



## Barriers to Safe Motherhood in India

Susheela Singh, Lisa Remez, Usha Ram, Ann M. Moore and Suzette Audam

### HIGHLIGHTS

- Maternal mortality remains unacceptably high in India, even though this hard-to-measure indicator has likely recently started to decline. For 2005–2006, mortality ratios range from the Indian government's estimate of 301 maternal deaths per 100,000 live births, to the World Health Organization's estimate of 450.
- The government's state-level estimates range from 517 maternal deaths per 100,000 live births in the most populous state, Uttar Pradesh, to 110 in the small state of Kerala.
- India contributes nearly one-quarter of the world's maternal deaths, so its insufficient progress in reducing maternal mortality imperils not only its own targets, but also the global achievement of the Millennium Development Goal to reduce maternal mortality by 75% from 1990 levels by 2015.
- A recent decline in fertility (from 3.4 children per woman in 1993 to 2.7 children in 2006) has greatly helped to lower the number of Indian women dying from these causes and their life-time risk of maternal death.
- Hemorrhage is the leading cause of maternal death in India; it is responsible for nearly two-fifths of all maternal deaths and thus accounts for half of the direct causes.
- Women's receipt of any professional prenatal or delivery care has increased dramatically—by one-half and one-third, respectively, from 1993 to 2006.
- Nonetheless, just over half (52%) of all Indian women deliver without trained medical assistance. Nearly three-fourths of women still give birth with no medical professional in attendance in Uttar Pradesh and Bihar, the country's first and third most populated states, respectively.
- Recently enacted programs to improve the safety of pregnancy and childbirth are likely behind the substantial increase in the proportion of women attended by trained professionals at delivery.
- Nevertheless, if India is to achieve its goal of 100 maternal deaths per 100,000 live births, government at all levels must redouble efforts to improve access to information and services to protect women's health during pregnancy and delivery, and to prevent unintended pregnancy and unsafe abortion.



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# Background

Maternal mortality is a strong negative indicator of women's status, and India's current levels remain unacceptably high. Estimates of the current actual level disagree (see discussion in "Data Sources"), but somewhere between 301<sup>1</sup> and 450<sup>2</sup> maternal deaths occur for every 100,000 live births. Expressed in sheer numbers, anywhere from 78,000<sup>1</sup> to 117,000<sup>2</sup> women die annually in India as a result of pregnancy or childbirth, which means that the country accounts for nearly one-quarter of all such deaths worldwide. Yet death represents only the most extreme outcome. For each woman who dies, an estimated 20 more suffer from infection, injury and disability connected to pregnancy or childbirth.<sup>3,4</sup> Some of the complications from giving birth can be serious enough to lead to organ failure, uterine rupture and fistulas.<sup>5</sup>

The toll that unsafe motherhood takes on the lives and health of Indian women, and, by extension, on their families and communities, is especially tragic since it is mostly avoidable. From a strictly medical standpoint, the large majority of maternal deaths—about 80%—can be prevented through effective and timely maternal health care.<sup>6</sup> The largest share of such deaths, an estimated half, occur during delivery; the remainder take place earlier (during pregnancy or after an unsafe abortion) or in the postpartum period.<sup>7</sup> The government of India is committed to reducing deaths associated with pregnancy and childbearing: Starting roughly in the early 1990s, consensus that the country had not adequately addressed the issue spurred national programs and policies to improve child survival and make motherhood safer. Achieving this objective will be daunting, given the vast and growing numbers of women of childbearing age: As of 2005, there were 280 million women of reproductive age (15–49 years) in India—one-third more than in 1992. The challenges these numbers represent underscore the need for the government to give priority to efforts to reduce maternal mortality and morbidity as it fulfills commitments made at the national and international levels.

## Unsafe Childbearing in the Context of India

The government's efforts to improve maternal health will not be easy, given that poverty is widespread and firmly entrenched in the country: Four-fifths of Indians currently

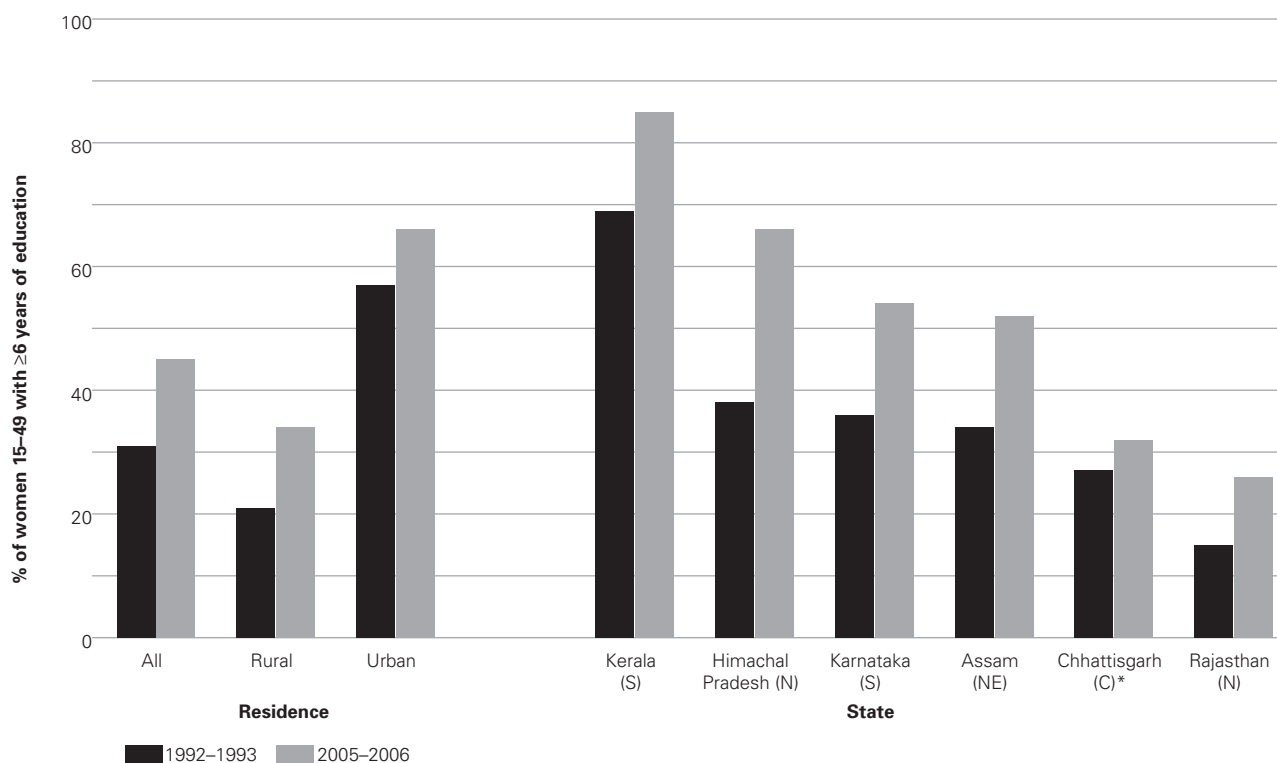
live on less than US\$2 a day; this total includes the one-third who live in abject poverty, on less than US\$1 a day.<sup>8</sup> Many still adhere to a rigid caste system that perpetuates intergenerational poverty and discrimination in parts of the country. Despite unprecedented recent economic growth in more developed states, the gross national income per capita was just US\$950 in 2007.<sup>9</sup>

India also remains a predominantly rural nation, with 71% of its people living in rural areas as of 2005.<sup>10</sup> For the country as a whole, the urban population is growing at an annual rate of 0.8%, but the pace is considerably faster in some states; Goa and Tamil Nadu, for example, are urbanizing at a rate of 2% per year. Goa has a comparatively high proportion of reproductive-age women living in urban areas (53%), while many of the country's larger, poorer states have far lower proportions: Just 15–17% of reproductive-age women in Bihar, Orissa and Assam live in urban areas (Appendix Table 1).

Even though parts of India are developing very rapidly, the positive effects of a booming economy have not been evenly distributed and are not yet apparent in increased investment in the overall health infrastructure.<sup>11</sup> Despite sustained national-level progress in the availability of trained health care professionals from 1992 through 2004–2005, the limited state-level data available show just how egregiously underserved some very large states remain—and an overall, well-functioning health system is key to lowering maternal mortality.<sup>12</sup> Availability of specialized care is particularly limited in some of these states. In 2005, for example, India's most populous state, Uttar Pradesh, which is home to more than one-seventh of all Indian women of reproductive age, had just 27 doctors and 10 nurse-midwives per 100,000 population, much lower than the national averages of 60 and 79 per 100,000, respectively (Appendix Table 1).

Added to the issue of the availability of medical providers is the question of whether women are even able to seek medical care for themselves: About half of all Indian women, with relatively little difference by state or area of residence (urban vs. rural), report that they have little or no say in decisions about their own health care (Appendix Table 1). Husbands and mothers-in-law continue to be primary decision makers regarding whether and when

**FIGURE 1. Trends in women’s educational attainment, all India and by area of residence, and for selected states to show range in trends**



\*Because of a change in state definition, trend is measured from 1998–1999 to 2005–2006. *Note:* Letters after states indicate regions—C=Central, N=North, NE=Northeast and S=South. *Sources:* Special tabulations of the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.

women seek medical care. For example, when husbands are asked why their wife delivered at home, the explanation most commonly given (i.e., cited by nearly half) is that they (or their family) perceived a health-facility birth to be unnecessary or would not allow it.<sup>13</sup>

Yet this situation may be starting to change. One of the most important factors influencing women’s status and ability to get care—educational attainment<sup>14</sup>—has been steadily improving. At the national level, 45% of Indian women aged 15–49 had at least six years of schooling in 2006, a sizable increase from just 31% in 1993 (Figure 1). Although progress was especially notable in rural areas (which saw an increase of 13 percentage points during this period), rural women were still only half as likely as their urban counterparts to have had this much education (34% vs. 66%).

The proportion of 15–49-year-old women who had completed six years of schooling in 2006 remained especially low—26%—in the northern state of Rajasthan and was one-third or lower in all three central states and in the eastern states of Bihar and Jharkhand. By contrast, that proportion reached 85% in the southern state of Kerala (Appendix Table 1). Despite this progress, however,

41% of all Indian women of childbearing age had never been to school, and this proportion was even higher in several large poor states (at least half of women in all three central states, and roughly three-fifths in Bihar, Jharkhand and Rajasthan; data not shown).<sup>13</sup>

### Scope of this Report

This report provides an evidence base of the need for improved maternal care in India and is intended to help policymakers and program planners understand the factors associated with the country’s high level of maternal mortality. The findings have the ability to inform the development and introduction of improved strategies to end the many needless deaths associated with childbearing in India.

The report provides a descriptive overview of maternal health in India and highlights the current status of and recent trends in gaps in the receipt of maternal health care and associated factors. We do not attempt to explain the possible social, structural and economic factors underlying these trends, although we do point to some key demographic indicators and highlight some large differences in trends and outcomes across regions and across states.

We also discuss key recent government policies and programs to improve maternal health and overcome barriers to safe motherhood. When feasible, we add insight into the impact of these policies and programs from the perspectives of key informants.

The maternal health measures reported here are restricted to those for which nationally representative trend data are available, primarily from the three India National Family Health Surveys (NFHS), as detailed in “Data Sources.” Unless specified otherwise, all data mentioned in the text are derived from special tabulations of data from those surveys and are presented in detailed form in the appendix tables.

# Data Sources

Obtaining accurate numbers of maternal deaths is extremely difficult: Even though mortality is high, maternal deaths are still rare events. Moreover, they must be recorded as such, which remains a challenge, since the link to maternity may not always be clear. Because of the difficulties associated with the collection of the data and their questionable reliability, accurately assessing maternal mortality is a controversial undertaking, and there is no consensus on its precise incidence in India. Thus, we provide both numbers gathered by the Indian government's Sample Registration System and indirect estimates generated by United Nations' models to present the range of values that are in use.

We focus more on maternal mortality than on maternal morbidity for two reasons. First, although maternal ill health is expressed in a range of undesirable outcomes, a focus on mortality is essential where reproductive death is still unconscionably high,<sup>15</sup> as is the case in India. Second, data on morbidity are even weaker than those on mortality in developing countries.<sup>12</sup>

Trends in maternal health and risk and in associated factors are based on data from the India NFHS conducted in 1992–1993 (NFHS-1),<sup>16</sup> 1998–1999 (NFHS-2)<sup>17</sup> and 2005–2006 (NFHS-3).<sup>13</sup> For brevity, we refer to the surveys as having been conducted in the single years in which the bulk of the fieldwork took place (1993, 1999 and 2006, respectively). This series of nationally representative surveys are the best available source of information on maternal health; they provide the most comparable and reliable data on these issues nationally and for all states over nearly 15 years. The surveys were designed to collect data on the population and its health through indicators of fertility, family planning, maternal and child health, nutrition and socioeconomic conditions.

The samples used in each of the three surveys permit estimates at the national and state levels. In the tables and figures, we label the states according to the six standard geographic regions used in the NFHS (Table 1). We calculated regional averages for a few selected indicators of women's reproductive health to assess the extent to which these averages yielded "expected" patterns based on each region's overall level of socioeconomic development. The regional variations reflect the diversity of the

individual states within regions, especially in the North and Northeast. We comment in the text when regional patterns (or lack thereof) are especially noteworthy.

For example, for several indicators—namely, total fertility rate, rural residence (as a proxy for limited access to health care), current use of a modern method of contraception and having a delivery attended by a trained medical professional—the regional averages followed "expected" patterns, with the more developed South and West consistently having the most favorable outcomes and the less developed Central, East and Northeast, the least favorable ones. On the other hand, education and early marriage (i.e., the onset of cohabitation with a husband) deviated from this pattern. The proportion of women in the Northeast attaining at least six years of schooling was basically the same as that in the South (57% and 55%, respectively). In terms of early marriage (both before the legal age of 18 and at any time during adolescence), women in the North (a mixed region socioeconomically), and the Northeast (with the large poor state of Assam), unexpectedly, were the least likely to have married early. In sum, the regional designations provide some useful information to situate states geographically and contextually, but state-level analyses remain essential, given the substantial variation among states within each region.

In the first two surveys, only ever-married women were interviewed, whereas in the third survey, women of all marital statuses were interviewed. For comparability, the majority of our variables are presented for married women (those already cohabiting with their husband). Because marriage is nearly universal in India and childbearing outside of marriage is rare, these samples of married women capture very high proportions of all women of childbearing age. The numbers of interviewed, ever-married 15–49-year-old women were 89,506 in 1993; 90,303 in 1999; and 98,923 in 2006. The 2006 sample also included 25,462 never-married women of reproductive age. On a few select variables, data from the 1993 and 1999 surveys were weighted to account for unmarried women. Only the first of the three surveys included 13- and 14-year-olds; for comparability, these youngest women are excluded from the analyses presented here.

Because of space limitations, the figures depicting trends show just a handful of states that were selected to represent the three possible outcomes in the indicator over time—increases, decreases and no change. The exceptions are education (the only indicator for which no state showed a decline over time) and unattended deliveries (the only one for which no state showed an increase over time).

There were changes in the geographic boundaries of several states over the study period, which affects our ability to assess trends over time. Between the 1999 and 2006 surveys, three new states—Jharkhand, Chhattisgarh and Uttarakhand—were formed from Bihar, Madhya Pradesh and Uttar Pradesh, respectively. The 1999 NFHS contains sufficiently detailed geographic information to allow mapping of its data to the 2006 state definitions, which enables direct comparisons between the later two surveys for these six states. However, the 1993 NFHS lacks the same level of geographic specificity, and therefore its data cannot be mapped similarly. To ensure

comparability, we calculate trends in these six states—the original states of Bihar, Madhya Pradesh and Uttar Pradesh, together with their split-off parts of Jharkhand, Chhattisgarh and Uttarakhand—from a later start point than for other states, namely, from 1999, rather than from 1993.

In addition, there were two differences in geographic coverage between the first and the later two surveys, which also limits trend analysis. The first NFHS sampled only the Jammu region of the state of Jammu/Kashmir, whereas the later two represented the entire state. Thus, this state also lacks comparable data between the first and later two surveys so, like the six states affected by changes in definition just mentioned, we assess trends for Jammu/Kashmir based on the later two surveys only. It must be kept in mind, then, that time trends for these seven states—Jammu/Kashmir plus the six states affected by changes in definition—cover roughly half the period used to assess trends for all other states. Second, the small Northeast state of Sikkim was not included in the first NFHS.

**TABLE 1. Selected demographic and reproductive health variables among women of childbearing age, by region, India, 2005–2006**

Region (and states)	Among women 15–49					Among women 20–24, % who marry before	
	Total fertility rate (lifetime births per woman)	% with ≥6 yrs. education	% living in rural areas	% using a modern method*	% of women whose most recent birth† was attended by a professional‡	Age 18	Age 20
<b>North</b> (Delhi, Haryana, Himachal Pradesh, Jammu/Kashmir, Punjab, Rajasthan and Uttarakhand)	2.64	53.0	63.0	54.9	54.0	26.8	44.9
<b>Central</b> (Chhattisgarh, Madhya Pradesh and Uttar Pradesh)	3.53	33.5	73.9	39.5	32.9	52.9	72.5
<b>East</b> (Bihar, Jharkhand, Orissa and West Bengal)	2.99	36.9	76.3	40.9	37.2	51.8	70.1
<b>Northeast</b> (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura)	2.61	57.3	71.5	32.1	43.2	26.6	41.9
<b>West</b> (Goa, Gujarat and Maharashtra)	2.21	63.5	49.8	57.7	74.2	32.4	50.9
<b>South</b> (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu)	1.88	54.9	60.3	62.7	81.2	37.1	54.0

\*Among married women; modern methods include the pill, IUD, injectables, condoms (male and female), sterilization (male and female), the diaphragm, foam and jelly. †For births in the past three years. ‡A doctor, auxiliary nurse-midwife, nurse or midwife/lady health visitor.

Source: Special tabulations of data from the 2005–2006 National Family Health Survey.

Because of their size, six small Northeast states—Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura—have been combined in our analyses. There is a slight noncomparability across the surveys in this group of small Northeast states given the omission of Sikkim in 1993 noted above. Moreover, because none of the three NFHS surveys covers the six Union Territories, those are also omitted from our analysis.

To help us interpret the trends and assess current health needs, we also consulted several published reports and official policy documents. For the most part, the policy and program sections of the report derive largely from these sources. When feasible, we add some impressions on how well policies and programs may be working gleaned from 12 interviews with 22 key informants from governmental and nongovernmental agencies in India (see “Acknowledgments”). The informal interviews were conducted in Mumbai and New Delhi between February 25 and March 3, 2008.



# An Overview of Maternal Mortality

The likelihood of dying during pregnancy or childbirth is intricately linked to the status of women in a given country, to its level of socioeconomic development and to the coverage and quality of its overall health system. The safety of induced abortion also plays a crucial role, as do cultural norms surrounding pregnancy and delivery.

## Levels and Trends in India

As mentioned previously, maternal mortality is notoriously difficult to measure in all developing-country settings, and India is no exception. Existing survey-based measures have a wide margin of error because of insufficient sample sizes. In addition, the reporting of maternal deaths in surveys likely substantially underestimates actual pregnancy-related deaths: Stigma associated with abortion, suicide or domestic violence may result in misreporting of the likely cause of death. Furthermore, the low status of women may lead to the failure to report their deaths for this or any other reason. Statistics from facilities likely also suffer from misclassification and incomplete reporting, since women who die after home-based deliveries and never make it to a facility are not captured in these data. Finally, cultural aversion to autopsies in India makes data on causes of death especially unreliable.<sup>18</sup>

Efforts to assess the level of maternal mortality in India using the most common measure, the maternal mortality ratio (the number of maternal deaths per 100,000 live births), have yielded wide-ranging estimates. For example, three national-level estimates for roughly the same time period, 1998–1999, from different sources range from 407<sup>19</sup> to 466<sup>20</sup> to 540.<sup>17</sup> More recent national efforts from 2002–2003 have also yielded varying estimates but the ratios are somewhat lower, ranging from 301<sup>1</sup> to 323.<sup>21</sup>

Together, these data strongly suggest that maternal mortality is in fact declining, even if it is difficult to pinpoint the exact extent of the drop.<sup>1,22</sup> However, the

approximate pace of decline, roughly determined by existing country estimates, would need to be sustained through 2015 for the country to meet the Millennium Development Goal (MDG) of reducing the 1990 maternal mortality ratio by three-quarters by 2015.<sup>23,24</sup>

In a country as vast and diverse as India, huge state-level variations in women's socioeconomic and cultural characteristics, and in their access to prenatal, delivery and emergency obstetric care, are reflected in states' wide-ranging levels of maternal mortality. For example, according to state- and region-level estimates published by the Registrar General from a Special Survey of Deaths for 2001–2003, women are most likely to die from maternal causes in the group of nine states made up of the eight states\* in the Empowered Action Group (EAG, as designated by the federal government because of historically above-average levels of child mortality and poverty) plus Assam (Table 2, page 10).<sup>1</sup> The maternal mortality ratio in this group of nine states is 2.5 times higher than that in the more developed South (438 vs. 173). These estimates also mean that the EAG states and Assam account for two-thirds of all maternal deaths in India, despite having one-third of its population. By contrast, the southern states, home to one-quarter of the population, contribute just 10% of the nation's maternal deaths.

One factor that is likely correlated with a high likelihood of maternal death is poverty, which may affect health service infrastructure and women's and men's prospects for education and gainful employment, which in turn affects women's ability to obtain needed prenatal and delivery care. The six EAG states with the highest percentages of their population living below the national poverty line<sup>†</sup>—Bihar, Chhattisgarh, Madhya Pradesh, Orissa, Uttar Pradesh and Uttarakhand<sup>25</sup>—are among those having maternal mortality ratios that are above the national average estimated by the Registrar General of 301 (i.e., they range

\*Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and Uttaranchal (now known as Uttarakhand).

†The 2004–2005 national poverty lines were 356 Rs (US\$7.98) per capita per month in rural areas and 539 Rs (US\$12.09) in urban areas (source: reference 25).

Maternal mortality means “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

**TABLE 2. Estimated maternal mortality ratios for all India and for selected major states and groups of states, 2001–2003**

Region/state	Maternal mortality ratio*
<b>Empowered Action Group† and Assam</b>	<b>438</b>
Assam	490
Bihar/Jharkhand	371
Madhya Pradesh/Chhattisgarh	379
Orissa	358
Rajasthan	445
Uttar Pradesh/Uttarakhand	517
<b>South</b>	<b>173</b>
Andhra Pradesh	195
Karnataka	228
Kerala	110
Tamil Nadu	134
<b>Other</b>	<b>199</b>
Gujarat	172
Haryana	162
Maharashtra	149
Punjab	178
West Bengal	194
Other‡	235
<b>All India</b>	<b>301</b>
*The number of maternal deaths per 100,000 live births. †The eight states making up the Empowered Action Group are so designated by the government because of historically above-average levels of child mortality and poverty, and below-average life expectancy. ‡Not specified. Note: Table is reprinted in its entirety from General Registrar, India Centre for Global Health Research, <i>Maternal Mortality in India, 1997–2003: Trends, Causes and Risk Factors</i> , New Delhi: Registrar General India, 2006.	

from 358 in Orissa to 517 in Uttar Pradesh and its split-off part of Uttarakhand). Another factor closely correlated to maternal mortality is the proportion of the population that lives in rural areas, which can influence accessibility to obstetric care. Assam, for example, has one of the highest proportions of women living in rural areas, at 86%, along with one of the highest maternal mortality ratios of any state—490 maternal deaths per 100,000 live births.

These basic associations between maternal mortality and social and demographic indicators observed in

2001–2003, the latest period for which such data are available, are supported by earlier mortality data as well. In the mid-1990s, for example, the risk of dying from maternal causes was far lower among well-educated women, women whose villages were more developed (and thus more likely to have a better health service infrastructure) and Muslim women (who are more likely than their Hindu counterparts to live in large villages, which generally translates into better availability of emergency obstetric services).<sup>22</sup>

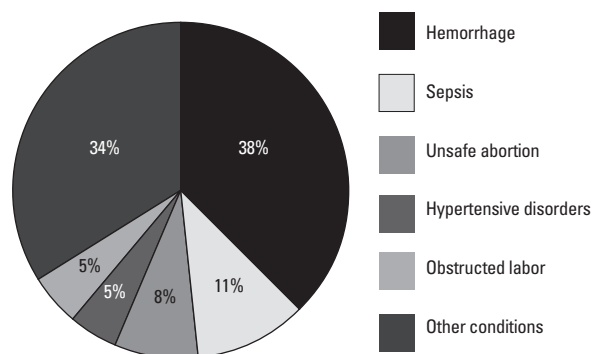
### Causes of Maternal Mortality

The five most common direct causes of pregnancy-related mortality in India as of 2001–2003 were hemorrhage (which accounted for 38% of all maternal deaths), sepsis (11%), unsafe abortion (8%), hypertensive disorders (5%) and obstructed labor (5%; Figure 2).<sup>1</sup> The remaining 34% of maternal deaths were due to unspecified indirect causes, meaning those related to illnesses or medical conditions that are aggravated by pregnancy or delivery (such as tuberculosis, viral hepatitis, malaria or anemia<sup>1</sup>). That hemorrhage is the largest contributor to maternal deaths in India (amounting to more than half of deaths due to direct causes) is unsurprising: One important contributing factor is that the country lacks sufficient staff trained to manage serious postpartum bleeding, as is evident from its score of only 35 out of 100 on an index measuring the availability of such personnel.<sup>26</sup>

The need for skilled postpartum care is most critical in impoverished eastern states, such as Jharkhand, where the prevalence of another measure, the specific complications that occur postpartum (within two months of delivery) of massive bleeding, fever or both is almost twice the national average (41% vs. 22%). The fact that one-third of pregnant women in India have moderate or severe anemia<sup>13</sup>(Table 10.24.1) (as do 17% of all women of reproductive age, Appendix Table 3) compounds the need for care, since anemia exacerbates the effects of hemorrhage. And unfortunately, hemorrhage appears to be a persistent postpartum complication in India: There has been little change in recent years in the occurrence of excessive bleeding in the two months after childbirth, with 11–12% of women giving birth suffering this complication in both 1999 and 2006.<sup>13,17</sup>

The proportion of maternal deaths that are associated with unsafe abortion is surprisingly high in a country that legally permits the procedure for a range of reasons. It is legal when the pregnancy occurs after contraceptive failure for married women, results from rape or poses a threat to a woman's physical or mental health, or when the fetus has a serious abnormality or genetic defect.<sup>\*27</sup> However, deaths are occurring because women are poorly informed about the law,<sup>28</sup> which leads them to seek

**FIGURE 2. Percentage distribution of maternal deaths by cause, India, 2001–2003**



Source: reference 1.

services from untrained, clandestine providers or to delay their procedure, increasing the risk of complications.<sup>29</sup> Women may also seek out informal providers in the hope of keeping their abortion a secret, which is likely to be especially important to unmarried women.

In addition, many Indian women seek abortion for reasons that fall outside the law. For example, although we lack data on its extent, some women report having an induced abortion for sex selection, a practice that has been illegal since 1994.<sup>30</sup> Persistent strong norms of son preference in India have led to a skewing of the sex ratio among children 0–6 years of age in some relatively better-off northern states where women have widespread access to prenatal diagnostic technology, such as Haryana and Punjab.<sup>31</sup>

Unsafe abortion’s major contribution to maternal mortality—it is the third leading direct cause—in large part results from the persistence of unsafe procedures provided by untrained traditional providers, which, in 2002,<sup>32</sup> made up one-quarter, or about 1.6 million, of the country’s 6.4 million estimated annual abortions.<sup>33</sup> Approximately 2.4 million additional abortions are estimated to be performed in uncertified facilities, where women’s safety cannot be ensured. The overuse of the outdated invasive technique of dilation and curettage likely further contributes to abortion-related mortality: The technique, which is used in fully 89% of facility-based procedures, is not recommended during the first trimester, when the vast majority of abortions occur.<sup>33</sup>

\*Yet among women who have had an abortion, only one-quarter cite reasons that fall under those allowed by the law (source: reference 33). Instead, although information is scarce and likely imprecise given the sensitivity of the subject, most women who obtain an abortion appear to do so to limit childbearing and to space pregnancies (source: reference 29).

# Factors Affecting Maternal Health

A wide range of reproductive and health-seeking behaviors have the potential to affect maternal health. These include whether a woman's births are planned and her use of contraception to achieve that end; her number of births and their spacing; and whether she received professional prenatal and delivery care, to name just a few. Changes in these factors in India in recent years present a mixed picture, with favorable trends in some factors but not others, as well as substantial variation across states.

## Fertility

Having fewer children enhances maternal health by reducing women's exposure to pregnancy and childbearing risks, so as fertility falls, so does the lifetime risk of dying from maternal causes. Although the methodologies used each year were not strictly comparable, the World Health Organization (WHO) estimates that Indian women's lifetime risk of maternal death decreased from one in 55 women in 1995<sup>34</sup> to one in 70 women in 2005<sup>2</sup> as their total fertility rate (lifetime births per woman) fell from 3.4 births per woman to 2.7 over roughly the same period (Figure 3).<sup>13</sup> Although it is not possible to verify empirically, change in India's overall fertility over the past two decades has likely contributed more to the decline in the number of maternal deaths than has change in any other single factor.<sup>35</sup>

Several positive trends have combined to reduce fertility in India. They include women's increasing desire for smaller families and increased use of effective contraception, their marrying at a somewhat older age (evident in a rise in median age at marriage of about half a year from 1993 to 2006) and their initiation of childbearing somewhat later as a result (as seen in a rise in age at first birth of about half a year).<sup>13,16</sup>

As family size fell in the country as a whole over the past decade and a half, declines were roughly equal in magnitude in rural and urban areas (Figure 3). Yet women in the countryside still have an average of one child more than those in cities, where fertility has fallen to the level needed to replace the existing population (2.1 births per woman).

Five states now have fertility levels that are below the replacement level (1.8–1.9 lifetime births per woman)—Andhra Pradesh, Goa, Himachal Pradesh, Kerala and Tamil

Nadu (Appendix Table 2). Substantial population growth at the national level is still going to continue, however, as family size remains large—at roughly four children—in the country's first and third most populous states, Uttar Pradesh and Bihar, respectively.<sup>36</sup> Moreover, Bihar along with another eastern state, Jharkhand, stands out as having experienced a slight *increase* in fertility over a seven-year time span; one possible contributing factor here could be women's better overall health leading to increased fecundity, as has been found in other countries.<sup>37</sup>

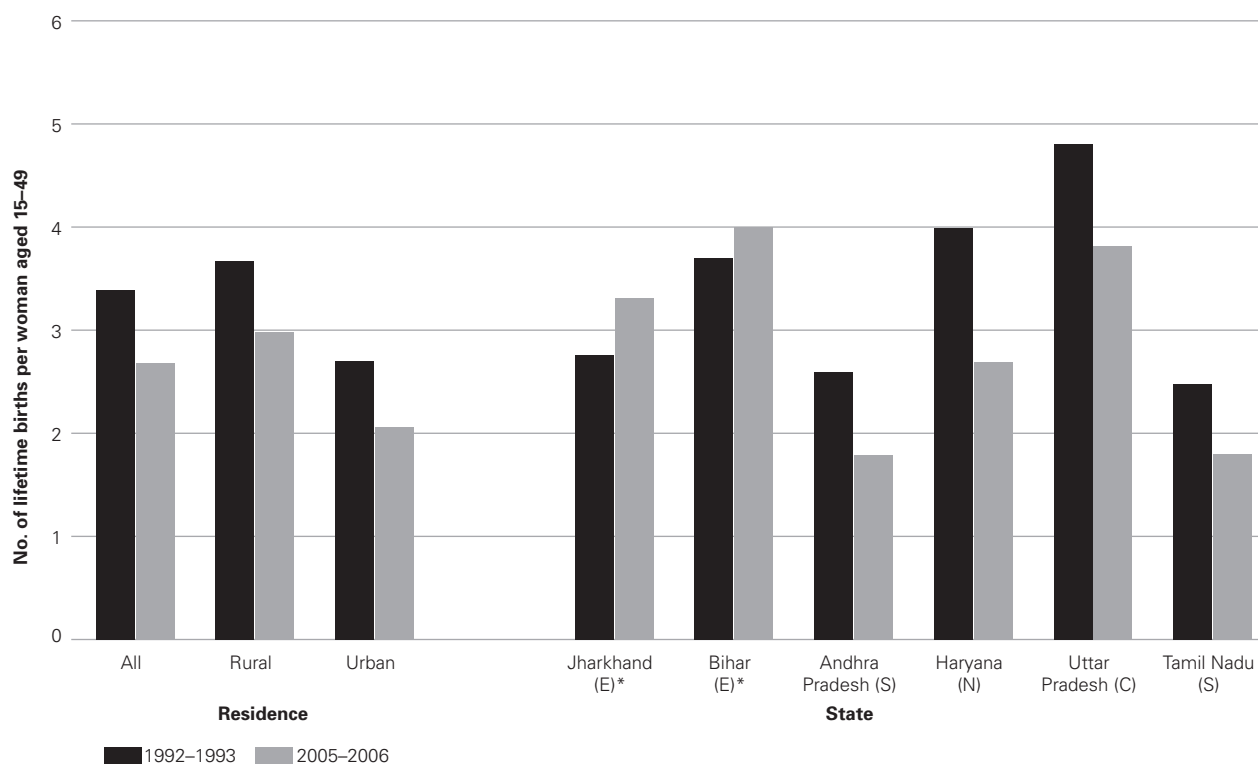
## Unplanned Childbearing

The overall declines in fertility suggest that Indian women's control over their reproductive lives has improved. Yet many women still have births that are unplanned, meaning births that are mistimed (occurring to women who would have preferred to become pregnant at a later date) or unwanted (occurring to women who wanted no children or no more children). Such births can negatively affect maternal health in many ways. For example, births that are mistimed because they follow a previous one too closely can increase the risk to women's health if it is already compromised by poor nutrition, anemia and other health problems. Unwanted births often occur to women who already have many children, which likewise heightens maternal risk. And unwanted births are just a small proportion of all unwanted pregnancies; despite the legality of abortion on several grounds, too many women still resolve unwanted pregnancies through unsafe abortion procedures, which contribute substantively to maternal mortality.

Evidence from other cultures suggests that women who do not intend to become pregnant are less likely to seek timely prenatal care.<sup>38</sup> The prevalence of unintended pregnancies in India has not been assessed. However, 21% of recent *births* (those in the past three years) were not planned, a proportion that has held roughly constant over the past decade and a half (Appendix Table 2). If we apply these respective proportions to total fertility rates, which have fallen over time in nearly all states, we see fewer unplanned births in 2006 than in 1993 (22 vs. 29 per 1,000 women).

At the state level, the proportion of recent births that were unplanned varies considerably. Only 10% of recent

**FIGURE 3. Trends in total fertility rates, all India and by area of residence, and for selected states to show range in trends**



\*Because of a change in state definition, trend is measured from 1998-1999 to 2005-2006. *Note:* Letters after states indicate regions—C=Central, E=East, N=North and S=South. *Sources:* Special tabulations of data from the 1992-1993, 1998-1999 and 2005-2006 National Family Health Surveys.

births were unplanned in the more developed western states of Maharashtra (which contains Mumbai) and Goa, and the northern state of Delhi (which contains the federal capital). The largest declines (one-half or more) in the proportion of births that are unplanned occurred in three low-fertility states—Maharashtra, Delhi and the southern state of Tamil Nadu. The proportion unplanned in 2006 was highest—one-third—in the country’s largest state, Uttar Pradesh, up from one-quarter in 1999. Women there now have an average of 1.3 unplanned births over their lifetime. A similar proportionate increase, though on a smaller absolute scale—from 8% to 19%—occurred in the much better-off state of Gujarat (i.e., where 60% of women are in the top two wealth quintiles, compared with just 32% of women in Uttar Pradesh, Appendix Table 1). Such increases in the proportion of births that are unplanned imply that women’s adoption of effective contraception in these disparate states is not keeping up with their increasing desires to have fewer children. Enabling

women to have only the number of children they want is essential to stabilizing the country’s population, which is currently growing at 1.6% each year.<sup>99</sup>

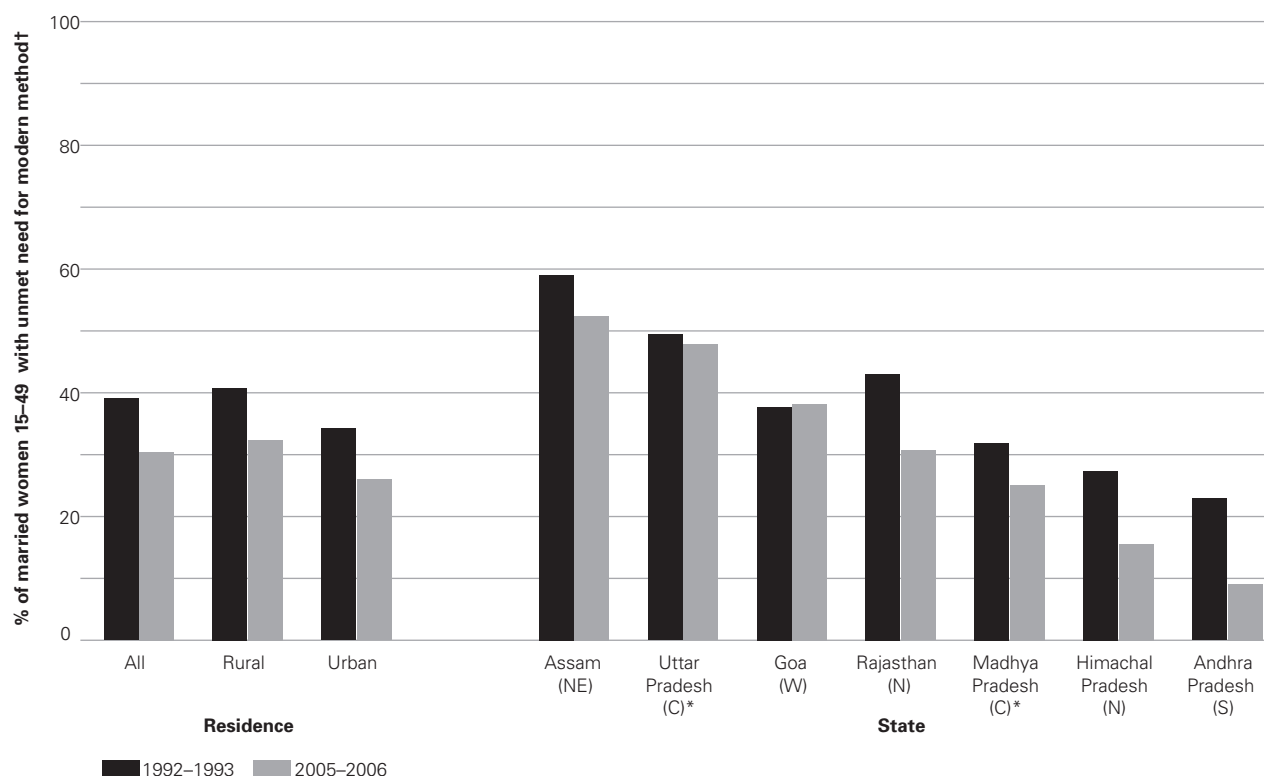
These patterns in the proportion of unplanned births are reflected in the average numbers of births to women that are unplanned. The largest drops in the numbers of unplanned births over time occurred in Delhi, Assam and Karnataka, where women had 0.6 fewer unplanned births in 2006 than in 1993. By contrast, Gujarati women had 0.2 more unplanned births over that period.<sup>13,16</sup>

### Use of Modern Contraceptives and Unmet Need

Preventing unplanned pregnancy is crucial to preserving maternal health: In developing countries, avoiding unintended or mistimed pregnancies has the potential to lower maternal mortality by an estimated 20%.<sup>12</sup> This can best be achieved by use of modern methods of contraception.\* The bulk of India’s fertility decline was likely achieved through increasing adoption of these methods, whose use rose from 37% of married women in 1993 to 49% in 2006.<sup>13</sup>(Table 5.7) Nearly four-fifths of that use, however, was accounted for by a single method—female sterilization: Thirty-seven percent of married women, whether in urban

\*Modern methods include the pill, the IUD, injectables, condoms (male and female), sterilization (male and female), the diaphragm, foam and jelly.

**FIGURE 4. Trends in unmet need for modern contraception, all India and by area of residence, and for selected states to show range in trends**



\*Because of a change in state definition, trend is measured from 1998–1999 to 2005–2006. †The pill, the IUD, injectables, condoms (male and female), sterilization (male and female), the diaphragm, foam and jelly. *Note:* Letters after states indicate regions—C=Central, N=North, NE=Northeast, S=South and W=West. *Sources:* Special tabulations of data from the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.

or rural areas, had undergone this procedure, whereas just 10% used a reversible modern method and 8%, a traditional method.\* (A negligible proportion of women, 1%, were not at risk for an unplanned pregnancy because of their partner’s vasectomy.) Reversible modern methods were more commonly used in urban than rural areas (17% vs. 7%), with Delhi having the largest proportion of women using these methods (33%).

Reliance on sterilization of either partner as of 2006 was especially high in Andhra Pradesh, which had very low fertility; two-thirds of married women in the state relied on that method, while merely 1% used a reversible modern method. A similar profile fits two other low-fertility states, Punjab and Goa, but it is notable that these two states had lower proportions relying on sterilization (32% and 26%, respectively). At least half of women were protected by sterilization in Karnataka, Kerala, Tamil Nadu, Maharashtra and Himachal Pradesh. By comparison, sterilization dipped to its lowest prevalence (13% of married

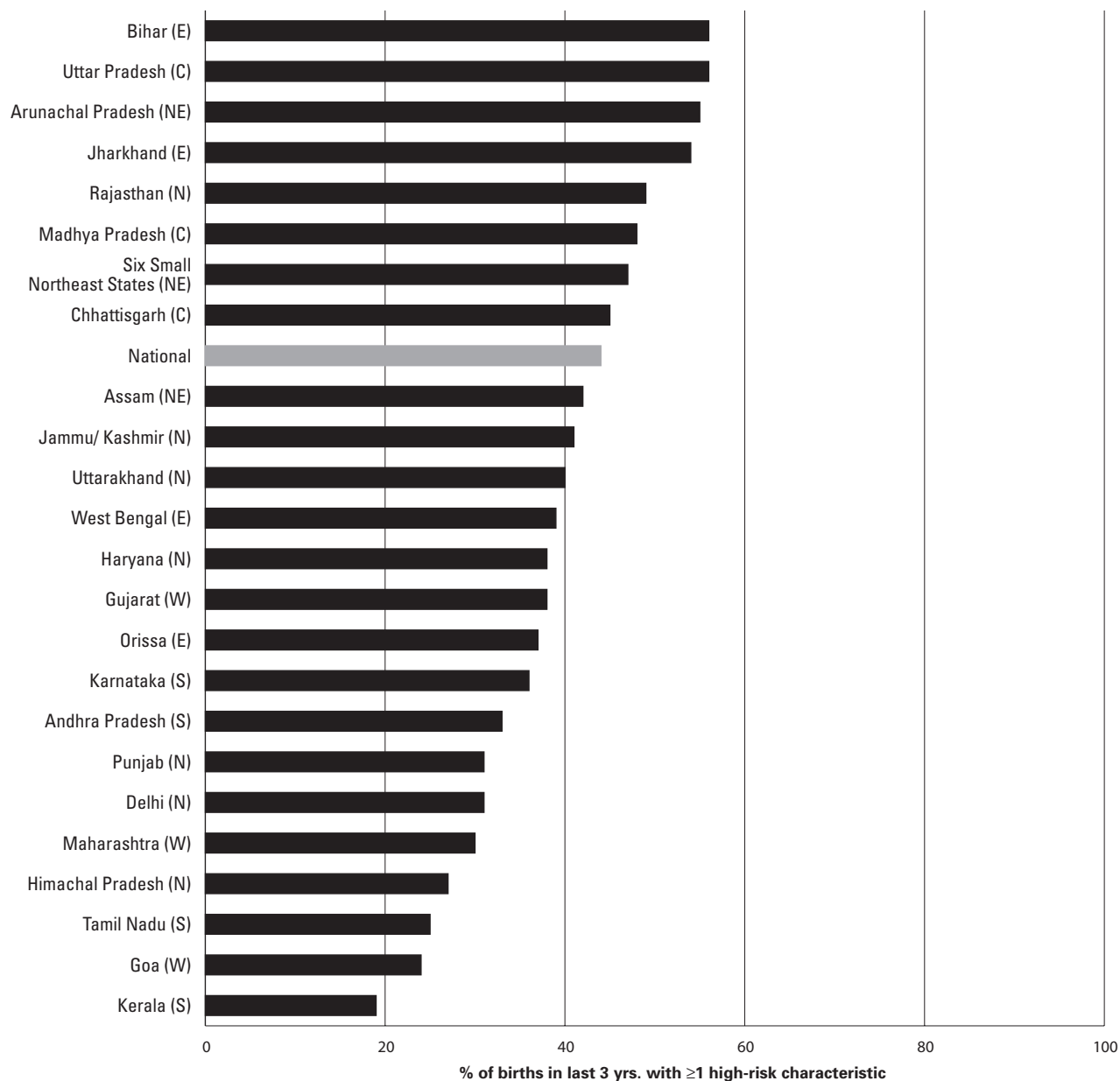
couples) in Assam.

Overall, reliance on sterilization increased by roughly one-quarter (from 31% to 38%) from 1993 to 2006, with the trend being similar in both urban and rural areas (Appendix Table 2). Three of the four southern states experienced above-average increases in sterilization use (of one-third or more), even though they started out with higher-than-average levels in 1993. Goan women’s contrasting situation is noteworthy in that they alone experienced a slight downward trend in the adoption of this permanent method over time.

The concept of unmet need for modern (effective) contraception is a good gauge of whether women are succeeding in achieving their desired timing of births and overall family size. It identifies those fecund, sexually active women who, despite not wanting a child in the next two years, nonetheless are not using any method or are using traditional methods, which generally have high failure rates.<sup>40</sup> For India as a whole, unmet need for a modern method decreased by just over one-fifth between 1993 and 2006, going from 39% to 30% (Figure 4). The state

\*Traditional methods include rhythm, withdrawal and folk methods.

**FIGURE 5. Proportion of recent births\* having at least one high-risk characteristic,† all India and all states, 2006**



\*Births in the past three years. †Occurred to mother younger than age 18 or older than age 35; occurred within 24 months of a previous birth; or was a fourth- or higher-order birth. Notes: Among women 15–49. Letters after states indicate regions—C=Central, E=East, N=North, NE=Northeast, S=South and W=West. Source: Special tabulations of data from the 2005–2006 National Family Health Survey.

that had the largest drop in unmet need—Andhra Pradesh, with a three-fifths decline—also is the state with the lowest current level of unmet need (just 9%).

Need for a modern method in 2006 was greatest, but has declined slightly, in Assam (52%), where traditional method use continues to be exceptionally high. The level of need there did not change appreciably (from 1999 through 2006) and persisted at 42–48% in Uttar Pradesh and Jharkhand. Unmet need also remained essentially the same across surveys at 38% in the very low fertility state of Goa, where use of any modern method was surprisingly well below the national average (i.e., 37% vs. 49%).<sup>13</sup>(Table 5.7)

## High-Risk Childbearing

Modern contraceptive use can further enhance maternal health by allowing women to prevent births that increase health risks for both mother and child. Although it is not always possible to predict in advance which individual births will cause severe complications, in the aggregate, births associated with increased risk include those occurring before full physical maturity (here defined as age 18), at a relatively advanced maternal age (defined as age 35 or older), soon after a previous birth (within 24 months) or to women who have three or more children.<sup>41</sup> In India, the high-risk births that occur most commonly are births to women with high parity, which account for 25% of all recent births in the past three years and births that are too closely spaced, which account for 24%; many births fall into both categories (Appendix Table 3).

Possibly reflecting the uniformly low use of reversible contraceptives for spacing, the proportion of births in 2006 that occurred fewer than 24 months after a previous one was the same in both rural and urban areas (24%), and varied moderately across states (from 17% in Assam to 31% in Punjab). Most likely because of wide state-level variation in completed family size, however, the range in the proportion that are fourth- or higher-order births was far wider (from 6% in Goa to 39% in Uttar Pradesh).

In 2006, high-risk births linked to maternal age were relatively uncommon: Just 7% of recent births were to women younger than 18 years of age and 5% were to those aged 35 or older. These national averages obscure wide state-level variation, however. Births before physical maturity of the woman accounted for a somewhat higher proportion than the average (9–12% vs. 7%) in six states with higher-than-average rates of early adolescent childbearing—Andhra Pradesh, Arunachal Pradesh, Bihar, Jharkhand, Karnataka and West Bengal.<sup>42</sup> Of note, Andhra Pradesh had the country's third-highest rate of childbearing before age 18 and the country's lowest total

fertility rate; this situation likely resulted from the state's overwhelming reliance on sterilization (used by 66% of married couples), which concentrates women's limited childbearing into a very narrow age-range. By contrast, early adolescent births accounted for only 1% of all births in Himachal Pradesh, Punjab, Kerala and Goa.

On the other end of the age spectrum, the proportion of births that were high risk because they were to women aged 35 or older reached 13% in the small Northeast states. Meanwhile, just 2% of births were to this age-group in Himachal Pradesh and Maharashtra.

Many births fall into more than one of the above high-risk categories. To assess the overall prevalence of births posing an elevated health risk to mother and child, we combined all four components. The results show that 44% of recent births to Indian women (47% in rural areas and 34% in urban areas) met one or more of the high-risk criteria (Figure 5, page 15). The decline of six percentage points in the prevalence of all such births—from 50% in 1993—is explained primarily by the drop in high-parity births, which is consistent with the country's sustained declines in average family size.

As of 2006, high-risk births accounted for a slight majority (54–56%) of all births in Uttar Pradesh, Bihar, Jharkhand and Arunachal Pradesh. Unsurprisingly, the state with the lowest proportion of high-risk births (19%) was Kerala, the state with the absolute lowest maternal mortality ratio in the country (110 per 100,000 live births).<sup>1</sup> In Kerala, the combination of virtually no adolescent childbearing (merely 1% of all recent births were to this age-group) and few high-parity births (only 6% of all recent births were to women who already had three or more children) reduced the proportion of any high-risk births to a level below that of the other lowest-fertility states, Andhra Pradesh, Tamil Nadu and Goa.

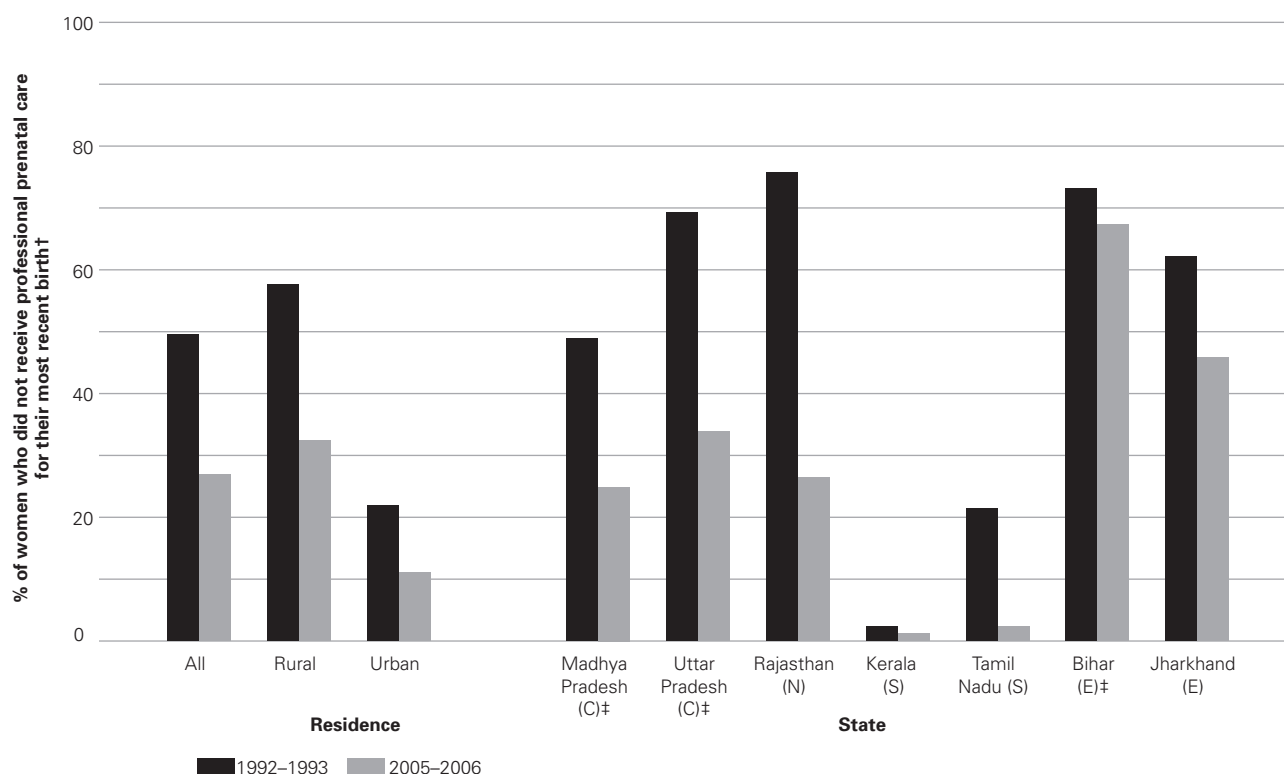
## Use of Maternal Health Care Services

Professional prenatal and delivery care could go a long way toward reducing maternal mortality in India: A fully functioning, mother-baby package intervention, as envisioned by the WHO, has been estimated to have the potential cumulative effect of averting 75–85% of maternal deaths and disability in developing countries.<sup>12</sup>(Table 26.A2) Having a medical professional present at delivery, good access to emergency obstetric care and a viable referral system can vastly improve a woman's chances of survival should complications arise.

Prenatal visits present an invaluable opportunity to educate women about where to go should they experience complications during labor. Women are much more likely to receive care from a trained health care professional—a



**FIGURE 6. Trends in lack of professional prenatal care,\* all India and by area of residence, and for selected states to show range in trends**



\*Care from a doctor, auxiliary nurse-midwife, nurse or midwife/lady health visitor. †For births in the past three years. ‡Because of a change in state definition, trend is measured from 1998–1999 to 2005–2006. Notes: Among women 15–49. Letters after states indicate regions—C=Central, E=East, N=North and S=South. Sources: Special tabulations of data from the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.

doctor, auxiliary nurse-midwife (ANM),\* nurse or midwife/lady health visitor†—during pregnancy than at delivery in India: As of 2006, 73% received professional prenatal care, but only 48% received professional delivery care (Appendix Table 3). The country’s Maternal Health Division requires that all women receive four prenatal care visits (the first one being for registration),<sup>43</sup> yet only 37% who recently gave birth made this many visits.<sup>13</sup>(Table 8.4) In addition, even when these visits occur, much of the opportunity to educate women is wasted, as only 37% of women (32% in rural areas but 50% in urban areas) receiving prenatal care got essential information on where to go for treatment of pregnancy complications (Appendix Table 3).

Encouragingly, women’s receipt of any professional prenatal and delivery care has increased dramatically—by one-half and one-third, respectively, from 50% in 1993 to 73% in 2006 (Appendix Table 3). Yet there is no question that high need for such care persists: As of 2006, about one-quarter of all Indian women who had a birth in the past three years went without any professional prenatal care for their most recent birth (Figure 6). Even though both rural and urban areas saw large improvements in

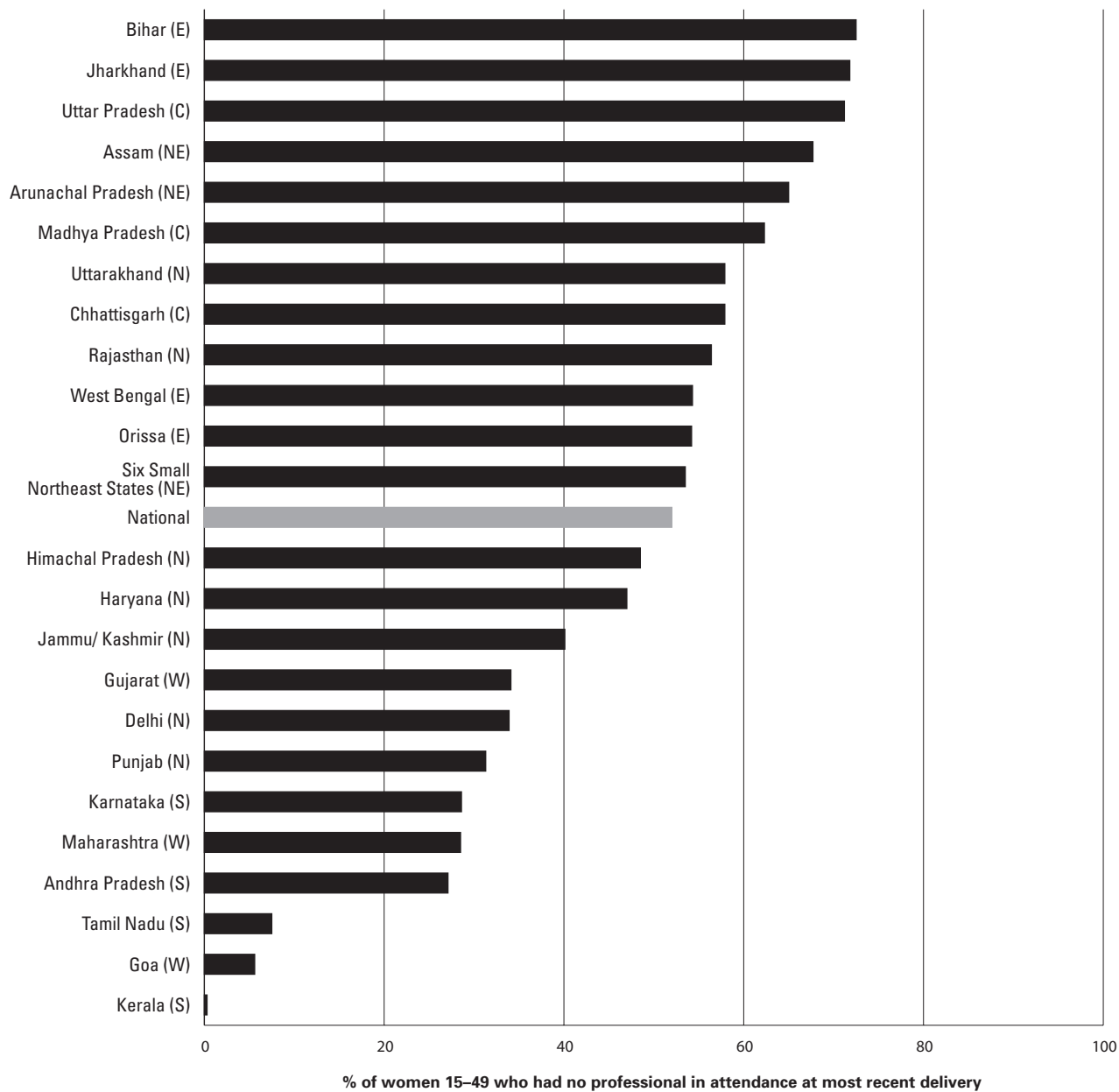
this measure over time, the proportion not making any prenatal visits during pregnancy was three times higher in the countryside than in cities as of 2006 (32% vs. 11%). Important declines (of at least half from high starting points) in this measure occurred in the large states of Rajasthan, Madhya Pradesh and Uttar Pradesh; the change was especially notable in the latter two states, since the decline happened in just seven years.

However, current need for prenatal care remains especially high in some eastern and northeastern states. Two-thirds of women in Bihar made no prenatal visits whatsoever with their most recent birth, and neither did nearly half of women in Jharkhand and Arunachal Pradesh. By contrast, virtually all pregnant women made at least one such visit in three southern states (Andhra Pradesh,

\*ANMs are key field-level health workers within the rural health care system who interact directly with the community, providing basic and curative services.

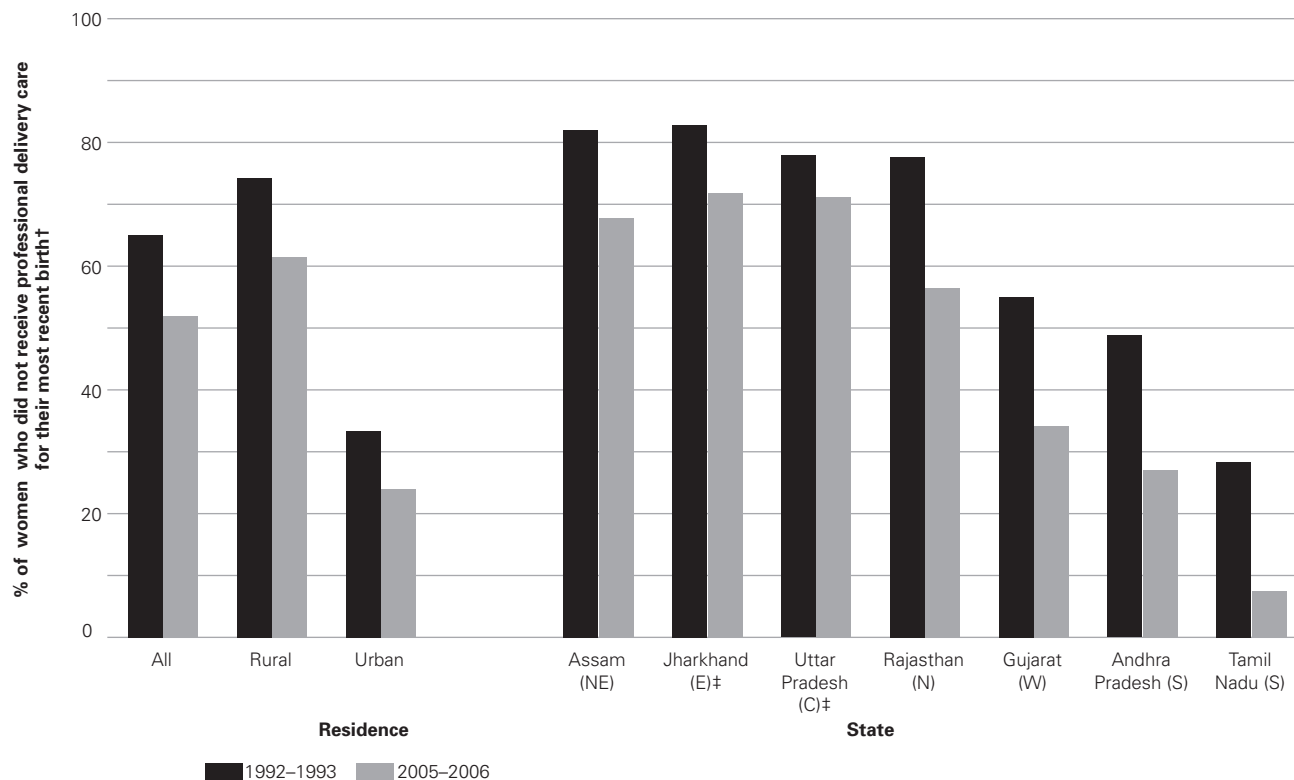
†A lady health visitor, who has a relevant diploma, trains traditional midwives and supervises ANMs. She reports to the Medical Officer of the Primary Health Center and acts as a liaison between the health center and the ANMs.

**FIGURE 7. Proportion of women whose most recent delivery was not attended by a trained professional,\* overall and by state, 2006**



\*A doctor, auxiliary nurse-midwife, nurse or midwife/lady health visitor. *Notes:* Among women who had a birth in the past three years. Letters after states indicate regions—C=Central, E=East, N=North, NE=Northeast, S=South and W=West. *Source:* Special tabulations of data from the 2005–2006 National Family Health Survey.

**FIGURE 8. Trends in lack of professional delivery care,\* all India and by area of residence, and for selected states to show range in trends**



\*Care from a doctor, auxiliary nurse-midwife, nurse or midwife/lady health visitor. †For births in the past three years. ‡Because of a change in state definition, trend is measured from 1998–1999 to 2005–2006. Notes: Among women 15–49. Letters after states indicate regions—C=Central, E=East, N=North, NE=Northeast, S=South and W=West. Sources: Special tabulations of data from the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.

Tamil Nadu and Kerala) and in the western state of Goa, where fewer than 5% of women went without care.

The situation is less encouraging for professional delivery care, which has an even more direct impact on maternal mortality<sup>6</sup> and thus should be prioritized in efforts to lower maternal deaths.<sup>15</sup> As of 2006, half of all Indian women giving birth did so without a trained professional in attendance (Figure 7). In Bihar, Jharkhand and Uttar Pradesh, the proportion was much higher—at least seven in 10. On the other end of the spectrum, fewer than 1% of women gave birth without the presence of a trained professional in Kerala, as did fewer than 10% of women in Tamil Nadu and Goa.

Recent progress in meeting the need for qualified delivery care was greatest in those states in which at least half of women already had safe delivery care in 1993: Among the states that saw the largest absolute declines in women having unattended deliveries (20 percentage points or more) were Andhra Pradesh, Gujarat and Tamil Nadu (Figure 8). Meanwhile, several states where large proportions of women delivered without professional as-

sistance in 1993—Assam, Jharkhand and Uttar Pradesh, among others—had changed comparatively little over the 13-year period (from 78–83% to 68–72%).

One important measure of maternal health services, the use of cesarean section, which can save both the mother’s and baby’s lives in case of obstructed labor, varies drastically by state (Appendix Table 3). The WHO estimates that about 11% of all infants are delivered via cesarean section in the developing world, a proportion in line with what is needed to achieve optimal health for both mother and child.<sup>44</sup> In India as of 2006, 9% of women delivered their most recent baby via a cesarean. That proportion was about half the national average, just 4%, in Arunachal Pradesh, Bihar, Madhya Pradesh and Rajasthan, suggesting that the risk of morbidity and mortality from prolonged labor is especially elevated in these states. The proportion is much higher than the expected minimum in states such as Kerala and Goa (31% and 27%, respectively), where women’s preferences and medical practice are additional factors that influence the prevalence of cesarean sections.

# Recent Relevant Policies, Programs And Initiatives

Although maternal mortality is a long-standing reality in India, the issue only recently rose to the level of national policy. Just a decade or so ago, reducing fertility and infant mortality were a greater policy focus for the government. Increased attention to maternal mortality resulted from the confluence of several developments—namely, the growing acknowledgment that it was a significant problem, a newfound consensus in how to address it and the election of more receptive governments.<sup>45</sup> Advocacy undertaken by the White Ribbon Alliance for Safe Motherhood also played a key role, as did the establishment in 2000 of the MDGs, which specifically called for all signatories to reduce maternal mortality by a clearly defined amount by 2015.<sup>23</sup> India's size means its lack of sufficient progress in this area could imperil global achievement of that goal.<sup>24</sup>

## Policies

Several recent national plans and policies include language on the importance of taking immediate action to reduce maternal mortality (although discussion of maternal mortality is virtually absent from two National Health Policies, released in 1983<sup>46</sup> and 2002<sup>47</sup>). The following summarizes the government's articulated commitment to lowering maternal mortality in recent national-level policies.

- One of the stated objectives of the National Population Policy of 2000<sup>48</sup> was to reduce the country's "unacceptable" maternal mortality ratio to below 100 maternal deaths per 100,000 live births by 2010. The policy emphasized the need to contextualize the issue as "a matter of social injustice" and as an indicator of gender inequity in nutrition and access to health care. It also specified the major contributions of malnutrition, unsafe abortion and frequent pregnancies to maternal mortality.
- The National Policy for the Empowerment of Women (2001)<sup>49</sup> explicitly recognizes maternal mortality as a "sensitive indicator of human development" and labels it a priority concern. To more effectively identify the

problem, the policy calls for efforts to improve the completeness and accuracy of mortality data.

- The Tenth Five Year Plan, spanning the years 2002–2007,<sup>50</sup> defined maternal mortality as "a matter of great concern," calling it a negative indicator of social empowerment and reiterating the goal of lowering the ratio to 100 per 100,000 live births, but by the later time point of 2012. This plan specified that the ratio could be reduced through efforts to promote institutional deliveries and to make home deliveries and abortions safer. The plan called for improving measurement of maternal mortality so that trends in levels and causes over time can be assessed, and singled out anemia as a major cause of pregnancy-related death.
- With the overarching framework known as the National Rural Health Mission (NRHM), which covers the years 2005–2012,<sup>51,52</sup> the government envisioned an "architectural correction" of the country's health delivery and financing systems to reduce inequity in the public sector. The NRHM acts on the government's commitment to increase spending on health—from 0.9% of gross domestic product to 2–3%, especially in 18 states with particularly weak infrastructure. \* The NRHM's first stated objective is to reduce maternal mortality to the "expected outcome" of 100 per 100,000 live births by 2012. It focuses on involving community-based health workers, known as Accredited Social Health Activists (ASHAs), and ongoing community monitoring with agreed benchmarks for reducing maternal mortality. It deems the presence of skilled attendants at all births and 24-hour emergency obstetric care to be "concrete service guarantees" and encourages decentralization and financial flexibility by issuing states funds without tying the money to spending criteria.
- Reducing the maternal mortality ratio (again, to 100 by 2012) is the first goal with a timeline in the Eleventh Five Year Plan for the years 2007–2012.<sup>7</sup> The plan acknowledges the country's heterogeneity by setting state-specific goals (e.g., a maternal mortality ratio of 37 in Kerala but 172 in Uttar Pradesh and Uttarakhand). It characterizes the current pace of decline as "insufficient." The plan's comprehensive strategy for improving maternal health has a long list of areas warranting

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\*Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jammu/Kashmir, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Rajasthan, Sikkim, Tripura, Uttarakhand and Uttar Pradesh.

special attention, which include enhancing emergency obstetric care so that it is available within two hours of travel time, improving roads and transportation for women referred for such care, increasing the number of skilled birth attendants and training doctors to provide anesthesia and perform cesarean sections, to name just a few.

Two abortion-related laws aim to indirectly reduce maternal mortality in India by addressing the threat to maternal health posed by unsafe abortion.

- The impact of unsafe abortion on maternal mortality led to the passage of the Medical Termination of Pregnancy Act of 1971,<sup>53</sup> which made induced abortion legal on several grounds as previously described.<sup>27</sup> Despite legalization, however, cumbersome regulation requirements for providers mean that an estimated two-thirds of the country's annual abortions are performed outside of accredited facilities,<sup>33</sup> where women's safety cannot be ensured.
- With the Pre-Conception and Pre-Natal Diagnostic Techniques Act of 1994,<sup>30</sup> the government sought to halt the practice of sex-selective abortions,<sup>29,33,54</sup> which take place predominantly in wealthier states with greater access to diagnostic technologies.<sup>55</sup> The law restricts the use of these technologies and is meant to counter the increasingly skewed child sex-ratio that perpetuates gender inequity by devaluing daughters. Unfortunately, it has not halted these abortions but has instead pushed them underground, which may increase the likelihood that they will be unsafe.<sup>56</sup> In fact, this situation raises the possibility that abortions performed for sex selection likely contribute disproportionately to maternal mortality, considering that they have to be delayed until relatively late in pregnancy when the sex of the fetus can be determined.

## Programs and Initiatives

The ongoing threat to the population's health posed by inadequate maternal health care has attracted substantial government programmatic attention over the past decade. The Ministry of Health and Family Welfare has intensified and focused its reproductive and child health services with each subsequent program iteration. For example, the Ministry followed up its Child Survival and Safe Motherhood Programme (spanning the years 1992–1997) with Phase 1 of the Reproductive and Child Health Programme (RCH–1, 1997–2004), which it then strengthened and enhanced by Phase 2 (RCH–2, 2005–2010).<sup>51,52</sup>

- RCH–1 promotes the “essential obstetric care” package, which covers a minimum of three prenatal care visits and promotes institutional deliveries, safer home

deliveries and increases in follow-up care during the postpartum period. Among the highlights of the program are investing in the training of traditional birth attendants; hiring more ANMs; providing transportation for poor women to reach facilities; offering 24-hour delivery services; hiring anesthesiologists; and setting up RCH clinics in remote areas.

- As the family health program of the NRHM, RCH–2 enacts the policy changes set forth by the framework—especially the decentralization of health care—and seeks to correct any identified shortcomings in RCH–1. The second round of the national program broadens partnerships between the public and private sectors so that poor women have equal access to emergency obstetric care. Among the many recommendations offered, RCH–2 specifically cites permitting ANMs to administer obstetric first aid, ensuring that primary health centers are open around the clock, better monitoring of the levels and causes of maternal mortality, and improving abortion safety by extending training in manual vacuum aspiration and in the use of the mifepristone-misoprostol regime.
- To enhance maternal health and reduce maternal mortality, an incentive program, *Janani Suraksha Yojana* (JSY),<sup>57</sup> rewards both pregnant women and the ASHAs and ANMs who care for them. Pregnant women below the poverty line are compensated for making the recommended number of prenatal visits, delivering in health care institutions and receiving postnatal care. Eligibility restrictions in some states are meant to indirectly encourage delayed childbearing and smaller families by requiring that recipients be at least 19 years of age and have had no more than two births.

# Status of Funding and Implementation

Government spending on health is exceptionally low in India—still less than 1% of the country's gross national product as of 2003–2004, or a meager 214 Rs (roughly US\$5) per person annually.<sup>58</sup> Moreover, it is unclear how much of the funds designated to the broad category of Reproductive and Child Health in India's budget support safe motherhood. The government is dramatically increasing spending on health generally: The approved outlays for the two most recent RCH programs, which cover a broad range of services, went from 5,288 *crores*\* Rs (US\$1.42 billion using the 1997–1998 exchange rate) in Phase 1 (covering 1997–1998 to 2003–2004)<sup>59</sup>—with domestic funding supporting just 22% of that total—to 40,000 *crores* Rs (US\$9.04 billion using the 2005–2006 exchange rate) in Phase 2 (covering 2005–2006 to 2009–2010)<sup>60</sup>—also with considerable input from donor countries and agencies, although their relative contribution is not specified. Yet the general perception is that money is not a barrier to providing services; other, more practical problems are greater barriers, such as facilities' inability to absorb more funds and health workers' discomfort with spending because of their inexperience with identifying funding priorities and managing money.<sup>61</sup>

The goals of the recent series of national policies and programs are laudable, but how are they being implemented on the ground? Clearly, the overhaul of public health services as envisioned in the NRHM is a massive undertaking that will require years to accomplish. It is still too soon to assess its impact on measurable outcomes. Encouragingly, a few midterm evaluations of the NRHM's progress mention the successes of increased numbers of community-based ASHAs and of institutional deliveries linked to JSY, as well as the use, usually for facility maintenance, of financial support not tied to specific projects or activities.<sup>61,62</sup> However, the far longer list of gaps and barriers that still need to be addressed include, among others, the failure of quality of care to keep pace with increased demand, corruption at all levels in paying out the incentives tied to JSY, the poor training of ASHAs,

inefficient referral systems that ping-pong women from one provider to another, and health workers' lack of confidence to spend unallocated funds.<sup>61,62</sup>

The widespread persistence of maternal mortality suggests that safe deliveries are hampered by a range of obstacles that constrain program effectiveness. These encompass inadequate health infrastructure, especially in essential emergency obstetric care; cultural attitudes that professional prenatal and delivery care are unnecessary; discrimination against women belonging to scheduled castes and tribes; and scarcity of specialists and inadequate specialist training. In informal discussions, key stakeholders mentioned the following specific implementation difficulties that deserve greater attention from policymakers and advocates:

- Although the government continues to stress institutional deliveries, hospitals are poorly equipped to take on the increased demand for services. As a result, many women experience long waiting times, and some return home without obtaining services or are discharged too soon after giving birth.
- JSY, the program to encourage women to seek prenatal and delivery care, has increased institutional deliveries, especially among poorer women who rarely gave birth at a facility before, but little is known about the program's quality of care. The age and parity eligibility criteria for participation in some states have likely led women to give false information to qualify, which could endanger their health.
- The responsibilities assigned to ANMs keep growing, but the numbers of these professionals and the extent of their training have not kept pace.
- The cultural preference for home births is hard to change, and home deliveries occur disproportionately among women from scheduled castes and tribes, who have correspondingly high levels of maternal mortality.

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\*A *crore* is equivalent to 10 million in Indian English. At the time these budgets were drawn up, the exchange rates against the U.S. dollar were 36.34 Rs to the dollar in 1997, and 44.11 Rs to the dollar in 2005.

# Conclusions and Recommendations

Because of the difficulty in accurately measuring maternal mortality, the magnitude and pace of decline in India cannot be exactly quantified. However, interpreting data from various sources—household surveys yielding direct and indirect estimates, and estimates from the WHO—we can conclude that some decline likely occurred from the late 1990s to the early 2000s. In addition, more readily quantifiable measures that affect women’s risk of negative maternal health outcomes indicate that the situation may be improving slowly: In the vast majority of states, fertility continues to decline, as do the proportions of unattended deliveries and of recent births that fall into any high-risk category. Nevertheless, available evidence suggests that death associated with pregnancy and childbirth remains a significant problem. Much more needs to be done if India is to come close to reaching its most recent goal to lower the maternal mortality ratio to 100 per 100,000 live births by 2012.<sup>7</sup> Below we offer some reflections on steps that could increase the likelihood of achieving this goal.

The general public needs to be better educated about the persistence of maternal mortality in India and the role that tradition can play in restricting women’s access to appropriate maternal health care. Long-standing cultural practices and beliefs that place women at increased risk for adverse maternal outcomes, such as dietary restrictions during pregnancy that exacerbate the already high incidence of anemia, must be strongly countered through public education campaigns about the nutritional needs of pregnant women. Husbands and mothers-in-law, in particular, play a central role in women’s use of maternal services. Hence, information campaigns on the importance of professional care must target these influential individuals.<sup>63</sup>

Social barriers that prevent poor, illiterate women from seeking services, such as fear of mistreatment and lack of privacy, could be mitigated through better training of

medical professionals to be more sensitive and respectful. Analyses of the causes of maternal death worldwide indicate that interventions to ensure safe delivery would have the greatest preventive benefit<sup>15</sup>; thus, the care of skilled personnel, with effective referral systems to emergency obstetric care is essential to lowering mortality. Institution-based care is essential to lowering maternal (and neonatal) mortality caused by unavoidable delivery complications, so the government’s focus on institutional births is encouraging. Recent data from the 2007–2008 District Level Household and Facility Surveys (DLHS-3)<sup>64</sup> suggest that the investment in JSY has started to pay off in several states. For example, in the few years separating 2002–2004 and 2007–2008, just before and after the program’s 2005 launch, the proportion of deliveries taking place in health care institutions increased dramatically in Madhya Pradesh (from 29% to 47%), Rajasthan (from 30% to 46%) and Andhra Pradesh (from 59% to 72%). In these three states, the proportions of mothers participating in JSY as of 2007–2008 stood at one-quarter (Andhra Pradesh) to one-third (Madhya Pradesh and Rajasthan).

Unfortunately, in two of the country’s largest states, Uttar Pradesh and Bihar, the fraction of all deliveries taking place in institutions barely changed and is still quite low (just one-quarter). These low institutional delivery rates coincide with low JSY participation rates: In Uttar Pradesh only 5% of mothers receive JSY assistance and in Bihar, only 10% of mothers get JSY funds. Clearly, even as efforts are made to increase institutional births, attention is also needed to make home births safer in states where home-based deliveries are still the norm.

To monitor the progress of interventions and accurately assess changes over time, it is essential to have maternal health data that are more reliable. The identification and measurement of contributory factors—not just those related to health but also to culture—need to be improved. To gather those data, innovative tools such as the Maternal and Perinatal Death Inquiry and Response (MAPEDIR) project, which was recently undertaken in six states,<sup>65</sup> should be more widely implemented.\* Encouragingly, interventions envisioned in national-level policies are being undertaken on the ground in response to local MAPEDIR findings; for example, some districts

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\*According to results from this audit tool used to assess maternal deaths in the community in 2005–2007, the perception that a woman “was not sick enough” was the most common reason for forgoing medical care. Further, women’s educational and socioeconomic characteristics were strongly associated with disproportionately high rates of maternal death (source: United Nations Children’s Fund (UNICEF), MAPEDIR Fact Sheet, undated, <[http://www.unicef.org/media/files/India\\_Mapedir\\_fact\\_sheet.doc](http://www.unicef.org/media/files/India_Mapedir_fact_sheet.doc)>, accessed May 29, 2009).

that have used the audit tool have initiated a voucher-based referral and transportation system to get women to needed medical care, while others have set up blood banks and blood storage units to treat hemorrhage and anemia. In response to the high prevalence of anemia among pregnant women and the large contribution of hemorrhage to maternal deaths, the John D. and Catherine T. MacArthur Foundation has distributed a device that holds promise for managing obstetric hemorrhage<sup>66</sup>—the nonpneumatic antishock garment, which can stabilize a woman with severe bleeding while she is transported to a medical facility for treatment. Such noninvasive, low-technology interventions can potentially save many lives.

The positive trend in adequate prenatal coverage—51% of women made at least three visits in 2006 compared with 44% in 1993<sup>67</sup>—needs to be sustained, since prenatal care enhances women's chances of safe delivery and acts as a crucial entry point into the health system. Lack of prenatal care has also been shown to be a proximate risk factor for death from pregnancy-induced hypertension in developing countries.<sup>12</sup> Each prenatal visit is an important opportunity to teach women how to recognize the warning signs of pregnancy complications and also when and how to seek emergency obstetric care. That the main providers of prenatal care, ANMs, are so overburdened, is likely affecting the quality and availability of care. One possible remedy is to empower and train lower-level ASHAs to take over some of the functions currently assigned to ANMs.

In a country where abortion is legal under broad criteria, the continued high level of unsafe procedures is troubling and contributes to avoidable maternal death. Much can be done to reduce abortion-related health complications, including simplifying the process for certifying facilities; better educating women about the abortion law; improving the quality of abortion providers; eliminating the practice of requiring spousal consent; and replacing widespread dilation and curettage with safer procedures (e.g., vacuum aspiration and medication abortion). Postabortion care that includes quality contraceptive services and counseling is also essential.

To the extent that high maternal mortality reflects the low status of women, efforts to increase the value of women is a crucial step toward making motherhood safer. So is raising public awareness of how maternal mortality can be prevented. The global consensus on the importance of meeting the MDGs has opened an invaluable window of opportunity to strengthen the political will to reduce maternal mortality, and this political push is needed at all levels—national, state and local. Individual states are under enormous pressure to comply and

are required to report their progress every six months. Even though several states are on track, the absence of sufficient progress in just a handful of large states with especially poor maternal health outcomes can prevent the country as a whole (and given India's size, the entire world) from achieving its goal in reducing maternal mortality. Efforts need to be redoubled in those states that face greater barriers to ensure a faster rate of progress toward the achievable goal of safe motherhood for all women.



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**APPENDIX TABLE 1. Selected demographic and socioeconomic characteristics among women aged**

Region and state	Total population (in 000s)*			% living in urban areas		% currently married (cohabiting with husband)			% with ≥6 yrs. of education†		
	1992	1999	2005	1992	2005	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006
	<b>1</b>			<b>2</b>		<b>3</b>			<b>4</b>		
All	205,047	240,244	275,489	27.3	31.1	77	75	75	31	37	45
Rural	148,940	169,753	189,740	na	na	80	77	77	21	28	34
Urban	56,107	70,491	85,749	na	na	71	69	70	57	62	66
<b>North</b>											
Delhi	2,371	3,177	4,094	91.0	94.7	74	69	70	60	69	71
Haryana	3,776	4,696	5,675	27.0	32.9	83	77	76	32	42	50
Himachal Pradesh	1,316	1,527	1,738	9.0	10.3	74	69	71	38	53	66
Jammu/ Kashmir**	1,860	2,290	2,737	24.8	27.1	<b>69</b>	64	62	<b>43</b>	37	50
Punjab	4,970	5,831	6,697	30.8	37.3	71	68	72	43	54	58
Rajasthan	10,066	12,124	14,235	24.1	26.2	81	82	79	15	22	26
Uttarakhand**	1,451	1,921	2,320	na	u	na	86	70	na	46	54
<b>Central</b>											
Chhattisgarh**	3,641	4,701	5,625	na	u	na	80	72	na	27	32
Madhya Pradesh**	11,786	13,383	15,149	24.6	28.2	<b>87</b>	79	78	<b>20</b>	26	33
Uttar Pradesh**	29,574	34,690	40,016	21.0	24.0	<b>81</b>	78	75	<b>21</b>	25	34
<b>East</b>											
Bihar**	14,588	17,384	20,008	13.3	14.7	<b>83</b>	79	81	<b>21</b>	23	28
Jharkhand**	5,107	6,005	7,106	na	u	na	80	78	na	25	31
Orissa	7,914	9,059	10,187	13.7	16.8	72	70	73	24	33	41
West Bengal	16,618	19,447	22,317	29.5	30.0	75	76	77	35	36	42
<b>Northeast</b>											
Arunachal Pradesh	197	239	284	13.6	27.9	72	64	69	27	43	40
Assam	5,355	6,277	7,224	12.2	15.4	66	68	69	34	41	52
Small NE states††	2,140	2,659	3,230	22.4	24.4	62	60	61	50	52	60
<b>West</b>											
Goa	328	366	404	41.9	53.4	56	59	62	60	68	76
Gujarat	10,460	12,404	14,386	36.0	40.5	74	73	76	39	45	54
Maharashtra	19,516	22,991	26,489	40.6	46.6	76	74	73	43	51	63
<b>South</b>											
Andhra Pradesh	16,867	19,321	21,728	28.3	29.4	80	79	77	26	29	38
Karnataka	11,271	13,221	15,188	32.7	37.4	73	71	72	36	45	54
Kerala	8,178	8,902	9,662	26.9	26.0	65	69	73	69	77	85
Tamil Nadu	15,229	16,892	18,483	36.1	50.1	72	71	71	40	46	58

\*The values for states do not add up to the national total because of rounding and because the national total includes the Union Territories, which were not included in the surveys that are discussed in this report. †For comparability with the 2006 survey, which included women of all marital statuses, these 1993 and 1999 data come from the household samples of these surveys, which collected information about all women in the household. ‡Currently married women 15–49 were asked: “Who makes decisions about health care for yourself?” Values shown are for women who answered either myself or myself and husband. §The count of beds is based on all hospitals practicing allopathic (Western) medicine; separate data for urban and rural areas are unavailable. \*\*Seven states for which certain trends can only be assessed starting with the 1999 values because of noncomparability in the areas sampled over time. For Jammu/Kashmir, only the region of Jammu was sampled in 1993 (denoted by bold italics), whereas the entire state was represented in 1999 and 2006, so trends were measured for the period between the later two surveys. Similarly, three large states—Bihar, Madhya Pradesh and Uttar Pradesh—changed definitions since the 1993 survey (denoted by bold italics): The 1999 survey contains sufficiently detailed geographic

**15–49, and indicators of health care availability, all India and by area of residence and state, 1992–2006**

	% living in households in the top 2 quintiles of the DHS wealth index	% belonging to scheduled tribe or caste	% who are involved, either solely or jointly with husband, in decisions about their own health care†	Per 100,000 population, no. of:									
				Hospital beds§	Doctors			Nurse-midwives			Lady health visitors/ANMs		
	2005–2006	2005–2006	2005–2006	2005	1992	1999	2005	1992	1999	2004	1992	1998/99	2004
	5	6	7	8	9			10			11		
	40	66	47	43	48	54	60	45	75	79	21	42	56
	23	71	46	u	u	u	u	u	u	u	u	u	u
	76	56	48	u	u	u	u	u	u	u	u	u	u
	90	32	52	35	113	157	158	u	u	u	u	u	u
	58	44	55	31	4	5	6	20	22	69	24	30	60
	64	39	47	125	u	u	u	29	103	124	44	125	149
	54	27	27	37	u	u	79	u	u	u	u	u	u
	76	41	55	35	129	133	136	110	141	179	56	71	79
	37	78	41	52	31	36	38	19	42	58	23	49	38
	57	40	43	11	u	u	u	u	u	u	u	u	165
	19	89	35	27	u	u	2	u	u	u	u	u	u
	27	79	40	28	24	30	46	67	147	142	30	34	41
	32	73	48	5	25	26	27	9	10	10	10	11	17
	23	76	43	3	41	40	40	13	11	10	14	11	9
	24	83	48	3	u	u	2	u	u	u	u	u	u
	22	67	47	34	35	38	40	49	90	120	3	45	79
	30	35	46	70	60	62	64	16	66	53	25	71	80
	35	75	47	173	u	u	u	u	u	u	u	u	u
	28	46	55	11	48	53	58	10	10	37	9	10	45
	47	74	51	94	u	u	u	u	u	u	u	u	u
	77	25	42	207	u	131	170	u	u	u	u	u	u
	60	63	48	65	55	63	71	42	168	158	19	50	69
	57	54	50	74	61	79	94	45	110	79	14	21	25
	40	73	47	44	30	38	44	22	58	106	22	72	121
	41	78	39	74	72	106	124	51	150	99	54	83	98
	80	47	55	79	66	89	105	68	80	217	15	27	107
	42	98	52	68	82	101	113	57	131	247	14	72	99

information to permit mapping to the 2006 state definitions, which allows trends to be measured from 1999 to 2006 for these three original states plus their split-off parts of Chhattisgarh (from Madhya Pradesh), Jharkhand (from Bihar) and Uttarakhand (formerly known as Uttaranchal, from Uttar Pradesh). ††The following Northeast states have been combined: Manipur, Meghalaya, Mizoram, Nagaland, Sikkim (unavailable for 1992–1993) and Tripura. *Notes:* DHS=Demographic Health Survey. ANM=auxiliary nurse-midwife. na=not applicable. u=unavailable. *Sources: Columns 1 and 2*—The 1992 and 1999 populations are interpolated from the 1991 Census of India. The 2005 population is estimated from, *Population Projections for India and States 2001–2026. Report of the Technical Group on Population Projections Constituted by the National Commission on Population, 2006. Columns 3–7*—Special tabulations of the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys. *Columns 9–11*—Ministry of Statistics and Programme Implementation, Statistical Abstract – India, New Delhi: Government of India, 1992–2005.

**APPENDIX TABLE 2. Trends in fertility levels and preferences, and contraceptive use among women**

Region and state	Total fertility rate (no. of births)*			% of births in past 3 yrs. that were unplanned†								
				Total unplanned			Unwanted			Mistimed		
	1992– 1993	1998– 1999	2005– 2006	1992– 1993	1998– 1999	2005– 2006	1992– 1993	1998– 1999	2005– 2006	1992– 1993	1998– 1999	2005– 2006
	<b>1</b>			<b>2</b>			<b>3</b>			<b>4</b>		
All	3.39	2.85	2.68	23	20	21	9	9	11	14	11	10
Rural	3.67	3.07	2.98	22	20	22	9	9	12	13	11	10
Urban	2.70	2.27	2.06	25	21	20	9	9	9	16	12	11
<b>North</b>												
Delhi	3.02	2.40	2.13	29	22	10	14	13	7	15	9	4
Haryana	3.99	2.88	2.69	20	10	11	9	6	4	11	5	7
Himachal Pradesh	2.97	2.14	1.94	24	16	16	12	9	6	13	6	11
Jammu/ Kashmir‡‡	<b>2.95</b>	2.71	2.38	<b>22</b>	31	22	<b>11</b>	16	10	<b>11</b>	15	12
Punjab	2.92	2.21	1.99	15	13	15	7	8	6	9	5	8
Rajasthan	3.63	3.78	3.21	14	15	17	8	8	8	6	6	8
Uttarakhand‡‡	na	2.61	2.55	na	23	25	na	15	13	na	9	12
<b>Central</b>												
Chhattisgarh‡‡	na	2.79	2.62	na	17	14	na	9	6	na	9	7
Madhya Pradesh‡‡	<b>3.90</b>	3.43	3.12	<b>16</b>	21	16	<b>7</b>	12	8	<b>9</b>	9	8
Uttar Pradesh‡‡	<b>4.81</b>	4.06	3.82	<b>24</b>	23	33	<b>11</b>	14	20	<b>13</b>	9	13
<b>East</b>												
Bihar‡‡	<b>4.00</b>	3.70	4.00	<b>24</b>	23	20	<b>10</b>	13	15	<b>14</b>	10	5
Jharkhand‡‡	na	2.76	3.31	na	26	27	na	9	11	na	17	16
Orissa	2.92	2.46	2.37	26	16	17	9	5	8	17	11	10
West Bengal	2.92	2.29	2.27	35	26	27	16	9	11	19	18	17
<b>Northeast</b>												
Arunachal Pradesh	4.25	2.52	3.03	13	24	20	6	9	8	8	15	12
Assam	3.53	2.31	2.42	28	20	15	9	11	9	19	9	6
Small NE states§§	2.95	3.00	3.00	30	27	28	11	7	11	19	19	17
<b>West</b>												
Goa	1.90	1.77	1.79	17	29	10	3	7	2	14	21	9
Gujarat	2.99	2.72	2.42	8	8	19	2	2	10	6	6	9
Maharashtra	2.86	2.52	2.11	23	19	10	7	7	3	16	12	7
<b>South</b>												
Andhra Pradesh	2.59	2.25	1.79	15	18	16	6	7	8	9	12	8
Karnataka	2.85	2.13	2.07	35	21	21	8	7	9	27	14	12
Kerala	2.00	1.96	1.93	19	19	17	3	2	4	17	16	13
Tamil Nadu	2.48	2.19	1.80	28	19	13	9	6	5	19	13	8

\*Number of lifetime births per woman, assuming prevailing rates in the past three years, among all women aged 15–49. †Data for 1993 and 1999 are for births to ever-married women only, whereas data for 2006 include births to all women, regardless of marital status. Unplanned births are made of up mistimed births (those to women who would have preferred to become pregnant at a later date) plus unwanted births (those to women who wanted no children or no more children). ‡Women who want no (more) children or want to wait two or more years before their next birth. §Modern reversible methods include the pill, IUD, injectables, condoms (male and female), diaphragm, foam and jelly. \*\*Traditional methods include rhythm, withdrawal and folk methods. ††Women are considered to have an unmet need for a modern method if they are fecund, sexually active and do not want a birth in the next two years, but are not using any method or are using traditional methods. ‡‡Seven states for which certain trends can only be assessed starting with the 1999 values because of noncomparability in the areas sampled over time. For Jammu/Kashmir, only the region of

aged 15–49, all India and by area of residence and state, 1992–2006

Among married women														
% wanting no more children or not wanting a child soon‡			% protected by sterilization (male or female)			% using reversible modern methods§			% using traditional methods**			% with unmet need for modern methods††		
1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006
5			6			7			8			9		
79	80	85	31	36	38	6	7	10	4	5	8	39	33	30
78	79	84	30	35	38	3	5	7	4	5	8	41	34	32
83	84	86	34	38	39	12	13	17	6	7	8	34	29	26
87	88	89	23	29	24	31	28	33	6	8	10	29	28	27
84	84	86	35	41	39	10	12	19	5	9	5	32	24	21
89	88	90	46	52	55	9	8	16	4	7	2	27	21	16
<b>84</b>	84	87	<b>30</b>	31	29	<b>10</b>	11	16	<b>10</b>	7	8	<b>38</b>	39	35
87	87	86	34	31	32	17	23	24	7	13	7	28	25	25
77	77	82	28	32	35	3	6	10	1	2	3	43	33	31
na	82	88	na	31	34	na	9	22	na	3	4	na	39	26
na	77	83	na	38	44	na	4	5	na	3	4	na	30	26
<b>82</b>	82	85	<b>32</b>	38	46	<b>4</b>	5	7	<b>1</b>	1	3	<b>40</b>	32	25
73	74	84	<b>13</b>	15	17	<b>6</b>	6	12	<b>1</b>	6	14	<b>55</b>	49	48
<b>70</b>	74	81	<b>19</b>	20	24	<b>3</b>	2	5	<b>2</b>	2	5	<b>46</b>	50	42
na	71	80	na	22	24	na	3	7	na	3	5	na	42	42
81	80	85	32	36	34	3	5	11	2	7	6	42	34	34
87	88	88	31	34	33	7	14	17	20	19	21	46	40	36
71	80	85	10	21	23	9	13	15	5	3	6	45	40	43
87	75	85	15	17	13	5	10	14	23	17	30	59	49	52
80	84	84	16	20	16	8	13	17	13	9	13	52	47	46
81	75	78	30	28	26	7	8	11	10	12	11	38	36	38
81	79	85	41	45	44	6	8	13	2	6	10	28	22	24
84	87	89	47	52	53	6	8	12	1	1	2	26	23	19
76	77	79	45	57	66	2	2	1	1	1	1	23	15	9
82	81	85	43	52	58	5	4	5	2	2	1	31	21	18
86	83	86	48	51	50	6	5	8	9	8	11	28	24	25
83	81	87	40	46	55	6	4	5	5	2	1	32	25	22

Jammu was sampled in 1993 (denoted by bold italics), whereas the entire state was represented in 1999 and 2006, so trends were measured for the period between the later two surveys. Similarly, three large states—Bihar, Madhya Pradesh and Uttar Pradesh—changed definitions since the 1993 survey (denoted by bold italics): The 1999 survey contains sufficiently detailed geographic information to permit mapping to the 2006 state definitions, which allows trends to be measured from 1999 to 2006 for these three original states plus their split-off parts of Chhattisgarh (from Madhya Pradesh), Jharkhand (from Bihar) and Uttarakhand (formerly known as Uttaranchal, from Uttar Pradesh). §§The following Northeast states have been combined: Manipur, Meghalaya, Mizoram, Nagaland, Sikkim (unavailable for 1992–1993) and Tripura. Note: na=not applicable. Sources: special tabulations of the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.

**APPENDIX TABLE 3. High-risk childbearing and indicators of maternal health among women aged**

Region and state	% of births in last 3 yrs. having high-risk characteristic										% with moderate or severe anemia*		1992–1993
	To women aged <18		To women aged ≥35		To women who had a birth within past 24 mos.		To women who already have ≥3 children		To women with ≥1 high-risk characteristic		1998–1999	2005–2006	
	1992–1993	2005–2006	1992–1993	2005–2006	1992–1993	2005–2006	1992–1993	2005–2006	1992–1993	2005–2006			
All	9	7	7	5	22	24	31	25	50	44	17	17	55
Rural	10	8	7	6	21	24	33	28	52	47	18	18	49
Urban	6	4	5	4	24	24	24	16	42	34	14	16	76
<b>North</b>													
Delhi	3	2	5	4	24	22	27	14	42	31	11	9	74
Haryana	8	4	5	6	27	26	28	19	50	38	16	20	66
Himachal Pradesh	2	1	5	2	26	25	21	9	39	27	9	12	47
Jammu/ Kashmir**	<b>3</b>	2	<b>6</b>	7	<b>21</b>	26	<b>26</b>	23	<b>42</b>	41	20	15	<b>69</b>
Punjab	4	1	4	3	26	31	23	12	42	31	13	12	82
Rajasthan	8	7	8	6	19	25	34	32	50	49	16	18	29
Uttarakhand**	na	2	na	4	na	22	na	22	na	40	na	15	na
<b>Central</b>													
Chhattisgarh**	na	7	na	5	na	22	na	28	na	45	na	18	na
Madhya Pradesh**	<b>10</b>	5	<b>6</b>	6	<b>20</b>	26	<b>33</b>	31	<b>51</b>	48	17	16	<b>44</b>
Uttar Pradesh**	<b>6</b>	6	<b>11</b>	8	<b>22</b>	26	<b>41</b>	39	<b>56</b>	56	15	16	<b>39</b>
<b>East</b>													
Bihar**	<b>8</b>	9	<b>10</b>	8	<b>18</b>	24	<b>40</b>	36	<b>56</b>	56	21	16	<b>33</b>
Jharkhand**	na	10	na	7	na	20	na	35	na	54	na	21	na
Orissa	8	7	5	4	18	19	28	20	45	37	18	17	56
West Bengal	13	12	5	3	19	19	29	16	50	39	17	18	72
<b>Northeast</b>													
Arunachal Pradesh	8	9	10	10	22	25	37	36	56	55	12	15	34
Assam	13	7	7	8	26	17	41	27	62	42	27	27	36
Small NE states††	5	4	11	13	22	24	33	29	48	47	u	13	46
<b>West</b>													
Goa	3	1	11	10	21	19	14	6	34	24	9	9	84
Gujarat	4	5	4	3	26	25	24	20	42	38	17	20	64
Maharashtra	14	7	3	2	25	21	23	12	48	30	17	16	72
<b>South</b>													
Andhra Pradesh	18	9	3	3	19	27	22	8	49	33	17	23	76
Karnataka	15	9	4	3	24	23	25	13	50	36	16	18	72
Kerala	3	1	6	5	18	18	10	6	26	19	3	7	91
Tamil Nadu	7	3	4	4	23	23	14	7	35	25	20	16	92

\*Defined as having a hemoglobin level of less than 10.0 g/dL. Assessed among ever-married women in both 1999 and 2006. †A doctor, auxiliary nurse-midwife, nurse or midwife/lady health visitor. ‡Among those receiving prenatal care. §Assessed during the two months after delivery; specifically refers to massive vaginal bleeding and very high fever. \*\*Seven states for which certain trends can only be assessed starting with the 1999 values because of noncomparability in the areas sampled over time. For Jammu/Kashmir, only the region of Jammu was sampled in 1993 (denoted by bold italics), whereas the entire state is represented in 1999 and 2006, so trends were measured for the period between the later two surveys only. Similarly, three large states—Bihar, Madhya Pradesh and Uttar Pradesh—changed definitions since the 1993 survey (denoted by bold italics): The 1999 survey contains sufficiently detailed geographic information to permit mapping to the 2006 state definitions, which allows



## 15–49, all India and by area of residence and state, 1992–2006

Among women who gave birth in past 3 yrs, for most recent birth:

% who had ≥2 doses of tetanus toxoid vaccine		% who received prenatal care from trained provider†			% who received delivery care from trained provider†			% who had a cesarean section			% informed where to go for care for complications‡	% who had postpartum bleeding, fever or both§	
1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	1992–1993	1998–1999	2005–2006	2005–2006	1998–1999	2005–2006
67	76	50	60	73	35	42	48	3	7	9	37	19	22
63	72	42	53	68	26	33	39	2	5	6	32	20	24
82	87	78	84	89	67	74	76	6	15	18	50	17	16
86	90	82	82	88	55	67	66	5	14	14	76	16	11
79	83	70	57	73	33	42	53	2	5	7	38	8	16
64	73	74	86	85	26	41	52	2	5	15	63	11	22
78	82	<b>78</b>	83	83	<b>32</b>	41	60	<b>4</b>	9	14	32	29	21
90	83	85	74	82	50	64	69	4	9	19	54	12	32
53	65	24	39	74	22	36	44	1	3	4	32	15	17
54	70	na	44	60	na	38	42	na	3	9	43	14	24
58	75	na	49	75	na	31	42	na	4	5	36	30	17
54	70	<b>38</b>	51	75	<b>31</b>	29	38	<b>1</b>	3	4	34	22	26
52	65	<b>31</b>	31	66	<b>18</b>	22	29	<b>1</b>	3	5	17	21	24
60	73	<b>27</b>	27	33	<b>20</b>	21	28	<b>1</b>	3	4	31	24	31
51	69	na	38	54	na	17	28	na	4	5	32	25	41
74	83	39	66	74	20	33	46	1	5	6	32	24	20
83	91	68	86	87	35	45	46	4	11	11	34	19	24
45	42	49	61	55	22	32	35	0	7	4	42	17	26
52	63	48	59	65	18	22	32	2	4	7	21	19	24
50	63	58	66	71	36	40	47	2	6	8	42	22	15
88	87	94	100	98	90	92	94	16	20	27	54	23	28
72	79	52	70	83	45	55	66	3	9	10	59	14	17
75	86	72	86	89	54	59	72	4	8	12	44	17	11
81	88	67	87	95	51	64	73	5	15	23	48	27	19
76	80	67	82	89	52	60	71	4	11	17	43	11	16
86	89	98	99	99	91	95	100	15	30	31	65	18	13
95	96	79	93	98	72	81	93	8	16	22	81	13	14

trends to be measured from 1999 to 2006 for these three original states plus their split-off parts of Chhattisgarh (from Madhya Pradesh), Jharkhand (from Bihar) and Uttarakhand (formerly known as Uttaranchal, from Uttar Pradesh). ††The following Northeast states have been combined: Manipur, Meghalaya, Mizoram, Nagaland, Sikkim (unavailable for 1993) and Tripura. *Notes:* Data pertain to births and pregnancies to ever-married women in 1993 and 1999 and to all women in 2006, except for anemia, which was assessed among ever-married women in both 1999 and 2006. na=not applicable. *Sources:* Special tabulations of the 1992–1993, 1998–1999 and 2005–2006 National Family Health Surveys.







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