Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 88, No. 2
doi:10.1007/s11524-010-9532-7

Intra-urban Differentials in the Utilization of Reproductive Healthcare in India, 1992–2006

Abhishek Kumar and Sanjay K. Mohanty

ABSTRACT *This paper examines trends in three reproductive healthcare indicators—namely, antenatal care, medical assistance at delivery, and contraceptive use among the urban poor and non-poor in India using data from the National Family Health Surveys, 1992–1993 and 2005–2006. The urban poor and non-poor are derived from composite wealth indices based on a set of economic proxies. Results indicate that the estimates of poor and non-poor are reliable. During the last 14 years, the service coverage in all three indicators has increased in the country, among both the urban poor and non-poor. However, the utilization of reproductive health services is concentrated among the urban non-poor cutting across the states, with the exception of Kerala. While the non-poor/poor gap in antenatal care and medical assistance at delivery remained large over the years, the gap in contraceptive use has narrowed down cutting across states. After adjusting for other confounders, household poverty was found to be a significant barrier in the utilization of reproductive healthcare services across the states. It has been observed that the utilization of reproductive healthcare services followed a continuum of rural total, urban poor, and urban non-poor.*

KEYWORDS *Urbanization, Poverty, Urban poor, Antenatal care, Medical assistance at delivery, Concentration index, India, Asia*

INTRODUCTION

Many of the developing countries including India are experiencing rapid growth in the urban population. According to the United Nations population projection (medium variant), the urban population of developing countries was estimated at 1,980 million in 2000 and is expected to reach 3,949 million by 2030. In the last decade (2000–2010), the annual growth rate of urban populations was more than 2% compared to less than 1% for rural populations. The share of urban population has increased from 18% in 1950 to 30% in 1980, 40% in 2000 and is expected to reach about 70% by 2050.[1] The rapidly growing urban populations of developing countries are synonymous with the growth of urban poverty,[2] as the proportion of urban poor is on the rise (increased from 27.7% in 1996 to 31.2% in 2006).[3,4]

Until the early 1980s, urbanization was considered beneficial for improved health status due to higher accessibility of health services in urban areas. Accordingly, the policies and programs of developing countries focused on improving the health of rural communities. The basic argument was that the

Kumar is with the International Institute for Population Sciences, Deonar, Mumbai, India; Mohanty is with the Department of Fertility Studies, International Institute for Population Sciences, Deonar, Mumbai, India.

Correspondence: Abhishek Kumar, International Institute for Population Sciences, Deonar, Mumbai, India. (E-mail: abhi85_iips@rediffmail.com)

majority of the population in developing countries resides in rural areas and that the urban population is homogenous with respect to economic and health status.[5] But in the 1980s and 1990s, research revealed the high incidence of poverty and the great diversity in income and access to health services in urban areas of developing countries, and urged the promotion of urban primary healthcare. Findings from multi-country studies revealed that the gap in reproductive health services was remarkably large among the poor and better-off in urban areas,[6–8] and the utilization of reproductive and child health services (RCH) services was lowest among rural populations, followed by the urban poor and the urban non-poor[6]. The ill effects of urban poverty on child health have also been well documented.[9–14] In some countries, the nutritional status of urban poor children was worse than that of rural children.[15]

The pattern of urbanization in India is similar to that of developing countries. The share of urban population in the country has increased from 17% in 1951 to 28% in 2001 (285 million) and is expected to reach 41% (about 611 millions) by 2030.[1,16] During the next decade (2010–2020), the urban population is expected to grow at 2.5% annually compared to a growth rate of less than 1% in rural India.[1] The rapid increase of the urban population in India is the combined effect of a natural increase and rural-to-urban migration, which is mainly due to widespread poverty, indebtedness, and underemployment in rural areas.[17] Official estimates of urban poverty in India are marginally lower than that of rural poverty—that is, 28% in rural India, compared to 26% in urban India based on a mixed recall period, 2004–2005.[18] Among these urban poor, a large proportion lives in slums which are typically overcrowded, polluted, lack basic services such as clean water and sanitation, and are exposed to infectious diseases. For example, about 57% of the urban population in Mumbai lives in slums.[19]

Apart from the unhygienic and health-threatening surroundings, limited access to healthcare services makes the urban poor more vulnerable to contact infection, fall sick and suffer prolonged illness. The other contributing factors for bad health among the urban poor are low awareness, irregular use of recommended health practices, high cost of health services, and poor accessibility.[20] Thus, there are many obstacles to the maintenance of good health in general and maternal health in particular, that affect the poor, particularly slum dwellers.[21] Studies documented that slum dwellers were at a disadvantage in utilization of maternal health services, compared to households residing in non-slum (urban) areas.[22,23] For example, a study conducted in the slums of India and Philippines indicates that the urban poor are at a disadvantage compared to their non-poor counterparts in unmet need of contraceptive use, antenatal care, and safe delivery.[24] Another study from India also indicated the poor utilization of maternal healthcare services in urban slums.[25] Even in some cases, women living in slum communities have less access and utilization of healthcare services than people of the rural areas[26–28].

There is a considerable body of literature documenting urban–rural dichotomy in the utilization of maternal health care in developing countries,[29,30] but little is known about the emerging inequality in the utilization of these services between urban socio-economic groups.[31] In the Indian context, several studies have documented the growing rich–poor gap in the utilization of basic RCH[32–34], but few have focused on healthcare utilization by the urban poor. We have attempted to understand the intra-urban differentials in the utilization of three reproductive health services in India as—(1) the urban population is quite diverse with respect to economic and social well being; (2) the increasing cost of healthcare services makes

health services unaffordable for the poor and marginalized in urban areas; (3) the weak family support networks of the urban poor lead to bad reproductive health outcomes; (4) many of the growing epidemics hit the urban center first and affect the poor the most; and (5) health programs and policies like National Rural Health Mission have been directed to improve the health status and the utilization of primary health care in rural India and they exclude urban India. In this context, the aim of this paper is to examine the trend in economic differentials in the utilization of selected reproductive healthcare services in urban India.

DATA AND METHODS

The study used the first and third rounds of National Family Health Surveys (NFHS) conducted in 1992–1993 and 2005–2006, respectively. These large-scale population-based surveys are along the similar lines as other Demographic and Health Surveys (DHS) and cover a wide range of topics; fertility, mortality, family planning, maternal and child health, nutrition, and other issues. The NFHSs are nationally representative surveys, and cover all the states of India. In both rounds of the survey, the probability-based sampling is used separately for urban and rural areas. The urban sample of NFHS 1 covered 28,822 households and 27,534 women, while the urban sample of NFHS 3 covered 50,236 households and 56,961 women. The details of the sampling procedure, sample size, and the findings are available in national and state reports.[35]

Identification of Urban Poor and Non-Poor

The first challenge in such study is to define the urban poor. In India, the Planning Commission provides the estimates on poverty, separately for rural and urban areas based on the consumption expenditure data collected by the National Sample Survey Organization (NSSO). However, these estimates are often debated and revised. Moreover, the health domains covered under the various rounds of NSSO are limited. Alternatively, the data obtained from various rounds of NFHSs are useful to understand the health situation of the urban population. Like other DHS, the NFHS does not provide direct economic measures (income or consumption expenditure) but provides information on a set of economic proxies such as housing quality, household amenities, consumer durables, and size of land holding. These proxy indicators are increasingly used to assess the economic status of the household,[36-38] and the composite index based on economic proxies broadly captures the economic differentials in the population and health domains.

The first two rounds of NFHS in India provided the composite wealth index, known as the standard of living index based on arbitrary scoring of the economic proxies.[39,40] In the third round, the wealth index based on 33 variables was computed using principal component analysis (PCA) and was divided into 5 quintiles.[35] However, the wealth index thus constructed has the following limitations: (1) only a national wealth index is computed without considering rural/urban and state differentials in the economic condition of the household. A previous study indicates that health estimates among wealth groups differ significantly when a separate wealth index is constructed for urban and rural areas, compared to a single index;[41] (2) The index is distributed into 5 quintiles and does not give the true cutoff point for the poor; and (3) some of the variables used in the wealth index do not have theoretical significance.

As a departure, we first constructed the wealth index using a set of selected consumer durables, household amenities, and housing qualities drawn from urban samples of India in both periods. The variables (Appendix 1) were selected based on a theoretical rationale and statistical significance. The theoretical rationale refers to the extent of sensitivity of the variables to the poor. For example, a variable like ownership of agricultural land is not included in the analysis because of its limited utility in urban areas. For statistical significance, a descriptive analysis has been carried out for all the available variables related to the economic aspect of the household. Variables with higher frequencies and lower standard deviations (closer to zero) are not included in the analysis. A standard deviation with zero value indicates that all households own that particular variable or no households own the variable. After selecting the variables, the PCA is used to compute the wealth index. As a first step, all the selected variables are re-coded into binary forms (1=yes and 0=no). In the second step, the PCA is used to derive the factor score and for generating eigenvalue (variance). The derived factor score is used as weight for each selected variable in computing the wealth index. In the third step, a percentile (100% distribution) of wealth index is obtained for country and each state.

Cutoff Point for the Urban Poor

The cutoff point to demarcate the poor and non-poor is equated with the officially accepted poverty estimates derived from consumption expenditure data by the Planning Commission, Government of India, close to the survey period. Accordingly, 26% of the population during 2005–2006 was classified as urban poor, equivalent to the Planning Commission's estimate in 2004–2005. To make the estimates comparable, a similar cutoff point was used for 1992–1993 and kept uniform for all the states. While doing so, it was considered that the proportion of urban poor would not be less than 26% from 1992–1993. The alpha values for all the states are more than 0.8 indicating that the estimates are reliable (Appendix 2).

After defining the urban poor, 3 indicators of reproductive healthcare—antenatal care, medical assistance at delivery, and current use of contraception were selected for analysis. Our prime focus is to understand the poor/non-poor differentials in 3 reproductive care services in urban India and we have provided the estimates of rural population only for purpose of comparison. The variables used in both rounds of surveys have varying reference periods. To make the estimates comparable, similar reference periods have been considered for all selected indicators. For instance, antenatal care of the last pregnancy has been considered and it is defined as a minimum of 3 visits, at least 2 injections of tetanus toxoid and given iron folic tablets or syrup during pregnancy. Medical assistance at delivery is defined as any institutional or home delivery assisted by a doctor, nurse, or any health personnel. We have considered the last 3 births in four years preceding the survey in computing medical assistance at delivery. Current use of contraception is defined as currently married women in the reproductive age group 15–49 using any method of family planning.

METHODS

Descriptive statistics was used to understand the differentials in utilization of selected maternal health services among urban poor, urban non-poor, and total rural inhabitants for the major states of India. Chi-square test was used to understand the significant differences in health care by poverty. The ratio of non-poor/poor and concentration index are used to understand the economic inequality in reproductive

health care among the urban non-poor and poor. The concentration index indicates the degree to which the selected variables are disproportionately concentrated among the non-poor (as dependent variables represent service utilization and are associated with better economic status) and used to measure the overall inequality.[42] It is defined as twice the area between the concentration curve and the line of inequality and varies between –1 and +1. The negative values indicate that health variables (bad health) or healthcare utilization are concentrated among the poor, while positive values indicate that good health or healthcare utilization are concentrated among the non-poor. A value closer to 1 indicates greater inequality in healthcare utilization, while one closer to 0 indicates greater equality in utilization among the groups.

The descriptive analysis is followed by logistic regression analyses to examine the significant effect of economic status and residence on maternal health indicators, after adjusting for the effect of age, parity, exposure to mass media, educational status, working status, religion, and caste as other important confounders. The analysis is carried out using the STATA 8.0 statistical package.[43]

RESULTS

Antenatal Care

Antenatal care during pregnancy helps in monitoring the health of the mother, the growth of the fetus, and pregnancy complications. Accordingly, the World Health Organization (1994) recommended antenatal care as a key goal of its Safe Motherhood Program. In India, the Ministry of Health and Family Welfare recommended through its RCH program that at least 3 antenatal check-ups, iron, and folic acid for 60 days as a prophylactic measure and at least 2 tetanus injections to women during pregnancy. Table 1 shows that antenatal care in the country has increased from 36% to 43% among the urban poor, compared to 65–70% among the non-poor during 1992–2006. From 1992–1993 and 2005–2006, the non-poor/poor ratio and the concentration index have declined from 1.79 to 1.64 and from 0.16 to 0.14, respectively, indicating a shrinking gap in prenatal care between the poor and the non-poor.

The regional pattern in antenatal care is mixed. In most of the states, the utilization of antenatal care has increased among the urban poor and non-poor but substantial differentials persist. The differences between the urban poor and non-poor are more pronounced in the states of Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, North-Eastern states, Punjab, Rajasthan, and Uttar Pradesh. For example the antenatal care among the urban poor and non-poor in 2005–2006 was 9% vs. 50% in Bihar, 27% vs. 58% in Haryana, 21% vs. 60% in Himachal Pradesh, 33% vs. 65% in Madhya Pradesh, 26% vs. 55% in North-Eastern states, 28% vs. 64% in Punjab, 40% vs. 81% in Rajasthan, and 16% vs. 43% in Uttar Pradesh. On the other hand, the differences are relatively lower in the economically progressive states of Gujarat, Karnataka, Kerala, Maharashtra, and Tamil Nadu. The non-poor/poor ratio in antenatal care services, though large, has reduced over the period. For example, the non-poor/poor ratio in antenatal care in 2005–2006 was 5.86 in Bihar, 2.80 in Himachal Pradesh, 2.66 in Uttar Pradesh, 2.27 in Punjab, 2.13 in Haryana, 2.07 in North-Eastern states, 2.01 in Madhya Pradesh, and, 2.00 in Rajasthan. In general, it has been observed that among those states where the level of antenatal care is low, the inequality is high and vice versa.

On comparing the antenatal care among the urban poor and the rural population, we found that the proportion of women receiving antenatal care does

TABLE 1 Percentage of women who received antenatal care among urban poor, urban non-poor, and rural residents in India, 1992–2006

	1992–1993			2005–2006			Non-poor/poor ratio		Concentration index	
	Urban poor	Urban non-poor	Rural	Urban poor	Urban non-poor	Rural	1992–1993	2005–2006	1992–1993	2005–2006
Andhra Pradesh	55.2	78.7	58.2	57.6	71.7	62.2	1.43	1.24	0.10	0.05
Bihar	9.0	57.0	9.4	8.6	50.4	9.1	6.35	5.86	0.44	0.47
Gujarat	34.5	72.6	44.2	56.8	76.4	48.9	2.10	1.35	0.16	0.10
Haryana	24.7	60.9	31.4	27.0	57.7	34.7	2.47	2.13	0.22	0.16
Himachal Pradesh	40.0	49.5	27.0	21.4	60.0	49.1	1.24	2.80	0.09	0.18
Jammu and Kashmir	17.8	39.0	44.5	42.9	77.0	50.5	2.19	1.80	0.14	0.10
Karnataka	48.3	83.1	56.3	52.5	78.1	51.2	1.72	1.49	0.14	0.12
Kerala	88.1	85.2	83.7	81.6	86.1	80.2	0.97	1.05	-0.01	0.01
Madhya Pradesh	29.2	61.3	17.0	32.6	65.4	26.6	2.10	2.01	0.24	0.19
Maharashtra	42.8	68.8	44.9	55.1	75.0	54.2	1.61	1.36	0.12	0.09
North-Eastern states	17.6	45.7	17.1	26.4	54.7	28.4	2.60	2.07	0.21	0.13
Orissa	31.0	63.9	22.5	56.5	85.9	52.2	2.06	1.52	0.23	0.12
Punjab	34.6	70.6	48.9	28.0	63.5	42.1	2.04	2.27	0.15	0.15
Rajasthan	12.8	44.4	10.6	40.4	80.7	25.5	3.48	2.00	0.36	0.21
Tamil Nadu	75.2	86.5	73.2	79.3	93.8	82.7	1.15	1.18	0.03	0.04
Uttar Pradesh	13.4	47.8	11.7	16.3	43.3	16.9	3.58	2.66	0.32	0.27
West Bengal	36.8	56.3	32.9	57.5	79.4	46.5	1.53	1.38	0.19	0.07
India	36.0	64.6	28.6	42.5	69.5	34.2	1.79	1.64	0.16	0.14

not differ substantially between the urban poor and rural residents, cutting across the states. Even in seven states, namely, Andhra Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, North-Eastern states, Punjab, and Tamil Nadu, the utilization of antenatal care among rural women is marginally higher than among poor women from urban areas. For example, in 2005–2006, it was 62% compared to 58% in Andhra Pradesh, 35% compared to 27% in Haryana, 51% compared to 43% in Jammu & Kashmir, 28% compared to 26% in North-Eastern states, 42% compared to 28% in Punjab, and 83% compared to 79% in Tamil Nadu. Moreover, changes in antenatal care utilization in the last 14 years were higher in rural areas than among the urban poor in the states of Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, North-Eastern states, Orissa, and Uttar Pradesh. The concentration index (2005–2006) is greatest in the states of Bihar (0.47) followed by Uttar Pradesh (0.27), Rajasthan (0.21), and Madhya Pradesh (0.19) and least in the states of Kerala and Tamil Nadu. In the states of Rajasthan, Andhra Pradesh, Orissa, and West Bengal, inequality in antenatal care has substantially reduced in urban areas.

Medical Assistance at Delivery. Medical assistance at delivery helps in saving the lives of many mothers and children of developing countries.[44–46] To promote medical assistance at delivery among the poor and marginalized, the Indian government has launched the *Janani Suraksha Yojana* with the provision of referral transport and cash incentives.

Medical assistance at delivery among the urban poor, urban non-poor, and rural populations has increased over the last 14 years (Table 2). From 1992–2006, medical assistance at delivery among the urban poor increased from 42% to 47%, while it increased from 72% to 83% among the urban non-poor. But the non-poor/poor ratio was 1.73 in 1992–1993 and 1.75 in 2005–2006, indicating that the gap in natal care marginally increased over the years. The concentration index reduced from 0.15 to 0.13 during the same period.

The state differentials in medical assistance at delivery among the urban poor and non-poor persist over the years. The differentials in the current level of medical assistance at delivery among the poor and non-poor is more pronounced in the states of Bihar (25% vs. 70%), Haryana (42% vs. 82%), Himachal Pradesh (31% vs. 72%), Jammu & Kashmir (24% vs. 86%), Madhya Pradesh (39% vs. 80%), North-Eastern states (15% vs. 70%), Orissa (46% vs. 85%), Punjab (42% vs. 83%), Rajasthan (48% vs. 90%), and Uttar Pradesh (19% vs. 63%). On the other hand, the differences are relatively lower in the states of Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, and Tamil Nadu. Similar patterns were observed during 1992–1993. During 2005–2006, the non-poor/poor ratio was greatest in North-Eastern states (4.77) followed by Jammu & Kashmir (3.65), Uttar Pradesh (3.37), Bihar (2.77), Himachal Pradesh (2.35), and Madhya Pradesh (2.07). In fact, in four of the states (Himachal Pradesh, Jammu & Kashmir, North-Eastern states, and Uttar Pradesh), the ratio had increased during the last 14 years. The concentration index (2005–2006) has a larger value in the state of Uttar Pradesh, followed by Bihar and Orissa, and it is close to zero in the states of Kerala and Tamil Nadu.

Though the urban poor are at advantage compared to their rural counterparts in the country over the period, it is not so for all the states of India. In the states of Andhra Pradesh, Bihar, Karnataka, Kerala, Orissa, Tamil Nadu, and Uttar Pradesh, the practice of medical assistance at delivery among rural areas is similar to that of the urban-poor in 2005–2006. The increase in medical assistance at delivery during

TABLE 2 Percentage of women who received medical assistance at delivery among urban poor, urban non-poor, and rural residents in India, 1992–2006

	1992–1993			2005–2006			Non-poor/poor ratio		Concentration index	
	Urban poor	Urban non-poor	Rural	Urban poor	Urban non-poor	Rural	1992–1993	2005–2006	1992–1993	2005–2006
Andhra Pradesh	54.4	84.6	37.0	79.4	91.2	70.3	1.56	1.15	0.12	0.04
Bihar	17.9	68.1	12.1	25.1	69.5	27.5	3.80	2.77	0.30	0.25
Gujarat	33.3	69.9	31.7	66.1	86.5	53.5	2.10	1.31	0.19	0.07
Haryana	16.1	59.1	23.8	41.7	82.1	43.1	3.68	1.97	0.22	0.13
Himachal Pradesh	41.7	68.0	21.9	30.8	72.4	67.5	1.63	2.35	0.10	0.16
Jammu and Kashmir	14.9	53.6	25.1	23.5	86.0	51.8	3.60	3.65	0.15	0.12
Karnataka	51.1	84.8	33.9	66.7	94.9	61.6	1.66	1.42	0.15	0.08
Kerala	85.5	97.9	87.4	100.0	100.0	99.5	1.14	1.00	0.02	0.00
Madhya Pradesh	33.4	76.6	16.6	38.8	80.2	24.9	2.29	2.07	0.22	0.15
Maharashtra	61.3	86.1	36.4	71.9	92.7	55.3	1.40	1.29	0.10	0.08
North-Eastern states	33.7	63.4	16.4	14.6	69.5	28.9	1.88	4.77	0.21	0.15
Orissa	28.9	61.9	14.1	46.2	85.0	40.9	2.14	1.84	0.21	0.18
Punjab	16.7	60.4	43.0	41.7	82.6	45.4	3.62	1.98	0.23	0.11
Rajasthan	20.1	52.7	14.3	47.9	89.5	33.6	2.62	1.87	0.29	0.15
Tamil Nadu	87.3	92.6	55.1	89.1	97.4	88.3	1.06	1.09	0.03	0.02
Uttar Pradesh	21.2	52.1	10.5	18.7	63.2	22.7	2.46	3.37	0.29	0.26
West Bengal	40.8	71.1	23.1	57.9	86.8	39.3	1.75	1.50	0.19	0.09
India	41.6	72.1	22.9	47.4	83.1	38.5	1.73	1.75	0.15	0.13

the last 14 years is substantially higher in rural areas compared to the urban poor in many of the states. For example, percentage increase in medical assistance at delivery among the urban poor and rural populations was 46% vs. 90% in Andhra Pradesh, 30% vs. 82% in Karnataka, 16% vs. 50% in Madhya Pradesh, 17% vs. 52% in Maharashtra, 2% vs. 60% in Tamil Nadu, 42% vs. 70% in West Bengal, and 14% vs. 68% in the country as a whole.

Current Use of Contraceptives. The current level of contraceptive use is one of the principal determinants of fertility as well as an indicator of success of the family planning program. Table 3 provides information on the current use of contraceptive among married women of urban poor, non-poor, and rural residents for India and the states during 1992–2006. The contraceptive use in the country has increased among both the urban poor and non-poor during the last 14 years. While it has increased from 39% to 57% among the urban poor, it increased from 55% to 67% among the urban non-poor. The percentage increase in contraceptive use was about 45% among the poor, compared to 21% among the non-poor. The increase in contraceptive use among the poor has also been reflected in the decline in the non-poor and poor ratio from 1.40 in 1992–1993 to 1.17 in 2005–2006.

From 1992–2006, contraceptive use increased among the states, cutting across the poverty level. Also, the non-poor/poor ratio has declined in most of the states. The non-poor/poor ratio in 2005–06 was closer to 1 in the states of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, North-Eastern states, Tamil Nadu, and West Bengal, indicating narrowing differences in contraceptive use among the poor and non-poor. Also, the contraceptive use by the urban poor is higher than that by the rural total in most of the states. The concentration index also varies in a narrow range across the states.

Differentials in Reproductive Healthcare Services among the Urban Poor and Non-Poor by Socio-Demographic Group

This section provides a brief description on differentials in 3 reproductive health indicators by different socio-demographic characteristics among the urban poor and non-poor in urban India for 2005–2006 (table not shown). In the case of antenatal care, we found significant differences among the poor and non-poor for age-groups, educational level, and parity of women. The differences were also observed among the poor and non-poor across the social groups. We also observed that the poor/non-poor differences in medical assistance at delivery are larger among higher parity and older women and among women who received less than 3 antenatal care visits. With respect to religion, the differences between the poor and non-poor are larger among Muslims, followed by Hindus and others. Contraceptive use varies largely with age, educational status, and exposure to mass media. The differences between the poor and non-poor in contraceptive use are more pronounced with lower age, educational status, and by religion.

Multivariate Analysis

We have used the logistic regression to understand the significant predictors of reproductive health indicators over time. The confounders included in the analyses are poverty, age, parity, education, exposure to mass media, working status, husband's education, religion, and caste, based on significant differences found in descriptive analyses. However, the odds of using the 3 reproductive health services are presented for poverty and residence only (Table 4). The results indicate that the urban poor were significantly less likely to utilize antenatal care services over the

TABLE 3 Percentage of currently married women using contraceptives among urban poor, urban non-poor, and rural residents in India, 1992–2006

	1992–1993			2005–2006			Non-poor/poor ratio		Concentration index	
	Urban poor	Urban non-poor	Rural	Urban poor	Urban non-poor	Rural	1992–1993	2005–2006	1992–1993	2005–2006
Andhra Pradesh	47.8	59.3	43.6	64.7	69.0	67.6	1.24	1.07	0.06	0.02
Bihar	25.1	51.7	19.8	37.1	59.5	31.4	2.06	1.61	0.20	0.14
Gujarat	36.0	55.5	47.5	64.6	68.2	65.9	1.54	1.05	0.09	0.04
Haryana	34.9	62.0	46.7	56.8	68.3	62.1	1.77	1.20	0.09	0.02
Himachal Pradesh	55.6	70.9	57.1	46.7	62.2	64.2	1.28	1.33	0.05	0.04
Jammu and Kashmir	21.8	44.2	46.2	53.3	69.6	46.2	2.03	1.30	0.07	0.03
Karnataka	39.9	57.4	47.7	57.8	62.3	65.4	1.44	1.08	0.11	0.02
Kerala	67.0	68.4	61.3	75.8	67.1	68.5	1.02	0.89	-0.01	-0.03
Madhya Pradesh	36.7	54.9	33.4	52.2	68.7	54.1	1.50	1.32	0.12	0.07
Maharashtra	41.8	58.2	54.3	65.4	67.3	67.1	1.39	1.03	0.09	0.02
North-Eastern states	39.1	56.4	38.0	60.4	62.0	52.3	1.44	1.03	0.09	0.02
Orissa	37.7	54.5	34.2	52.0	66.3	49.0	1.44	1.28	0.12	0.06
Punjab	49.1	63.7	57.2	60.0	75.1	72.5	1.30	1.25	0.05	0.02
Rajasthan	38.4	50.9	28.1	58.1	69.8	40.5	1.32	1.20	0.10	0.07
Tamil Nadu	51.5	50.7	49.2	56.8	61.8	62.0	0.99	1.09	0.02	0.00
Uttar Pradesh	16.7	38.5	16.7	44.5	62.1	39.7	2.30	1.40	0.23	0.11
West Bengal	43.8	64.8	55.7	77.2	75.3	69.5	1.48	0.98	0.10	0.01
India	39.2	55.0	36.9	56.9	66.6	53.0	1.40	1.17	0.09	0.04

TABLE 4 Odds ratios of antenatal care, medical assistance at delivery, and contraceptive use for urban non-poor and rural residents vs. urban poor, based on logistic regression models in India and selected states, 1992–2006

	Antenatal care				Medical assistance at delivery				Contraceptive use			
	1992–1993		2005–2006		1992–1993		2005–2006		1992–1993		2005–2006	
	Urban non-poor	Rural	Urban non-poor	Rural	Urban non-poor	Rural	Urban non-poor	Rural	Urban non-poor	Rural	Urban non-poor	Rural
Andhra Pradesh	1.88	1.95	1.19	1.06	1.97**	0.56***	1.40	0.58**	1.98	1.27	1.16	1.07
Bihar	1.90	0.68	2.64**	0.81	3.28***	0.52***	2.45***	0.65**	0.69	0.39**	1.37**	0.69**
Gujarat	3.12	0.74	1.21	0.74	1.85**	0.72	1.58	0.57*	3.01**	1.91	1.14**	1.17
Haryana	2.23	0.98	1.76**	1.33	3.28***	1.20	2.31***	1.20	0.58	1.28**	1.23**	1.17
Himachal Pradesh	1.83***	0.45*	1.40	1.04	1.01	0.31**	2.65	2.41	2.60**	0.46	1.61	1.89
Jammu and Kashmir	0.57	0.80	2.67**	0.85	1.84	0.53	3.01**	3.18*	1.64**	0.98	1.95	0.76**
Karnataka	2.07	1.34	1.42*	0.93	2.09***	0.42***	3.29***	0.73*	1.35**	1.24	1.49**	1.60***
Kerala	0.84	1.66	0.99	0.87	2.47**	1.05	–	–	1.29**	1.01	0.72	0.55**
Madhya Pradesh	0.74	0.74	2.19***	0.71**	2.32***	0.40***	3.43***	0.53***	1.19	0.97	1.71***	0.96
Maharashtra	1.27	1.02	1.48**	0.97	2.19***	0.38***	2.42***	0.53***	1.06	0.86**	1.37***	1.10
North-Eastern states	1.99**	1.09	1.48	0.92	2.37***	0.37	3.38**	0.88	1.85	1.11	1.31	0.90**
Orissa	2.49	0.13**	1.85**	0.87	1.60**	0.29***	2.75***	0.74	1.58	1.14	1.15**	0.90
Punjab	2.26**	3.10	1.44**	1.06	2.17**	1.13**	1.67	0.48	1.10	1.12	2.48**	2.19***
Rajasthan	2.26***	0.84	3.19***	0.74	1.51	0.55**	4.88***	0.57**	0.45	0.26***	1.11	0.49***
Tamil Nadu	1.31***	0.32**	1.82**	0.87	0.85	0.16***	3.45**	0.55	1.02*	0.55	2.06***	0.92
Uttar Pradesh	1.87***	0.56**	1.59***	0.70**	1.57**	0.41***	3.82***	1.09	1.53**	0.70	1.70***	0.74***
West Bengal	1.13	0.67	1.74**	0.67*	1.55	0.25***	3.37**	0.44**	1.07**	1.16	0.82	0.74
India	1.35**	0.78**	1.48***	0.74***	1.43***	0.43***	2.16***	0.69***	1.10**	0.89**	1.34***	0.91***

*$p<0.1$, **$p<0.05$, ***<0.01; – There is no significant difference with reference category.

periods. In India, the odds of using antenatal care among the urban non-poor were 1.35 in 1992–1993 and 1.48 in 2005–2006. The odds are significant in the states of Punjab, Rajasthan, Tamil Nadu, and Uttar Pradesh (over the period). On the other hand, the utilization of antenatal care is significantly less likely among rural women with respect to the urban poor for the country. For instance, the odds of utilizing antenatal care among rural women are 0.78 and 0.74 for 1992–1993, 2005–2006, respectively. Among the states, utilization of antenatal care among the rural women is significantly less likely in Madhya Pradesh, Uttar Pradesh, and West Bengal in 2005–2006.

Poverty at the household level is a significant predictor with respect to medical assistance at delivery in the country. For instance, the odds of medical assistance at delivery among the urban non-poor were 1.43 in 1992–1993 and 2.16 in 2005–2006. It is also appeared as a significant barrier in the states of Bihar, Haryana, Karnataka, Madhya Pradesh, Maharashtra, North-Eastern states, Orissa, and Uttar Pradesh for both the periods, 1992–1993 and 2005–2006. In 1992–1993, the odds were also significant in the states of Andhra Pradesh, Gujarat, and Punjab, but not in 2005–2006. Interestingly, antenatal care (ANC) visits of women along with education are significantly associated with medical-assisted delivery in India and across the states (result not shown). This result is consistent with another study.[47] However, the urban poor are significantly more likely to avail of medical assistance during delivery than rural women in the country as a whole, and in most of the states. For example, the odds of utilizing medical-assisted delivery for rural women in the country are 0.43 and 0.69 during 1992–1993 and 2005–2006, respectively.

With respect to contraceptive use, the odds of using contraception among the urban non-poor were significantly high in the country (1.10 in 1992–1993 and 1.34 in 2005–2006). Similarly, urban non-poor were more likely to use contraception in the states of Gujarat, Karnataka, Tamil Nadu, and Uttar Pradesh in both the periods, 1992–1993 and 2005–2006. However, in 2005–2006, the odds were not significant in the states of Andhra Pradesh, Himachal Pradesh, Jammu & Kashmir, Kerala, North-eastern states, Rajasthan, and West Bengal. The odds of using contraception were significantly lower among rural residents than among the urban poor in the country (the odds for rural residents are 0.89 and 0.91 in 1992–1993 and 2005–2006, respectively). In general, the bi-variate differentials in RCH services among the urban poor and non-poor are supported by the multivariate analyses.

DISCUSSION

The study attempts to understand the intra-urban differentials in the utilization of reproductive health services in India and the states. It explores the relative differences in antenatal care, medical assistance at delivery, and contraceptive use among the urban poor and non-poor within states over time and does not compare it across the states. As a first step, the wealth index was computed only for an urban sample using the PCA for each of the states. A cutoff point of 26% in wealth index was used to demarcate the urban poor for 1992–1993 and 2005–2006. The results indicate that the poor and non-poor classified by a set of variables inhibit greater reliability for all the selected states. To facilitate the discussion, the urban poor are also compared with the rural total in the analysis. Results indicate that for all the 3 indicators, the urban poor are at a disadvantage compared to the non-poor in India and in the states. Though the utilization of reproductive healthcare services has

improved among the urban poor cutting across the states, stark gaps are observed between groups.

With respect to antenatal care and natal care, although the service coverage has increased both among the urban poor and non-poor, the majority of the poor women in the country have not availed of such services. Moreover, the gap between the poor and non-poor remained stark over the period. The findings are similar to the growing rich–poor gap in RCH services in the country as a whole,[32–34] and findings from this study demonstrate similar gaps within urban settings. Regional patterns in the use of antenatal care are mixed and of varying degrees. While the differences are non-existent in the states of Kerala and Tamil Nadu, they remain large in demographically backward states such as Bihar, Uttar Pradesh, Madhya Pradesh, and Rajasthan. It indicates that like other demographic indicators, north–south dichotomy also exists in utilization of RCH services in urban India. On the other hand, the poor and non-poor differential in contraceptive use is comparatively lower than that in prenatal and natal care and has narrowed, cutting across the states over time. Results of the concentration indices indicate that reproductive health services are concentrated among non-poor in the country and states over the periods. However, the magnitude of concentration varies across the states for all reproductive healthcare indicators. The value of the concentration index is relatively higher for services like antenatal care and delivery care in the country as a whole, and in the states, while it is relatively lower for contraceptive use.

While comparing with rural population, we found that all 3 indicators varied from rural total to urban poor and non-poor—both in India as a whole and in the states, and findings are similar to earlier study.[6] However, rural residents are better than urban poor in utilization of antenatal care in the states of Andhra Pradesh, Bihar, Haryana, Jammu & Kashmir, and Punjab during both periods, 1992–1993 and 2005–2006. This result corroborates the finding of previous study.[48] Similarly, use of contraceptive is also higher among the rural women than the urban poor in the states of Gujarat, Karnataka, Maharashtra, and Punjab over the periods. However, this pattern does not hold true for natal care.

These findings obtained from descriptive analysis were supported by the multivariate analyses. After adjusting for confounders, the urban poor are less likely to utilize all 3 reproductive health services across the states and over time. These results are similar with other studies, which have established a link between socioeconomic status and underutilization of reproductive healthcare services.[6–8,49] Apart from poverty status, individual characteristics such as educational attainment, age, parity, and exposure to mass media also appeared as significant determinants of utilization of reproductive healthcare services, as documented by previous studies.[10,50–55] Moreover, antenatal care is also associated with utilization of medical assistant at delivery in country and states and in similar findings of other studies.[23,47]

We observed the following pattern in the utilization of health services by the urban poor, non-poor, and total rural population. First, where the level of antenatal care utilization is low, the differences between the poor and non-poor are high, and vice versa. Moreover, the utilization of antenatal care by the urban poor is close to that by the rural population in the country as a whole, and for many states. Second, the utilization of medical assistance at delivery has stagnated among the urban poor, resulting in higher inequality over the periods. Third, the differentials in contraceptive use among the urban poor and non-poor have narrowed down over the

period, cutting across the states. Fourth, the service coverage is highest among the urban non-poor followed by the urban poor and rural total.

CONCLUSION

Findings indicate that the current situation of urban poor with respect to utilization of reproductive healthcare is considerable. With increases in the urban population, disparities between the urban poor and non-poor in the utilization of reproductive healthcare services may lead the health crisis. The programs are mainly designed for the rural population, and neglect the urban poor, who enjoy little or no health advantage over their rural counterparts. Therefore, this study argues that in order to improve the reproductive health condition in the country, attention should be given to the urban poor along with the rural population. Special attention should be given to the states of Uttar Pradesh, Madhya Pradesh, Rajasthan, Andhra Pradesh, Orissa, and Bihar, where the urban poor live in abysmal conditions, and the urban population is expected to grow at a faster pace than in other parts of the country.

ACKNOWLEDGMENTS

An earlier version of this paper was presented at the annual meeting of the Population Association of America (PAA) at Dallas, Texas, USA, April 15–17, 2010. We are thankful to Dr. Ann K. Blanc, Director of the Maternal Health Task Force, New York, USA and Dr. Anrudh Jain and Saumya RamaRao, Population Council, New York, USA for their valuable comments and suggestion on the previous draft of the paper.

APPENDIX 1

TABLE 5 List of variables used in the computation of the wealth index for urban area using the data of NFHS, 1992–2006

	Households variables available in different rounds of NFHS		Used in construction of wealth index for Urban area	
	NFHS-1	NFHS-3	NFHS-1	NFHS-3
Most stable variables				
Bank account/post office account	N	Y	N	Y
Landline phone	N	Y	N	Y
Electricity	Y	Y	Y	Y
Consumer durables				
Radio	N	Y	N	N
Bicycle	Y	Y	N	N
Watch	Y	Y	N	N
Pressure cooker	N	Y	N	Y

TABLE 5 (Continued)

	Households variables available in different rounds of NFHS		Used in construction of wealth index for Urban area	
	NFHS-1	NFHS-3	NFHS-1	NFHS-3
Motorcycle	Y	Y	Y	Y
Electric fan	Y	Y	Y	Y
Sewing machine	Y	Y	Y	Y
Television (black and white)	Y	Y	Y	Y
Television (color)	N	Y	N	Y
Refrigerator	Y	Y	Y	Y
Mobile phone	N	Y	N	Y
Computer	N	Y	N	Y
Car	Y	Y	Y	Y
Mattress	N	Y	N	N
Chair	N	Y	N	N
Cot/bed	N	Y	N	N
Table	N	Y	N	N
Housing condition and sanitation				
Pucca house	Y	N	Y	N
Semi pucca house	Y	N	Y	N
Kaccha house	Y	N	Y	N
Floor material (natural/rudimentary or finished)	N	Y	N	Y
Wall material (natural/rudimentary or finished)	N	Y	N	Y
Roof material (natural/rudimentary or finished)	N	Y	N	Y
No window	N	Y	N	Y
Window without cover	N	Y	N	Y
Window with cover	N	Y	N	Y
Ownership of house	N	Y	N	Y
2 Person per room	Y	Y	Y	Y
2 to 4 Person per room	Y	Y	Y	Y
More than 4 person per room	Y	Y	Y	Y
Has separate kitchen	Y	Y	Y	Y
Own arrangement of drinking water	Y	Y	Y	Y
Drinking water from public tap and small tank	Y	Y	Y	Y
Other sources of drinking water	Y	Y	Y	Y
Fuel type	Y	Y	Y	Y
No toilet	Y	Y	Y	Y
Pit toilet	Y	Y	Y	Y
Flush toilet	Y	Y	Y	Y
Agricultural related accessories				
No land	Y	Y	N	N
Marginal land	Y	Y	N	N
Less than 5 acres	Y	Y	N	N
5 acres and more	Y	Y	N	N
Any irrigated land	Y	Y	N	N
Live stocks	Y	Y	N	N
Thresher	Y	Y	N	N
Tractors	Y	Y	N	N
Water pumps	Y	Y	N	N

Y available/used, *N* not available/not used

APPENDIX 2

TABLE 6 Reliability (alpha test) of computed wealth index for urban India and selected states 1992–2006

	Reliability of computed wealth index	
	1992–1993	2005–2006
Andhra Pradesh	0.88	0.87
Bihar	0.90	0.89
Gujarat	0.88	0.85
Haryana	0.86	0.87
Himachal Pradesh	0.83	0.86
Jammu and Kashmir	0.85	0.85
Karnataka	0.87	0.86
Kerala	0.83	0.82
Madhya Pradesh	0.87	0.88
Maharashtra	0.85	0.85
North-Eastern states	0.85	0.86
Orissa	0.87	0.91
Punjab	0.84	0.82
Rajasthan	0.87	0.88
Tamil Nadu	0.86	0.87
Uttar Pradesh	0.88	0.89
West Bengal	0.89	0.85
India	0.87	0.87

REFERENCES

1. World Urbanization Prospects. The 2007 Revision Population Database, World Population Prospects: the 2006 Revision and World Urbanization Prospects.
2. Wratten E. Conceptualizing urban poverty. *Environ Urban*. 1995; 7(1): 11–38.
3. United Nations Population Fund. The state of the world population 1996. Changing places: population, development and the urban poor. New York: United Nations; 1996.
4. UN-HABITAT. The Millennium Development Goals and Urban Sustainability. The State of the World's Cities 2006/7. http://users.bigpond.net.au.
5. Rossi-Espagnet A, Goldstein GB, Tabibzadeh I. Urbanization and health in developing countries: a challenge for health for all. *World Health Stat Q*. 1991; 44(4): 186–244.
6. Monica MA, Zulu EM, Brockerhoff M. The inequality of maternal health care in urban sub-Saharan Africa in the 1990s. *Pop Stud*. 2003; 57(3): 347–366.
7. Montgomery MR, Hewett PC. Urban poverty and health in developing countries: household and neighborhood effects. *Demography*. 2005; 42(3): 397–425.
8. Monica M. Maternal and child health among the urban poor in Nairobi, Kenya. *African Pop Stud*. 2004; 19(2): 179–198.
9. Harpham T, Lusty T, Vaughan P. *In the shadow of the city: community health and the urban poor*. Oxford: Oxford University Press; 1998.

10. Bradley D, Stephens C, Harpham T, Cairncross S. *A review of environmental health impacts in developing countries. Urban management program discussion paper 6*. Washington: World Bank; 1992.
11. Timaeus I, Lush L. Intra-urban differentials in child health. *Health trans Rev*. 1995; 5: 163–190.
12. Atkinson AM. Rural and urban families' use of child care. *Family Relations*. 1994; 43(1): 16–22.
13. Brockerhoff M, Brennan E. The poverty of cities in developing countries. *Pop Develop Rev*. 1998; 24(1): 75–114.
14. UNICEF. Poverty and exclusion among urban children, Innocenti digest No. 10, UNICEF Innocenti Research Centre (www.unicef-isdc.org).
15. de Poel EV, O'Donnell O, Doorslaer EV. Are urban children really healthier? Evidences from 47 developing countries. *Soc Sci Med*. 2007; 65: 1986–2003.
16. Office of the Registrar General & Census Commissioner. Census of India, 2001, Final Population Totals, Series-1, Registrar General, Government of India, New Delhi; 2004.
17. Bhagat RB. Rural-urban classification and municipal governance in India. *Singapore J Tropical Geo*. 2005; 26(1): 61–73.
18. Planning commission of India. *Report of the expert group on estimation of proportion and number of poor*. New Delhi: Press Information Bureau; 2007.
19. International Institute for Population Sciences (IIPS) & MACRO International. Health and living conditions in Eight Indian Cities. National Family Health Survey (NFHS-3), 2005–06: Mumbai, India: IIPS; 2007.
20. Mulgaonkar VB, Parikh IG, Taskar VR, Dharap ND, Pradhan, VP. Perception of Bombay slum women regarding refusal to participate in a gynecological health program; 1994.
21. Brockerhoff M, Biddlecom AE. Migration, sexual behaviour and the risk of HIV in Kenya. *Intern Migration Rev*. 1999; 33(4): 833–856.
22. Islam M, Montgomery M, Taneja S. *Urban health and care-seeking behavior: a case study of slums in India and the Philippines*. Bethesda: The Partners for Health Reformplus Project, ABT Associates Inc; 2006.
23. APHRC. Averting preventable maternal mortality: delays and barriers to the utilization of emergency obstetric care in Nairobi's informal settlements. Unpublished report of the World Bank-funded Maternal Health Survey; 2006.
24. Rutstein S, Johnson K, Montana L. Targeting Health Services to the Urban Poor: is Slum Geography Enough? Paper presented at the XXV International Population Conference, International Union for the Scientific Study of Population, Tours, France; 2005.
25. Khan Z, Mehnaz S, Khalique N, Ansari MA, Soddiqui AR. Poor perinatal care practices in urban slums: possible role of social mobilization networks. *Ind J Commu Medic*. 2008; 34(2): 102–107.
26. Gupta M, Thakur J, Kumar R. Reproductive and child health inequalities in Chandigarh Union Territory of India. *J Urban Health*. 2008; 85: 291–299.
27. African Population and Health Research Centre (APHRC). Health and livelihood needs of residents of informal settlements in Nairobi City. Nairobi: African Population and Health Research Centre; 2002.
28. UN-HABITAT. State of the world's cities 2006/7. London: Earthscan publications Ltd.
29. Madise N, Diamond I. Determinants of infant mortality in Malawi: an analysis to control for death clustering within families. *J Bio Soc Sci*. 1995; 27(1): 95–106.
30. Stephenson R. The impact of rural-urban migration on child survival in India. Unpublished thesis submitted for M.Phil. Candidature to the Department of Social Statistics, University of Southampton, UK; 1998.
31. Sen A. Population: delusion and reality. *New York Review*, September 22, 1994.
32. Chattopadhyay A, Roy TK. Are urban poor doing better than their rural counterpart in India? A study of fertility, family planning and health. *Demography India*. 2005; 34(2): 299–312.

33. Ladusingh L, Singh HC. Rich-poor gap in maternal care: the case of northeast India. *Asian Pop Stud*. 2007; 3(1): 79–94.
34. Mohanty SK, Pathak PK. Rich-poor gap in utilization of reproductive and child health services in India. *J Bio Soc Sci*. 2008; 41(03): 381–398.
35. International Institute for Population Sciences (IIPS), MACRO International. *National Family Health Survey (NFHS-3), 2005–06: India*. Mumbai: IIPS; 2007.
36. Montgomery MR, Grangnolati M, Burke KA, Paredes E. Measuring living standards with proxy variables. *Demography*. 2000; 37(2): 1556–1574.
37. Vyas S, Kumaranayake L. Constructing Socio-economic status indices: how to use principal component analysis. *Health Policy Plann*. 2006; 21(6): 459–468.
38. Filmer D, Pritchett H. Estimating wealth effects without expenditure data-or tears: an application to educational enrollments in states of India. *Demography*. 2001; 38(1): 115–132.
39. International Institute for Population Sciences (IIPS), MACRO International. *National Family Health Survey (NFHS-1), 1992–93: India*. Mumbai: IIPS; 1993.
40. International Institute for Population Sciences (IIPS), MACRO International. *National Family Health Survey (NFHS-2), 1998–99: India*. Mumbai: IIPS; 2000.
41. Mohanty SK. Alternative wealth indices and health estimates in India. *Genus*. 2009; LXV (2): 113–137.
42. Erreygers G. Correcting the concentration index. Research Paper 2006–07. Department of Economics, Faculty of Applied Economics, University of Antwerp. 2006.
43. StatacCorporation. *Stata statistical software: Release 8.0*. College Station: StataCorp; 2003.
44. Freedman LP, Graham WJ, Brazier E, et al. Practical lessons from global safe motherhood initiatives: time for a new focus on implementation. *Lancet*. 2007; 370: 1383–91.
45. Ronsmans C, Graham WJ. Maternal mortality: who, when, where, and why. *Lancet*. 2006; 368: 1189–200.
46. Campbell OMR, Graham WJ. Strategies for reducing maternal mortality: getting on with what works. *Lancet*. 2006; 368: 1284–99.
47. Ram F, Singh A. Is antenatal care effective in improving maternal health in rural Uttar Pradesh? Evidence from a district level household survey. *J Bio Soc Sci*. 2006; 38(4): 433–438.
48. Fotso JC, Ezeh A, Oronje R. Provision and use of maternal health services among urban poor women in Kenya: what do we know and what can we do? *J Urban Health*. 2008; 85 (3): 428–42.
49. Kunst A, Houweling E. A global picture of poor–rich differences in the utilization of delivery care. *Studies in Health Services Organizations and Policy*. 2001; 17: 297–315.
50. Bankole A, Westoff CF. Mass media influences on contraceptive behavior and reproductive preferences. Paper Presented at the Annual Meeting of the Population Association of America, New Orleans, Lousiana; May 9–11, 1996.
51. Ramesh BM, Gulati SC, Retherford RD. Contraceptive use in India, 1992–93. National Family Health Survey Subject Reports No. 2. Mumbai: International Institute for Population Sciences; and Honolulu: East–West Center, Program on Population; 1996.
52. Retherford RD, Mishra VK. Media exposure increases contraceptive use. National Family Health Survey Bulletin August (7). Mumbai: International Institute for Population Sciences and Honolulu: East–West Center Program on Population; 1997.
53. Rao KV, Mishra VK, Retherford RD. Effects of exposure to mass media on knowledge and use of oral rehydration therapy for childhood diarrhea in India. National Family Health Survey Subject Report No.10. Mumbai: International Institute for Population Sciences and Honolulu: East West Center Program on Population; 1998.
54. Wong EL, Popkin BM, Guilkey DK, Akin AS. Accessibility, quality of care and prenatal care use in the Philippines. *Soc Sci Med*. 1987; 24(11): 927–944.
55. Bhatia JC, Cleland J. Determinants of maternal care in a region of South India. *Health Trans Rev*. 1995; 5(2): 127–142.