39.6	39.4	18.6
1995-2000[1]	26.8	25.2	36.3	36.1	17.8
Table 2: Crude Death Rates in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1950-1955	24.2	25.0	27.9	28.5	11.5
1955-1960	22.9	21.7	26.7	24.8	9.9
1960-1965	22.0	19.4	25.0	21.6	8.5
1965-1970	21.0	17.5	22.8	19.8	8.3
1970-1975	20.8	15.8	21.1	17.7	8.1
1975-1980	18.9	13.9	18.4	15.4	7.1
1980-1985	16.8	12.7	16.2	12.0	6.2
1985-1990	13.6	11.3	14.1	10.6	5.9
1990-1995	11.0	9.8	12.9	9.2	5.8
1995-2000[1]	9.7	9.0	11.0	7.8	5.9

1. Estimates for 1995-2000 are from the UN "medium variant" projection.
Source: United Nations (1996).

Table 2: Annual Rates of Population Growth in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	**Bangladesh**	**India**	**Nepal**	**Pakistan**	**Sri Lanka**
1950-1955	1.70	2.00	1.51	2.24	2.55
1955-1960	2.45	2.26	1.77	2.45	2.51
1960-1965	2.52	2.26	1.95	2.69	2.43
1965-1970	2.68	2.28	2.07	2.79	2.28
1970-1975	2.77	2.24	2.44	2.57	1.67
1975-1980	2.83	2.08	2.50	2.64	1.71
1980-1985	2.37	2.17	2.59	3.42	1.61
1985-1990	2.00	2.05	2.58	3.26	1.21
1990-1995	1.49	1.76	2.67	2.69	1.00
1995-2000[1]	1.64	1.61	2.53	2.71	0.97

Table 2: Life Expectancy in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1950-1955	36.6	38.7	36.3	38.9	56.6
1955-1960	38.6	42.6	37.6	42.1	60.5
1960-1965	40.6	45.4	39.1	45.0	63.5
1965-1970	43.3	48.0	41.0	47.8	64.2
1970-1975	44.9	50.3	43.3	50.6	65.0
1975-1980	46.6	52.9	46.2	53.4	66.8
1980-1985	49.7	55.2	49.1	56.2	69.1
1985-1990	52.8	57.8	52.0	59.0	70.6
1990-1995	55.5	60.5	54.6	61.5	71.9
1995-2000[1]	58.1	62.4	57.3	63.9	73.1

1. Estimates for 1995-2000 are from the UN "medium variant" projection.
Source: United Nations (1996).

Table 2: Total Fertility Rates in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	**Bangladesh**	**India**	**Nepal**	**Pakistan**	**Sri Lanka**
1950-1955	6.7	6.0	5.8	6.5	5.7
1955-1960	6.6	5.9	5.8	6.8	5.4
1960-1965	6.7	5.8	5.8	7.0	5.2
1965-1970	6.9	5.7	5.8	7.0	4.7
1970-1975	7.0	5.4	6.3	7.0	4.0
1975-1980	6.7	4.8	6.2	7.0	3.8
1980-1985	6.2	4.5	6.1	6.5	3.3
1985-1990	4.8	4.1	5.8	6.0	2.6
1990-1995	3.4	3.4	5.4	5.5	2.2
1995-2000[1]	3.1	3.1	5.0	5.0	2.1

Table 2: Infant Mortality Rates in South Asia (1950-2000) (Estimated by the United Nations Population Division)					
Year	Bangladesh	India	Nepal	Pakistan	Sri Lanka
1950-1955	180	190	210	190	91
1955-1960	162	173	200	170	76
1960-1965	150	157	189	155	65
1965-1970	140	145	175	145	61
1970-1975	140	132	160	140	56
1975-1980	137	129	142	130	44
1980-1985	128	106	125	115	35
1985-1990	110	93	109	100	24
1990-1995	91	78	96	85	18
1995-2000[1]	78	72	82	74	15

1. Estimates for 1995-2000 are from the UN "medium variant" projection.
Source: United Nations (1996).

Table 3: Comparison of US Bureau of the Census and United Nations Population Division Demographic Estimates and Projections for South Asia (1995 and 2000)		
Country	**US Bureau of the Census International Data Base**	**United Nations Population Division**
Bangladesh		
TFR 1995	3.7	3.4
IMR 1995	105	91
Life Expectancy 1995	55.5	55.5
Annual Growth Rate 1990-95	1.85	1.49
Mid-Year Population 1995	120.8	118.2
Mid-Year Population 2000	132.1	128.3
India		
TFR 1995	3.3	3.4
IMR 1995	73	78
Life Expectancy 1995	59.3	60.5
Annual Growth Rate 1990-95	1.81	1.76
Mid-Year Population 1995	936.5	929.0
Mid-Year Population 2000	1012.9	1006.8
Nepal		
TFR 1995	5.2	5.4
IMR 1995	81	96
Life Expectancy 1995	53.1	54.6
Annual Growth Rate 1990-95	2.46	2.67
Mid-Year Population 1995	21.6	21.5
Mid-Year Population 2000	24.4	24.3
Pakistan		
TFR 1995	5.4	5.5
IMR 1995	99	85
Life Expectancy 1995	58.1	61.5
Annual Growth Rate 1990-95	2.08	2.69
Mid-Year Population 1995	126.4	136.3
Mid-Year Population 2000	141.1	156.0
Sri Lanka		
TFR 1995	2.1	2.2
IMR 1995	21	18
Life Expectancy 1995	72.1	71.9
Annual Growth Rate 1990-95	1.24	1.00
Mid-Year Population 1995	18.3	17.9
Mid-Year Population 2000	19.4	18.8

Table 4: Total Fertility Rates from Census, Survey, and Sample Registration Data in Bangladesh, India, Nepal, Pakistan, and Sri Lanka 1981-1996

Country	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Bangladesh																
1989 Bangladesh Fertility Survey	7.0	6.1	6.1	5.9	5.6	5.0	4.9	4.6								
1989 Contraceptive Prevalence Survey				5.6	5.5	5.0	4.6	4.9								
1991 Contraceptive Prevalence Survey						5.2	4.9	5.0	4.5	4.2	4.2					
1991 Population Census (1)			7.7					6.1		5.7	4.7					
1993/94 Demographic and Health Survey								5.1	4.8	4.5	3.7	3.2	3.2			
1995 Health and Demographic Survey															3.6	
Sample Vital Statistics Registration (SRS)	5.0	5.2	5.1	4.8	4.7	4.7	4.4	4.4	4.4	4.3	4.2	4.2	3.8	3.6		
India																
Sample Vital Statistics Registration (SRS)	4.5	4.5	4.5	4.5	4.3	4.2	4.1	4.0	3.9	3.8	3.6	3.4				
1992/93 National Family Health Survey (2)												3.4				
Nepal																
1986 Nepal Fertility Survey						6.0										
1991 Family Health Survey											5.1					
1991 Population Census (3)			7.8					6.0		4.6	4.3					
1996 Nepal Family Health Survey (4)																4.6

Table 4: Total Fertility Rates from Census, Survey, and Sample Registration Data in Bangladesh, India, Nepal, Pakistan, and Sri Lanka 1981-1996

Country	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Pakistan																
1981 Population Census	6.5															
1984/85 Contraceptive Prevalence Survey				6.0												
1988 Demographic Survey (5)								6.9								
1990/91 Demographic and Heath Survey (6)											6.1					
1994/95 Contraceptive Prevalence Survey (7)													5.7			
Sri Lanka																
1982 Contraceptive Prevalence Survey (8)		3.7														
1987 Demographic and Health Survey (9)							2.8									
1993 Demographic Health Survey (10)													2.3			
Sample Vital Registration (11)	3.4			3.0	3.0	2.7	2.6	2.5	2.5	2.3	2.3					

1. Bangladesh census estimates for 1983 = (average for 1981-86); 1988 = (average for 1986-91); 1990=(average for 1988-91); and 1991=1991.
2. India National Family Health Survey estimate is a three average covering the period 1990/91-1992/93.
3. Nepal census estimates for 1983 = (average for 1981-86); 1988 = (average for 1986-91); 1990=(average for 1988-91); and 1991=1991.
4. 1996 Nepal Family Health Survey estimate is a three year average covering the period 1994-1996.
5. 1988 Pakistan Demographic Survey estimate is a five year average for the period 1984-88.
6. 1990/91 Pakistan Demographic and Health Survey estimate is a six year average for the period 1986-1991. This estimate was adjusted upward from 5.4 based upon a post-enumeration check of the original survey.
7. 1993/94 Pakistan Contraceptive Prevalence Survey estimate is for the three year period 1991/92-1993/94.
8. 1982 Sri Lanka Contraceptive Prevalence Survey is a single year estimate based upon 1982 data.
9. 1987 Sri Lanka Demographic and Health Survey estimate is a five year average for the period 1982-87.
10. 1993 Sri Lanka Demographic and Health Survey is a five year average for the period 1988-93.
11. Registration estimate for 1981 is a two year average combining data from 1980-81.

Table 5: Infant Mortality Rates from Survey and Sample Registration Data in Bangladesh, India, Nepal, Pakistan, and Sri Lanka 1981-1996

Country	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Bangladesh																
1989 Bangladesh Fertility Survey	128	129	136	134	111	113	84									
1989 Contraceptive Prevalence Survey					107	99	90	102								
1991 Contraceptive Prevalence Survey							73	88	88	75						
1993/94 Demographic and Health Survey (1)			116					112					87			
1995 Health and Demographic Survey															78	
Sample Vital Statistics Registration (SRS)	112	122	118	122	112	116	113	116	98	94	91	88	84			
India																
Sample Vital Statistics Registration (SRS) (2)		115					99					85				
1992/93 National Family Health Survey (2)		101					94					79				
Nepal																
1986 Nepal Fertility Survey (3)				83												
1991 Family Health Survey (4)	123			115					80							
1996 Nepal Family Health Survey (5)				127					108							79
Pakistan																
1984/85 Contraceptive Prevalence Survey				106												
1988 Pakistan Demographic Survey								112								

Table 5: Infant Mortality Rates from Survey and Sample Registration Data in Bangladesh, India, Nepal, Pakistan, and Sri Lanka 1981-1996

Country	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Pakistan																
1990/91 Demographic and Heath Survey (6)				97							91					
Sri Lanka																
1987 Demographic and Health Survey (7)	39.2						25.4									
Sample Vital Statistics Registration	29.5	30.5	28.4	27.2	24.2	23.2	22.6	20.2	18.4	19.3	17.2					

1. 1993/94 Bangladesh Demographic and Health Survey IMR estimates are five year averages for the period 1979-83, 1984-88, and 1989-93.
2. Indian IMR estimates from the SRS and the 1992/93 National Family Health Survey are five year averages for the periods 1978-82, 1983-87, and 1988-92.
3. Indirect IMR estimate from the 1986 Nepal Fertility Survey was 110 deaths per 1,000 births.
4. 1991 Nepal Family Health Survey IMR estimates are five year averages for 1977-81, 1982-86, and 1987-91.
5. 1996 Nepal Family Health Survey IMR estimates are five year averages for 1982-86, 1987-91, and 1992-96.
6. 1990/91 Pakistan Demographic and Health Survey IMR estimates are six year averages for the periods 1978-84 and 1985-91.
7. 1987 Sri Lanka Demographic and Health Survey estimates are five year averages for the periods 1977-81 and 1982- 87.

Table 6: Percentage of Currently Married Women Using Contraception in Bangladesh, India, Nepal, Pakistan, and Sri Lanka compiled from Survey Data (1975-1996)

Country	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
All Methods																						
Bangladesh	7.9		8.9		12.6	19.6	19.6		19.1		25.3				31.4		39.9		44.6	46.3		
India	21.0					32.4								42.9		44.9		40.7				
Nepal		2.9					6.8					15.1					25.1					28.5
Pakistan	4.0					6.4				9.1						11.8				17.8		
Sri Lanka	32.0		41.0					54.9					61.7						66.1			
Modern Temporary																						
Bangladesh	4.0				6.0		6.5		6.3		9.0				13.3		20.8		27.1	34.0		
India	4.5					5.2								7.8		8.6		5.5				
Nepal		0.9					1.7					2.2					4.5					8.5
Pakistan	2.1					1.7					4.9					5.5				7.5		
Sri Lanka	8.5							8.4					10.8						16.5			
Sterilization																						
Bangladesh	1.0				3.4		5.0		7.4		9.4				10.0		10.3		9.2	5.3		
India	13.0					20.6								30.8		31.3		30.9				
Nepal		2.0					5.2					13.0					19.6					17.5
Pakistan	0.7					0.6					2.6					3.5				5.0		
Sri Lanka	9.9		18.0					20.6					29.8						27.2			
Traditional Methods																						
Bangladesh	3.1				3.2		8.0		5.4		6.9				8.1		8.7		8.4	6.9		
India	5.0					6.6								4.3		5.0		4.3				
Nepal		0.1					0.0										1.0					2.5
Pakistan	1.3					4.2					1.5					2.8				5.2		
Sri Lanka	13.6		23.0					25.9					21.2						22.4			

Table 7: Percentage of Currently Married Women Using Contraception in Bangladesh, India, Nepal, Pakistan, and Sri Lanka by Age (Most Recent Survey Data)							
Country	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**
All Methods							
Bangladesh (1993/94)	24.7	37.6	50.6	57.2	58.5	51.9	29.3
India (1992/93)	7.1	21.0	42.4	55.8	61.0	56.3	45.8
Nepal (1996)	6.5	15.8	30.7	39.0	42.7	40.7	27.9
Pakistan (1994/95)	3.4	10.1	17.1	20.1	25.8	23.7	17.3
Sri Lanka (1987)	20.2	42.3	57.3	66.8	73.8	71.5	56.1
Modern Temporary							
Bangladesh (1994/95)	19.4	29.6	36.1	31.6	26.9	19.5	7.2
India (1992/93)	2.6	6.4	8.5	7.1	5.0	2.8	1.3
Nepal (1996)	3.8	9.1	10.4	12.1	10.2	7.0	2.3
Pakistan (1994/95)	1.8	3.4	6.6	6.8	7.8	4.8	3.4
Sri Lanka (1987)	9.8	17.9	15.6	11.2	7.8	6.2	4.4
Sterilization							
Bangladesh (1993/94)	0.3	2.4	7.5	14.6	19.8	18.6	14.1
India (1992/93)	1.4	10.9	29.4	43.7	50.3	49.0	42.0
Nepal (1996)	0.6	4.4	17.0	23.8	30.2	31.7	24.8
Pakistan (1994/95)	0.0	0.5	0.9	2.8	8.1	8.0	6.8
Sri Lanka (1987)	1.0	7.8	22.1	34.1	42.0	41.7	29.7
Traditional Methods							
Bangladesh (1993/94)	5.1	5.6	7.1	11.1	11.8	13.7	8.0
India (1992/93)	3.1	3.7	4.6	4.9	5.6	4.5	2.5
Nepal (1996)	2.2	2.2	3.4	3.3	2.4	2.0	0.8
Pakistan (1994/95)	0.7	2.5	2.3	3.8	4.5	3.0	1.5
Sri Lanka (1987)	9.5	16.7	19.4	21.7	23.9	23.7	22.1

Table 8: Implied TFR Levels based upon Estimates of the Contraceptive Prevalence Rate (CPR) in Bangladesh, India, Nepal, Pakistan and Sri Lanka (Recent DHS and Other Survey Data)

Country/Region	Reported CPR	Implied TFR[1]	Reported TFR	TFR Difference[2]
Bangladesh (1991)	39.9	4.5	4.3	0.2
Bangladesh (1993/94)	44.6	4.2	3.4	0.8
Barisal	47.7	4.0	3.5	0.5
Chittagong	*29.3*	*5.2*	*4.0*	*1.2*
Dhaka	44.3	4.2	3.5	0.7
Khulna	55.3	3.4	3.1	0.3
Rajshahi	54.8	3.5	3.0	0.5
India (1992/93)	*40.6*	*4.5*	*3.4*	*1.1*
Andhra Pradesh	*47.0*	*4.0*	*2.6*	*1.4*
Arunachal Pradesh	*23.6*	*5.6*	*4.3*	*1.4*
Assam	42.8	4.3	3.5	0.8
Bihar	*23.1*	*5.7*	*4.0*	*1.7*
Delhi	60.3	3.1	3.0	0.1
Gujarat	49.3	3.8	3.0	0.9
Goa	*47.8*	*3.9*	*1.9*	*2.0*
Haryana	49.7	3.8	4.0	-0.2
Himachal Pradesh	58.4	3.2	3.0	0.2
Jammu	49.4	3.8	3.1	0.7
Karnataka	*49.1*	*3.9*	*2.9*	*1.0*
Kerala	63.3	2.9	2.0	0.9
Madya Pradesh	36.5	4.7	3.9	0.8
Maharashtra	53.7	3.5	2.9	0.7
Manipur	*34.9*	*4.9*	*2.8*	*2.1*
Meghalaya	*20.7*	*5.8*	*3.7*	*2.1*

Table 8: Implied TFR Levels based upon Estimates of the Contraceptive Prevalence Rate (CPR) in Bangladesh, India, Nepal, Pakistan and Sri Lanka (Recent DHS and Other Survey Data)

Mizoram	*53.8*	*3.5*	*2.3*	*1.2*
Nagaland	*13.0*	*6.4*	*3.3*	*3.1*
Punjab	58.7	3.2	2.9	0.3
Rajasthan	*31.8*	*5.1*	*3.6*	*1.4*
Tamil Nadu	*49.8*	*3.8*	*2.5*	*1.3*
Tripura	56.1	3.4	2.7	0.7
Uttar Pradesh	*19.8*	*5.9*	*4.8*	*1.1*
West Bengal	57.4	3.3	2.9	0.4
Nepal (1991)	25.1	5.5	5.1	0.4
Nepal (1996)	28.9	5.3	4.6	0.7
Pakistan (1990/91)	*11.8*	*6.5*	*5.4*	*1.1*
Balochistan	*2.0*	*7.2*	*5.8*	*1.3*
Punjab	*13.0*	*6.4*	*5.4*	*1.0*
Sindh	*12.4*	*6.4*	*5.1*	*1.3*
NWFP	*8.6*	*6.7*	*5.5*	*1.2*
Sri Lanka (1987)	61.7	3.0	2.7	0.3
Sri Lanka (1993)	66.1	2.7	2.3	0.4

1. Computed using the formula TFR=7.2931-(.0700*CPR). See Ross and Frankenberg, 1994:6.
2. Italic type indicates that the difference between the reported and implied TFR (derived from the CPR) is 1.0 or more births.

Table 9: Measures of Age Misreporting in Bangladesh, India, and Pakistan (Recent DHS and Other Survey Data)			
Country/Region	**Whipple Index**	**Myers Index**	**Bachi Index**
Bangladesh (1991)	3.26	74.0	46.8
Bangladesh (1993/94)	1.30	16.2	10.0
Barisal	1.28	14.4	8.2
Chittagong	1.43	18.2	11.5
Dhaka	1.30	16.2	10.0
Khulna	1.25	11.0	7.7
Rajshahi	1.27	13.3	7.5
India (1992/93)	1.95	35.9	21.8
Andhra Pradesh	2.49	51.0	31.3
Assam	2.81	55.5	37.8
Bihar	1.29	23.7	12.7
Delhi	2.49	51.0	31.3,
Gujarat	1.88	34.6	20.3
Haryana	2.67	50.6	35.5
Himachal Pradesh	2.17	39.3	26.5
Jammu	2.28	36.3	-
Karnataka	1.50	18.2	13.0
Kerala	1.39	19.4	12.8
Madya Pradesh	2.33	48.9	29.4
Maharashtra	1.80	29.0	17.9
Orissa	2.55	49.9	33.0
Punjab	2.44	50.6	33.0
Rajasthan	2.89	62.8	39.0
Tamil Nadu	1.61	22.2	14.3

Table 9: Measures of Age Misreporting in Bangladesh, India, and Pakistan (Recent DHS and Other Survey Data)

Uttar Pradesh	1.70	32.6	19.6
West Bengal	2.11	33.8	23.7
Pakistan (1990/91)	2.41	44.3	29.2
Balochistan	1.25	11.0	7.7
Punjab	2.30	41.2	27.1
Sindh	2.50	47.6	31.5
NWFP	2.76	54.3	36.0

Table 10: Percentage Distribution of Total Births by the Number of Years Preceding the Date of Interview in Bangladesh, India, and Pakistan (Recent DHS and Other Survey Data)

	Number of Years Preceding Date of Interview						
Country/Region	**1**	**2**	**3**	**4**	**5**	**6**	**Total Births**
Bangladesh (1993/94)	14.7	14.2	15.3	17.7	18.5	19.5	8878
Barisal	15.0	14.9	14.5	17.8	18.5	19.2	572
Chittagong	14.3	15.3	14.2	18.4	17.9	20.0	2729
Dhaka	15.3	13.8	14.8	17.1	18.5	20.5	2731
Khulna	14.8	14.6	17.4	17.5	17.9	17.9	919
Rajshahi	14.4	12.9	16.9	17.7	19.8	18.3	1926
India (1992/93)	17.0	16.9	15.4	16.4	15.3	19.0	76240
Andhra Pradesh	18.0	15.9	14.7	15.5	16.0	19.9	4857
Assam	15.2	15.4	16.9	15.7	16.9	19.9	2505
Bihar	16.7	16.9	13.9	16.8	15.7	20.0	8686
Delhi	16.2	17.0	15.6	16.3	16.5	18.4	877
Gujarat	18.4	17.7	15.4	16.0	14.1	18.4	3348
Haryana	17.2	17.8	15.1	15.3	16.6	18.0	1738
Himachal Pradesh	16.9	16.2	16.0	16.0	16.2	18.7	444
Jammu	17.8	17.2	15.0	14.7	15.6	19.6	326
Karnataka	17.0	16.5	15.6	18.1	14.6	18.3	3797
Kerala	16.1	16.3	16.4	16.3	16.4	18.6	1755
Madhya Pradesh	18.2	17.3	15.3	15.8	14.9	18.5	6378
Maharashtra	16.5	16.6	15.8	17.6	14.8	18.8	6602
Orissa	15.8	15.9	16.1	16.4	15.6	20.3	2795
Punjab	17.2	17.0	15.8	16.2	13.1	20.7	1669
Rajasthan	17.5	16.2	16.2	16.0	12.7	21.4	4024
Tamil Nadu	15.7	17.6	16.6	17.0	14.8	18.3	3835

Table 10: Percentage Distribution of Total Births by the Number of Years Preceding the Date of Interview in Bangladesh, India, and Pakistan (Recent DHS and Other Survey Data)							
	Number of Years Preceding Date of Interview						
Uttar Pradesh	17.5	18.1	14.9	16.2	15.9	17.5	15944
West Bengal	16.2	15.7	15.7	16.9	14.7	20.7	5719
Pakistan (1990/91)	17.4	16.1	15.6	15.9	13.1	22.0	8326
Balochistan	13.7	13.7	14.3	17.9	17.6	22.8	329
Punjab	17.2	17.0	15.8	16.2	13.1	20.7	5011
Sindh	17.4	14.3	15.5	14.7	13.1	25.0	1855
NWFP	19.2	15.2	15.3	16.1	12.0	22.6	1131

Table 11: Exposure Status to the Risk of Pregnancy by the Percentage of Person-Years Lived by Synthetic Cohorts in Recent Surveys from Bangladesh, India, and Pakistan (National and Regional Decompositions)

Country/Region	Never Married	Not Currently Married	Infecund	Modern Temporary Methods	Sterilization	Traditional	Pregnant or Amenn	Women Exposed to Risk of Pregnancy	Total
Bangladesh (1993/94)	20.2	7.0	12.5	18.1	8.5	6.7	6.8	20.2	100.0
Barisal	20.0	7.5	11.0	18.5	8.9	7.3	7.2	18.7	100.0
Chittagong	23.0	7.6	14.3	11.6	5.3	4.5	7.8	25.9	100.0
Dhaka	19.6	7.2	11.5	19.3	8.3	6.5	6.8	20.8	100.0
Khulna	19.3	5.6	12.3	21.8	9.5	10.6	6.0	14.9	100.0
Rajshahi	18.2	6.6	12.0	22.3	11.8	7.5	6.1	15.5	100.0
India (1992/93)	12.9	6.1	14.8	4.1	28.9	3.5	12.3	17.4	100.0
Andhra Pradesh	9.3	8.3	16.7	1.4	41.5	0.4	9.5	12.9	100.0
Arunachal Pradesh	15.8	6.4	19.6	6.1	9.9	3.5	17.2	21.5	100.0
Assam	18.5	9.7	9.0	3.5	12.6	16.7	14.5	15.5	100.0
Bihar	9.1	5.2	21.1	2.3	19.5	1.2	17.3	24.3	100.0
Delhi	17.3	4.7	8.0	22.1	21.8	5.0	9.9	11.2	100.0
Goa	30.9	5.6	13.3	4.3	20.8	6.4	4.5	14.2	100.0
Gujarat	15.7	5.2	10.7	4.1	38.0	1.9	10.6	13.8	100.0
Haryana	9.6	4.5	8.6	7.3	35.9	4.7	13.1	16.3	100.0
Himachal Pradesh	16.1	5.0	8.5	6.2	40.7	2.8	10.5	10.2	100.0
Jammu	18.1	4.7	9.1	7.1	28.1	7.7	10.8	14.4	100.0
Karnataka	14.5	8.4	13.0	3.4	36.5	1.5	10.8	11.9	100.0
Kerala	23.1	7.4	6.4	3.7	36.5	6.3	6.7	9.9	100.0
Madhya Pradesh	6.8	4.9	14.6	3.1	33.7	0.9	16.0	20.0	100.0
Maharashtra	12.8	7.1	10.5	4.4	42.7	1.0	10.6	10.9	100.0
Manipur	29.2	5.5	13.5	6.3	11.1	7.3	14.8	12.3	100.0
Meghalya	18.1	10.7	15.5	3.6	9.6	3.9	17.4	21.2	100.0
Mizoram	24.6	9.6	9.4	4.6	33.8	0.7	9.0	8.3	100.0

Table 11: Exposure Status to the Risk of Pregnancy by the Percentage of Person-Years Lived by Synthetic Cohorts in Recent Surveys from Bangladesh, India, and Pakistan (National and Regional Decompositions)

Country/Region	Never Married	Not Currently Married	Infecund	Modern Temporary Methods	Sterilization	Traditional	Pregnant or Amenn	Women Exposed to Risk of Pregnancy	Total
Nagaland	22.6	9.0	26.8	4.9	5.3	0.0	10.3	21.1	100.0
Orissa	15.8	6.1	18.4	2.0	28.9	1.2	12.2	15.4	100.0
Punjab	17.9	4.2	8.1	12.5	30.1	5.7	8.5	13.0	100.0
Rajasthan	10.9	3.4	19.8	2.7	28.0	0.7	14.5	20.0	100.0
Tamil Nadu	16.4	7.7	16.4	3.8	31.9	3.8	7.9	12.1	100.0
Tripura	18.3	8.4	6.8	6.0	16.0	20.4	11.6	12.5	100.0
Uttar Pradesh	10.5	4.2	20.3	4.5	14.0	1.1	18.3	27.1	100.0
West Bengal	13.4	7.8	8.9	4.6	27.5	15.1	9.8	12.9	100.0
Pakistan 1990/91	20.0	3.5	19.3	4.1	3.5	2.2	19.5	27.9	100.0
Balochistan	13.2	0.8	29.7	1.1	0.4	0.3	21.2	33.3	100.0
N.W. Frontier	21.5	2.2	18.4	3.6	3.1	0.8	22.4	28.0	100.0
Punjab	20.2	4.2	17.3	4.5	3.8	2.5	19.6	27.9	100.0
Sindh	19.5	2.8	23.7	4.0	3.5	2.4	17.6	26.5	100.0

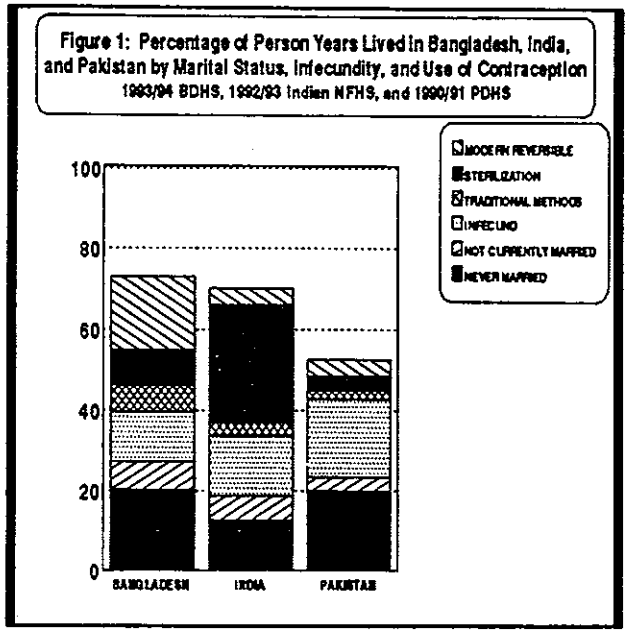
Figure 1: Percentage of Person Years Lived in Bangladesh, India, and Pakistan by Marital Status, Infecundity, and Use of Contraception
1993/94 BDHS, 1992/93 Indian NFHS, and 1990/91 PDHS
100
80
60
40
20
0
BANGLADESH
INDIA
PAKISTAN
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

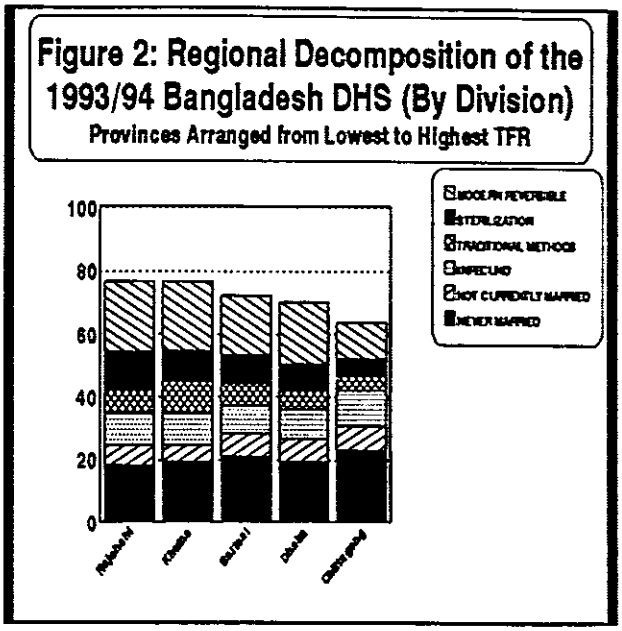
Figure 2: Regional Decomposition of the 1993/94 Bangladesh DHS (By Division)
Provinces Arranged from Lowest to Highest TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

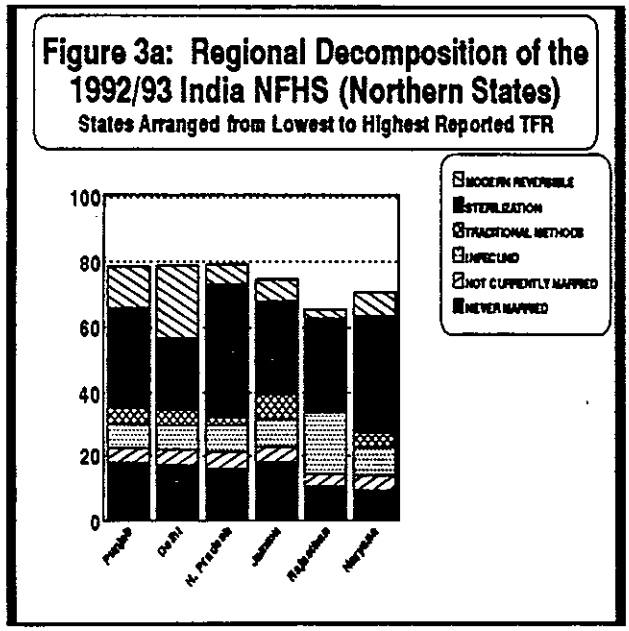
Figure 3a: Regional Decomposition of the 1992/93 India NFHS (Northern States)
States Arranged from Lowest to Highest Reported TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

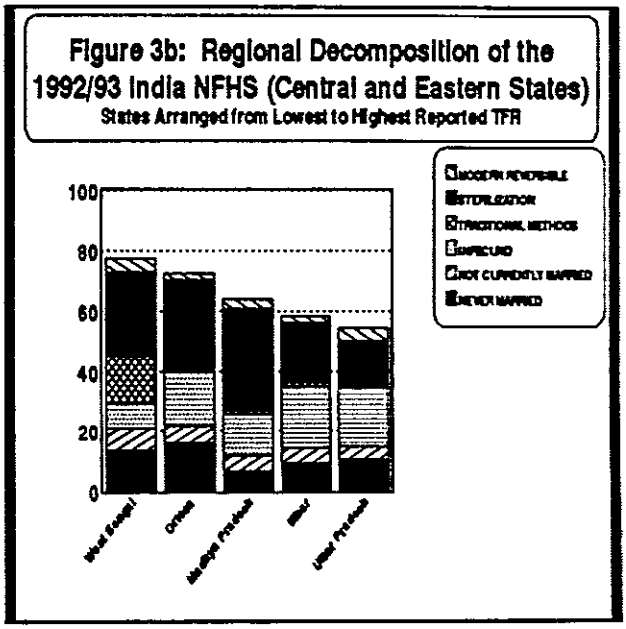
Figure 3b: Regional Decomposition of the 1992/93 India NFHS (Central and Eastern States)
States Arranged from Lowest to Highest Reported TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

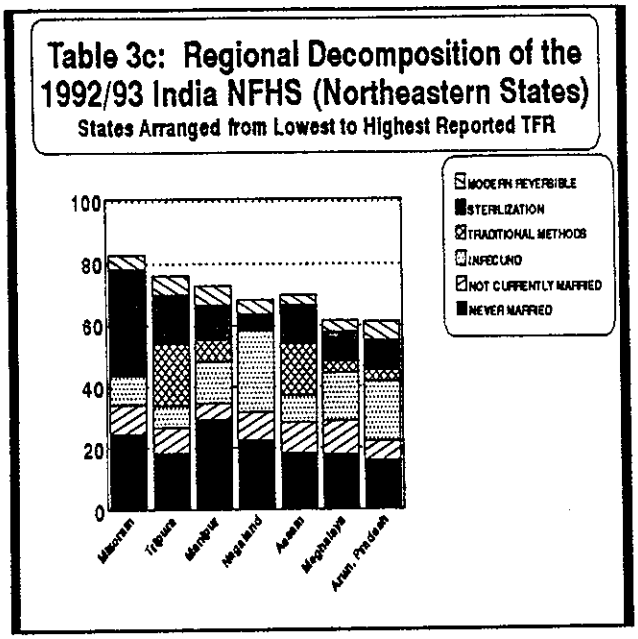
Table 3c: Regional Decomposition of the 1992/93 India NFHS (Northeastern States)
States Arranged from Lowest to Highest Reported TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

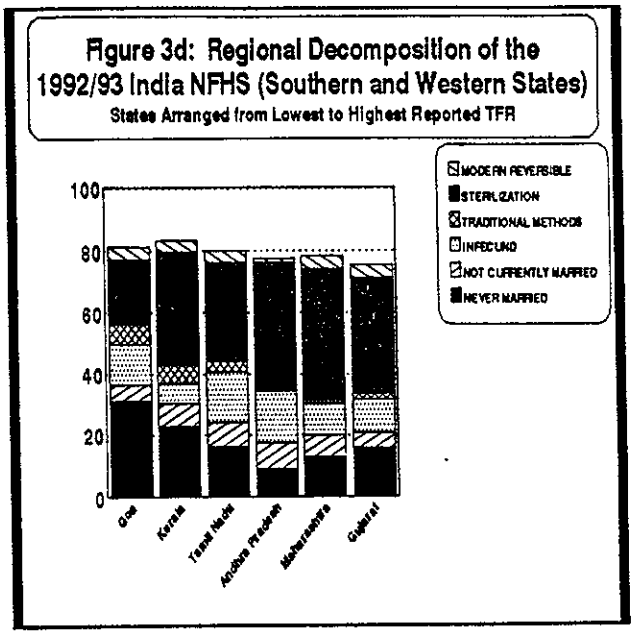
Figure 3d: Regional Decomposition of the 1992/93 India NFHS (Southern and Western States)
States Arranged from Lowest to Highest Reported TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED

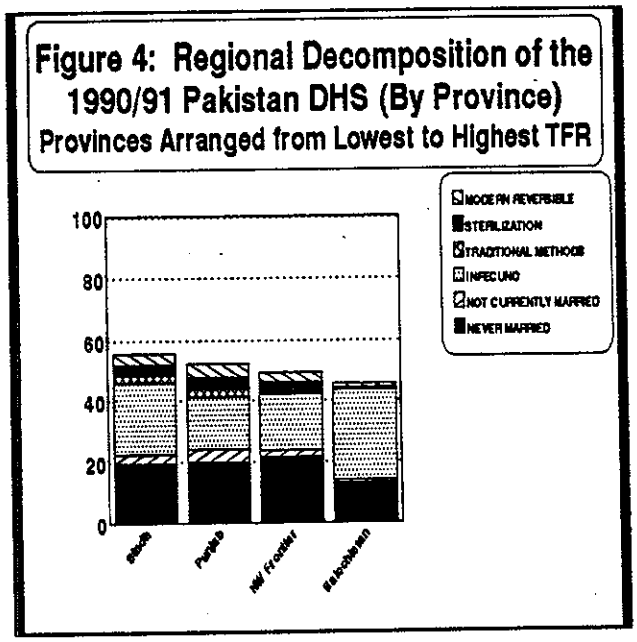
Figure 4: Regional Decomposition of the 1990/91 Pakistan DHS (By Province)
Provinces Arranged from Lowest to Highest TFR
100
80
60
40
20
0
MODERN REVERSIBLE
STERILIZATION
TRADITIONAL METHODS
INFECUND
NOT CURRENTLY MARRIED
NEVER MARRIED