
Journal of Health & Population in Developing Countries

Are Socially and Economically Weaker Sections Deprived of Maternal Health Care in Tamil Nadu, India?

M. Sivakami
P.M. Kulkarni

Abstract

This paper examines whether women from economically, socially, and educationally weaker sections of the society receive adequate maternal health care. Though most women in Tamil Nadu receive antenatal care, many do not get institutional and professional care at delivery. Logit regression analysis shows that in both rural and urban areas only the economic factor, and not the social and educational factors, has a significant net effect on the ability to secure institutional delivery care.

Key words: Tamil Nadu, India, antenatal care, institutional delivery, professional delivery care, weaker sections.

Address for correspondence: Dr. M. Sivakami, Research Fellow, Population Research Center
Institute for Social and Economic Change, Nagarbahvi PO, Bangalore 560 072, INDIA
E-mail: siva4432@yahoo.com

Introduction

A woman is most vulnerable to reproductive morbidity during pregnancy and at its termination. Traditionally, maternal care was provided by members of family (mother, mother-in-law, other relatives) and deliveries were attended to by midwives or often only by female relatives and neighbors. With the spread of the modern health care system, professional antenatal and delivery services can be obtained from hospitals and other health centers. However, there are constraints in obtaining such services because of the fees required to be paid, lack of easy physical access (since such services may be available only in urban or other centers), and lack of awareness about the need for these. The weaker sections of society would naturally be at a disadvantage in securing appropriate maternal health care.

In view of this, public health services in many developing countries provide maternal health as an extension service. In India, maternal and child health care is an important component of the public health system (Bose and Tyagi, 1983; Ghosh, 1989). Government hospitals and primary health centers provide free antenatal and delivery services. Besides, paramedical professionals, usually female health workers, provide extension services. They visit houses, identify pregnant women, and provide antenatal, delivery, and post-natal services at home to the extent possible. But how successful is the service delivery system in ensuring complete coverage of women for maternal health care? This question is particularly relevant for weaker sections of the society. Some of the recent studies have found that illiterate women received poor maternal health care as compared to literate women in India (Kanitkar and Sinha, 1989; Bhatia and Cleland, 1995; Govindasamy and Ramesh, 1997), Jordan (Obermeyer and Potter, 1991), Mexico (Levine et al., 1991), Peru (Elo, 1992), Morocco and Tunisia (Obermeyer, 1983), and Guatemala (Goldman and Pebley, 1994). Similarly women from low income class or low standard of living are at a disadvantage in utilizing maternal health care (Kanitkar and Sinha, 1989; Bhatia and Cleland, 1995; Obermeyer and Potter, 1991; Obermeyer, 1993; Majumdar et al., 1994). Many studies have also found marked rural urban differences in access to antenatal care services and institutional delivery (Govindasamy and Ramesh, 1997; Obermeyer, 1993). In India, another important dimension is the social backwardness. Those belonging to traditionally oppressed sections of the society called the Scheduled Castes and Scheduled Tribes (SC/ST), live in relative isolation and are often not permitted easy access to common facilities in spite of legal provisions prohibiting such discrimination. Moreover, health workers may also be reluctant to visit localities or hamlets of Scheduled Castes and Tribes. Further, the minorities who normally live in separate settlement could also plausibly receive poor maternal care. Recent research from India shows that women belonging to Scheduled Castes and Scheduled Tribes are at a disadvantage in receiving antenatal and delivery care as compared to other women (Govindasamy and Ramesh, 1997; Shariff, 1999). Thus, the poor, the less educated, the socially weaker sections such as the Scheduled Castes and Scheduled Tribes, and the rural population, are possibly at a disadvantage. However, the various dimensions of vulnerability are likely to be associated and often it is not clear whether a particular factor, economic, social, or educational backwardness as such influences the ability to obtain appropriate maternal care. A recent analysis of the Indian National Family Health Survey (NFHS) data on utilization of maternal health care found that education and caste play an important role of receiving antenatal and delivery care, but in this analysis the economic factor was not included (Govindasamy and Ramesh, 1997). Thus, it is not clear if the observed effects are due to social and educational factors as such or are on account of their association with economic factors which were not controlled in the analysis. Another survey in India by the National Council of Applied Economic Research revealed gross differentials by economic, social, and education, but did not assess net effects (Shariff, 1989). There is a need for a multivariate analysis to see if the economic, social, and educational factors individually influence maternal health care.

The rural and urban health delivery systems in India differ somewhat both in the private and public sectors. The urban areas have large number of private and government hospital, clinics, and maternity homes. In the rural areas, the reliance is greater on public services and facilities in urban centers. Thus, physical access is not a matter of major concern for the urban population in contrast to rural

population. On the other hand, the extension services are expected to provide universal coverage to the rural areas but in the urban areas only some selected localities are covered. Those with higher incomes can afford to obtain services from the private providers and also may be in a better position to access the services of government clinics and hospitals. As a result, economic condition may play a more important role in urban areas than rural. On the other hand, social backwardness may be an issue more in rural areas than urban because social restrictions may not apply in urban localities. Thus, it is not just that the rural population is less likely to receive poorer care as compared to urban population but the coverage for weaker sections may also differ between rural and urban areas. Some of the analyses of data on the determinants of maternal health care used residence as one of the socioeconomic variables but did not explore whether the determinants of health care vary between rural and urban areas. In order to see if the influences of other factors differ between rural and urban areas, in the context of the differences in the delivery systems, parallel analyses for the two are required. The present study examines the plausible determinants of antenatal and delivery care in rural and urban areas of the state of Tamil Nadu in India. The state of Tamil Nadu has been successful in raising the level of maternal health care in the recent years. We would like to see if this is the case for the weaker sections in the state as well. The focus is on three dimensions, economic condition, social class, and education. We would like to assess the influences of various factors on different aspects of maternal health care and to see if these differ between rural and urban areas. Does the coverage vary by social class (caste and religion) or economic class of women? Further, since the rural and urban health delivery systems in India differs somewhat in both clinic/hospital facilities and in the extension component, does the coverage of the weaker sections also vary between rural and urban populations?

The Setting

Tamil Nadu is one of the major states of India, located in the southeastern portion of the sub-continent. Its population was 62.1 million in 2001 census. The state is more urbanized than India as a whole with 43.9 per cent of the population living in urban areas, compared to 27.8 per cent in India (Registrar General, India, 2001). The level of female literacy in the state, 64.6 per cent, was also higher than the national average of 54.2 per cent in 2001. Women of Tamil Nadu enjoy greater autonomy as compared to women in northern India (Karve, 1998). In economic indicators such as per capita state domestic product however, the state is just at about the national level (EPW Research Foundation, 1994). The state performs better than the national average in health indicators. The life expectancy was 60.3 years during 1986-90, compared to 57.9 for India (Registrar General, India, 1994). Infant mortality has been moderate, 58 per thousand live births during 1990-92, but lower than national average of 80 for the same period (Registrar General, India, 1996). Fertility has fallen substantially during the 1980s; various estimates place the Total Fertility Rate in the range 2.2 to 2.5 during 1990-92, and 2.0 to 2.2 during 1996-98, well below the national average (Registrar General, India, 1996; Ambathurai, 1992; IIPS and MACRO, 2000). The health services in the state have been better than in many other states with special programs on nutrition including school meals. The Universal Immunization Program has been in operation for quite some time, according to a recent estimate for 1988-92, over 90 per cent of children and pregnant women had received recommended immunizations (Ambathurai, 1992).

Data and Methods

The data for this analysis are from the National Family Health Survey (NFHS), a large survey that covered almost all the states of India. The survey, carried out during April to July 1992 in Tamil Nadu, covered a sample of 3,948 ever-married women in the age group of 13-49 from 4,287 sample households (Ambathurai, 1992). Subsequently, another survey was carried out in 1998-99, the data of which are yet to become available for the state of Tamil Nadu. In the NFHS, data on fertility histories, contraception, maternal care, breastfeeding, child health and socioeconomic background were obtained.

Further, each woman who had a live birth between January 1988 and the date of survey (April-July 1992), was asked for each such birth whether any health worker visited her at home to provide antenatal check-up when she was pregnant, whether she had sought antenatal check-up in a clinic or health center, where did she give birth, and who assisted with the delivery. The women in the sample had 1,869 live births during the reference period, and hence the analysis here is based on these. It should be noted that the information is only for pregnancies that resulted in a live birth. For some women, there were two or more births during the reference period. Thus, the unit for analysis is pregnancy with a live birth, and not necessarily woman.

In the following analysis, five indicators of antenatal care and delivery care are used as dependent variables. These are -

- i) Antenatal care was provided by a health worker (usually the Auxiliary Nurse-cum – Midwife, commonly called the ANM) at home
- ii) Woman went for antenatal check-up to someone
- iii) Antenatal care was received (either the woman was visited at home or the woman went for antenatal check-up)
- iv) Delivery took place in an institution
- v) Health professional assisted at delivery, are used as dependent variables.

The explanatory variables included in the analysis are standard of living index, caste/religion, and education of the mother. These three variables represents the three dimensions of vulnerability noted earlier; that is, economic, social, and educational. In the NFHS, information on household income was not collected and therefore income was not included in the earlier analyses of the NFHS data. However, the NFHS did collect data on ownership of assets, consumer goods, and housing condition. A simple index of standard of living is calculated on the basis of these by giving scores to various aspects of housing condition and ownership of goods. This is similar to the index constructed by Roy and Jayachandran (1996) and serves as a proxy for economic status. The possible range for the total score is 0-39 and it is being used in a categorized form as low (0 - 9 points on the scale), medium (10 - 19), and high (20 - 39) standard of living for use in the analysis. The caste/religion variable is categorized as: Hindu-non-SC/ST, Hindu-SC/ST, Muslim, and Christian. This takes into account both caste distinction among Hindus (scheduled caste/tribes and others) in addition to categories for the three major religions in the state (Hindu, Muslim, and Christian). Education of the woman is also used as a categorized variable with the four categories: illiterate, literate-primary school completed but below middle school, middle school completed but below high school, and high school completed. In addition, work status (three categories: non-working, working at home, and working away home) is used as a categorized variable. Order of birth has been included because women may have a greater tendency to seek antenatal and delivery care at first pregnancy or birth but not be so particular at later pregnancies. To account for such possible effects, a categorized variable was included for birth order (four categories: order 1, 2, 3, and 4+).

It needs to be recognized that women's tendency to seek antenatal care and institutional care for delivery could also be influenced by pregnancy related morbidity. In particular, a woman who would not have normally gone for an antenatal check-up may do so in case of acute pregnancy related morbidity. Further, women with complications during pregnancy as well as those who experienced prolonged labor or excessive bleeding are more likely to seek institutional care. However, the NFHS did not collect data on pregnancy related morbidity. Further, prolonged labor was reported for only about five percent of deliveries, and excessive bleeding for less than 1 percent. Hence, these factors could not be incorporated into the equations.

Since in the present analysis the dependent variables are dichotomous in nature, (whether a service was received or not), multiple linear regression is not appropriate because the error term would not be normally distributed (Maddala, 1997). Instead, the technique of logit regression has been adopted which is suited to assess the influence of certain variables on the probability of occurrence of an event, in

this analysis, the probability of receiving a specific maternal health care service. The logit of the probability of occurrence, p , is expressed as a function of a set of explanatory variables $\{X_i\}$ as -

$$\text{logit}(p) = \log(p/(1-p)) = \beta_0 + \sum \beta_i X_i$$

where $\{\beta_i\}$ are the regression coefficients to be estimated

From the estimated coefficients, the predicted odds for a given set of values of $\{X_i\}$ can be computed as $\exp(\beta_0 + \sum \beta_i X_i)$ and the predicted probability of occurrence as $\exp(\beta_0 + \sum \beta_i X_i) / [1 + \exp(\beta_0 + \sum \beta_i X_i)]$. Logistic regression can also be used if one or more of the explanatory variables are categorized. In such a case, a category needs to be designated as 'reference category'. In the present analysis, the reference categories are: 'Low' for the standard of living variable, 'Hindu non-SC/ST' for caste/religion, 'Illiterate' for education of woman, 'Non-working' for work status of the woman, and 'Order 1' for birth order. The logit regression coefficient for a category of a variable is interpreted in relation to the reference category; $\exp(\text{coefficient for a category})$ gives the 'odds ratio', ratio of odds for the specified category to the odds for the reference category. For a more meaningful interpretation of results, predicted probabilities of the occurrence of an event can be computed for each category holding the other numerical variables constant at the mean values and the other categorized variables at population distributions in a manner similar to the computation of 'adjusted means' in Multiple Classification Analysis. In the present analysis, such predicted probabilities have been computed and expressed in percentage terms as 'adjusted percentages'.

The analysis has been done separately for rural and urban areas in order to see if the effects of economic, social, and educational disadvantage on maternal health care differ between rural and urban areas. Only those observations with valid values for all the variables in the analysis are included. The SPSS package has been used.

Results

Levels of Maternal Health Care

The utilization of various maternal health services both for the rural and urban areas is presented in Table 1. In the urban areas, a smaller proportion were visited by a health worker at home as compared to the rural areas; this is not surprising given that health workers are expected to provide complete coverage in villages, but to only some localities in the cities and towns. On the other hand, the use of antenatal check-up is greater in the urban areas. Some of those who were visited at home had also gone for check-up to a clinic; this was the case for 27 per cent of the pregnancies in the rural areas and 19 per cent in the urban. Overall, antenatal care (either at home or a check-up at center) was nearly universal during the period covered (93 per cent in the rural area and 97 per cent in the urban). The coverage of the tetanus toxoid immunization, administered during pregnancy, was also nearly universal (not shown in the Table).

In the urban area, 90 per cent of the births had taken place at institutions such as maternity homes, private clinics, and hospitals as compared to only 49 per cent in the rural areas. The assistance of a health professional was taken for 60.8 per cent of the deliveries in the rural area (30.3 per cent were attended by doctors and the rest by paramedical persons), and 91.6 per cent in the urban area (66.6 per cent were attended by the doctors and the rest by paramedical persons). Naturally, almost all the deliveries in institutions had this benefit but of the non-institutional deliveries, only about a fourth were attended by a health professional in both the rural and urban areas. Overall, utilization of the maternal health services is better in the urban areas as compared to the rural areas, especially for delivery care.

Table 1. Utilization of Maternal Health Care, Rural and Urban Areas, Tamil Nadu, India, NFHS, 1992

Indicators	Rural	Urban
Percent of pregnant women who were visited at home by a health worker	49	24
Percent of pregnant women who went for antenatal check up	71	92
Percent of pregnant women who were visited at home by health worker and also went for antenatal check up	27	19
Percent of pregnant women who were either visited at home or went for antenatal check up	93	97
Percent of deliveries in institution	49	90
Number of Births	1200	655
Percent of deliveries assisted by health professional		
All births	61	92
	(1199)	(655)
Non-institutional births	24	24
	(613)	(67)

Note: The figures in parentheses are the total number of births in the respective cell; cases with missing information are omitted.

Number of births refers to the births during January 1988 - date of survey (April-July 1992).

Differentials in Antenatal and Delivery Care

In both the rural and urban areas, the widest differentials in per cent of pregnant women who were visited by a health worker (shown as “Unadjusted Percentages” in columns 2-3 of Table 2) are seen by standard of living. The poorest receive much greater care at home than the middle and upper classes. The proportion of pregnant women who received care at home from a health worker is marginally higher among SC/ST and lower among Muslims as compared to others. A greater proportion of illiterate than literate women received health care at home. A large proportion of pregnant women who work away from the home received care by a health worker, but the differences by work status are very narrow in the urban areas. A female health worker at home visits women at higher birth orders more as compared to women at lower orders; the difference is large in the rural areas.

Differentials in visit to health center for antenatal check-up are generally in the opposite direction (Table 2, columns 6-7 as “Unadjusted Percentages”). More upper class than poorer women went for antenatal check-up; the differentials are more conspicuous in rural areas. More Muslim and fewer SC/ST pregnant women had sought antenatal care services. Similarly, a greater proportion of educated pregnant

women than illiterate and non-working than working women went for antenatal check-up. Order of birth shows an inverse relationship with this variable. The differentials in urban areas are generally very narrow, since most urban women do go for antenatal check-up.

Since in almost all cases, antenatal care was received either at home or at a clinic, differentials in this variable (any antenatal care received) are negligible, and hence are not presented and analyzed further.

Table 3 (columns 2-3, the panel of “Unadjusted Percentages”) presents differentials in institutional care for delivery, that is, whether the delivery took place in a health institution. The differentials are quite small in urban areas, almost all received institutional care. In the rural population, the differentials are of a nature similar to those for antenatal check-up, but much larger in magnitude. In particular, among rural SC/ST population, only 33 per cent of births took place in institutions. Education of the mother and standard of living index show clear positive association with institutional delivery. The percentage of institutional deliveries is low among mothers who work away from home. Order of birth shows a negative association with institutional delivery.

Almost all the deliveries in institutions are attended to by health professionals (doctor, nurse, or ANM). But how many non-institutional deliveries receive such professional care? Since the number of non-institutional deliveries among the urban sample women is very small (67 cases), the differentials are examined only for rural area. Further, since the number of cases belonging to Muslim and Christian religions are very small (only 44 cases) in the rural sample, the analysis is restricted only to Hindus. Moreover, the two categories in standard of living (medium and high), the two higher education categories (middle completed and high school +), two categories in work status (working at home and working away home) are combined because the number of deliveries in some of these were very small. Among the non-institutional deliveries, assistance by a health professional is lower among SC/ST Hindus as compared to others (“Unadjusted Percentages” in column 7 of Table 3). Education of the mother and standard of living index show positive association with assistance at delivery by a health professional. The percentage that received professional assistance at delivery is slightly higher among non-working mothers than working mothers. Order of birth is negatively related with this variable.

Logit Regression Analysis

We have seen that there are differentials in the various measures of utilization of services by socioeconomic, cultural, and demographic variables. However, some of these variables are associated. Standard of living is highly associated with education (contingency coefficient of 0.52) and moderately with caste/religion (contingency coefficient of 0.28). Similarly, the contingency coefficient between education and caste/religion is 0.31. The differentials observed in bivariate analysis are confounded by such association. Hence, there is a need to assess the effect of an individual factor when other variables are controlled. To this end a logit regression analysis is carried out to quantify the net effects of these background factors on each of the dependent variable. Since all the explanatory variables are categorized, the results are given in the form of odds ratios (with reference to a specified category for each variable), and presented in Appendix Table 1 and 2. For a more meaningful understanding, the predicted probabilities of the dependent variable are computed for each category from the logit regression coefficients, holding the other variables at average level or distribution. These are similar to the adjusted values in Multiple Classification Analysis and are shown as "Adjusted Percentages" in Tables 2 and 3.

Determinants of Antenatal Care

In both rural and urban areas, smaller proportions of pregnant women in the highest standard of living classes are visited by health workers at home. (Appendix Table 1, and the “Adjusted Percentages” in columns 4-5 of Table 2). This is probably because the health workers are asked to concentrate on the poorer sections, but also possibly because they may hesitate to visit the elite, most of who obtain services

from private practitioners. In urban areas, Muslim women have significantly less chance (than Hindu non-SC/ST) of being visited by a health worker at home. Education of the women does not show any significant effect on home visit. In rural areas, pregnant women who work away from home are more likely than non-working pregnant women to be visited by a health worker at home. This may appear odd since a health worker should find it easier to provide service to a non-working woman who would be available at home than to one who works away from home. A plausible explanation is that rural women working away from home normally work in the same village and can easily be contacted by health workers. It is also possible that rural working women are perceived to be very poor and the health workers make special efforts to cater to their needs. In rural areas, large proportions of pregnant women at third order of birth are visited at home.

Economic status does not show a significant effect on the tendency to seek antenatal care in both rural and urban areas. Muslim women have a greater tendency to go for an antenatal check-up as compared to others in urban areas (Appendix Table 1, and the "Adjusted Percentages" in columns 8-9 of Table 2). Surprisingly, education of the pregnant woman does not show any significant effect on this variable. No notable variations are seen by work status of the woman. The order of birth shows negative influence but this is significant only in rural areas, at fourth or higher order births. Women who have already had some births are less particular about an antenatal check-up.

Determinants of Delivery Care

As expected, both in rural and urban areas, upper class mothers are more likely than poorer mothers to go to an institution for deliveries, but contrary to expectation, institutional deliveries are less likely among middle classes in the urban areas (Appendix Table 2, and the "Adjusted Percentages" in columns 4-5 of Table 3). The tendency (or more correctly, the ability) to have a delivery in an institution does not vary much by the caste and religion groups in both rural and urban areas. In rural areas, the large gross differentials by education (shown as unadjusted percentages) narrow down and are insignificant though in the expected direction after adjusting for other variables. Thus, both social status and educational level do not show a net effect on the ability to obtain delivery care. Apparently, the observed gross effects of these factors were on account of the association with economic status and once that is controlled, no net effect is seen. Institutional deliveries are low among rural mothers who work away from home. This is probably because rural women who work away from home are generally farm laborers who do not have the benefit of maternity leave and hence do not prefer hospitalization for a delivery that would involve being away from work. Birth order has a negative influence on the tendency to go for institutional deliveries both in rural and urban areas, but the effect is significant only in rural areas. This is to be expected since some complacency may set in after women have experienced the process of delivery 2-3 times.

In order to see if women who receive antenatal care and especially those who go to clinics for check-up also have a greater tendency to go for an institutional delivery, the variable "antenatal care" was included as one of the explanatory variables in the analysis and the logit regression rerun. The antenatal care variable has three categories: no antenatal care received, woman was visited at home by health worker but did not go for antenatal check-up, woman went for antenatal check-up (including women who were not visited at home but went for antenatal check-up, and women who were visited at home and also went for a check-up). This analysis is restricted to rural areas since most urban women had gone for check-ups. The results from the logit analysis are given in Appendix Table 2 and the adjusted percentages in column 6 of Table 3. It is seen that women who go for antenatal check-up are also more likely to have the delivery at an institution. On the other hand, health worker's visit as such has no effect. The odds for other variables do not change much indicating that woman's visit for antenatal check-up has an additional effect.

The variable, assistance at delivery by health professionals in the case of non-institutional deliveries, is examined only for rural Hindus for the reason cited earlier. The results show that educated

mothers (at least middle school level) are significantly more likely to obtain the assistance at delivery by health professionals (Appendix Table 2 and the last column of Table 3). But caste and economic status do not show a significant influence on this variable.

Table 2. Unadjusted and Adjusted Indicators of Antenatal Care, Tamil Nadu, India, NFHS, 1992

Characteristics	Percent of Pregnant Women who were Visited by Health Worker				Percent of Pregnant Women who went for Antenatal Check-up			
	Unadjusted		Adjusted*		Unadjusted		Adjusted*	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
All (Grand Mean)	49	24			71	92		
Standard of Living Index								
Low	52	40	48	29	63	85	70	91
Medium	44	24	53	33	89	92	69	89
High	26	7	35	11	98	98	89	96
Caste/Religion								
Hindu Non SC/ST	48	26	49	26	74	89	72	90
Hindu SC/ST	52	32	48	27	58	90	66	85
Muslim	41	14	50	16	85	99	79	98
Christian	45	23	47	30	76	96	70	89
Education of the Women								
Illiterate	54	34	50	25	61	82	70	90
Literate/Primary	42	27	46	26	80	94	69	91
Middle completed	37	21	44	24	90	93	75	88
High school +	44	15	55	23	92	98	78	95
Work Status of the Women								
Non-working	43	24	47	24	78	93	69	91
Working at home	45	21	44	16	71	82	71	93
Working away home	57	28	52	30	61	90	69	91
Order of Birth								
1	40	23	47	24	83	95	74	92
2	49	23	46	24	69	92	72	93
3	58	29	54	26	64	86	70	90
4 +	56	26	49	23	56	82	65	87
Number of Births	1200	655			1200	655		

Note: *Adjusted in a manner similar to a Multiple Classification Analysis, from the predicted values obtained from the logit regression, holding all other explanatory variables at average (that is, population distribution). The results of logit regression are given in Appendix Table 1.

Table 3. Unadjusted / Adjusted Indicators of Delivery Care, Tamil Nadu, India, (NFHS, 1992)

Characteristics	Percent of Deliveries in Institutions					Percent of Non-institutional Births Assisted by Health Professional	
	Unadjusted		Adjusted*		Adjusted*	Unadjusted	Adjusted*
	Rural	Urban	Rural	Urban	Rural**	Rural Hindus	
All (Grand Mean)	49	90				23	
Standard of Living Index							
Low	41	82	49	88	49	22	23
Medium	64	90	44	81	43	27 ^a	23 ^a
High	91	99	70	97	70		
Caste/Religion							
Hindu Non SC/ST	54	91	50	90	50	26	24
Hindu SC/ST	33	82	45	88	46	20	22
Muslim	63	88	56	87	55	-	
Christian	45	95	43	94	42	-	
Education of the Woman							
Illiterate	36	80	47	89	47	19	23
Literate/Primary	61	91	47	89	47	29	18
Middle completed	73	94	55	91	55	52 ^b	43 ^b
High school +	76	96	56	91	55		
Work Status of the Woman							
Non-working	58	90	53	90	52	26	23
Working at home	58	92	59	95	59	22 ^c	23 ^c
Working away home	34	86	42	85	42		
Order of Birth							
1	61	94	51	91	50	28	24
2	50	88	52	89	52	25	24
3	41	87	49	91	48	21	22
4 +	31	84	41	89	42	19	22
Antenatal Care							
No antenatal care received	18	50	-	-	38	-	-
Health worker visited home, woman did not go for check-up	30	86	-	-	37	-	-
Woman went for check-up	58	91	-	-	54	-	-
Number of Births	1200	655				613	

Note: * See footnote to Table 2. The results of logit regression are given in Appendix Table 2

** : The variable on antenatal care is used as an additional explanatory variable in this regression.

a: Medium and High Standard of Living categories combined.

b: Middle School completed or higher educational level.

c: Working at home or away from home.

- : Variable not used in the equation.

Discussion

In recent years, most women in Tamil Nadu have received health care during pregnancy, either from a health worker at home or when they visit a clinic. In both rural and urban areas, large proportions of the pregnant women have sought antenatal care, indicating that there is widespread awareness of the importance of antenatal care services. However, among the poorer classes, relatively fewer pregnant women go to clinics for check-ups, indicating that it does involve some expenditure. On the other hand, health workers concentrate more on the poorer sections thus compensating for the greater access the upper classes have for clinic services. Overall, almost all pregnant women in both rural and urban areas get antenatal care, either at home or in a clinic, or both. Hardly any caste differences are seen; the socially weaker sections receive antenatal care at par with the upper social stratum. However, this does not necessarily mean that all sections receive care of high quality. In the absence of data on quality of care, this issue cannot be addressed. There is some amount of selectivity in health worker's visits in the rural areas, in that women at third order births are more likely to be visited. One would have to see if this is for the purpose of motivation for family planning since women with three children are prime candidates for sterilization. Though antenatal care is received by almost all, many do not get professional care at delivery. In rural areas, only about half of the deliveries take place in institutions. Women from poorer households are particularly disadvantaged in this aspect. Women who go out to seek antenatal check-up also have a greater tendency to obtain institutional care at delivery. Probably, both the awareness of and the ability to pay for a delivery in an institute are important. Some rural women are successful in securing the assistance of health professionals even in the case of home deliveries. In particular, more educated mothers, probably because of greater awareness, demand and get such help more than the illiterate mothers.

Given the differences in the nature of institutional and extension services between the rural and urban areas, one would expect rural-urban differences in antenatal and health care. As expected, antenatal care at home is received more in rural areas and clinics provide better coverage in urban areas. As a result, the overall coverage is nearly universal in both rural and urban areas. However, large differences between rural and urban populations are seen in delivery care. Standard of living (proxy for economic status) is a determinant common to the rural and urban populations. Mothers from upper economic classes are more successful in securing institutional delivery care. Religion/caste do not appear to have a net effect. But education is an important factor in obtaining professional care for home deliveries in rural areas.

Most hospitals, public or private, are located in cities and hence are within the reach of most of the urban population. The public health facilities do provide services free of cost or at a nominal cost, some expenditure is involved, on medicines, nominal charges, etc. and hence economic class does have an effect. The rural population does not have the benefit of access and a woman must go to the nearest city or town for an institutional delivery. Many villages are not well served by public transport and even for villages connected by a bus service, moreover, when a delivery is imminent, a bus is not an appropriate mode of transport. Ambulances are rarely available and private taxi services are prohibitively expensive. Naturally, poor villagers find it difficult to obtain institutional care for delivery. Further, if a woman is admitted to a hospital, she needs some attendant from the family who would take care of food (hospitals rarely supply food) and other requirements. Even in the case of home deliveries, it is not easy for a rural family to secure the services of a doctor or a nurse since these professionals may not be available in the villages and not easily accessible due to poor communication facilities. However, educated mothers apparently give priority to professional care and try to obtain professional assistance even for home deliveries.

Conclusions

Most women in Tamil Nadu are successful in securing health care during pregnancy. The extension component of the primary health care system has been quite successful in meeting the needs of the weaker sections especially those in rural areas and the poor. On the other hand, the state has to go a long way in providing universal professional care at delivery. Rural women are at a disadvantage because of lack of access to medical institutions. The problem is acute for poor women especially in rural areas. The economically, socially, and educationally weaker sections do receive less care than the other sections but the multivariate analysis showed that the economic factor is the primary cause of this. Controlled for economic status, social status does not have a net effect. Thus, though women from the scheduled castes/tribes receive inadequate delivery care, it is on account of poverty but not account of caste membership per se. The deprivation is mainly attributable to low incomes rather than to low social status. Education does enhance the tendency to secure professional care in case of home deliveries. There is a need to address the difficulties faced by the poor in obtaining institutional care for delivery. Though government institutions do provide free services, certain costs are involved especially in transport and medicines. Unless transport and communication become easily accessible to villages and to health professionals and centers, many rural women, especially the poor and illiterate, may not be able to receive appropriate health care at delivery.

Acknowledgments

The data used in the paper are primarily from the NFHS, Tamil Nadu, a major survey carried out by the PRC, The Gandhigram Institute of Rural Health and Family Welfare Trust, Ambathurai R. S., in collaboration with the International Institute for Population Sciences, Mumbai, as part of the national survey. The computerized data were kindly made available by the NFHS organization at the IIPS. The authors gratefully acknowledge the contributions of the PRC, The Gandhigram Institute of Rural Health and Family Welfare Trust, and the IIPS, Mumbai. An earlier version of the paper was presented at the Twenty-first Annual Conference of the Indian Association for the Study of Population, Varanasi.

References

- Bhatia, J.C. and J. Cleland. 1995. Determinants of Maternal Care in a Region of South India. *Health Transition Review*. 5:127-142.
- Bose, A. and R.P. Tyagi. 1983. Rural Health Services: Present Status. In Bose, A. and P.B. Desai (ed.) *Studies in Social Dynamics of Primary Health Care*. Delhi, India: Hindustan Publishing Corporation. 104-122.
- Elo, I.T. 1992. Utilization of Maternal Health Care Services in Peru: The Role of Women's Education. *Health Transition Review*. 2: 49-69.
- EPW Research Foundation. 1994. Social Indicators of Development for India-II, Inter-State Disparities. *Economic and Political Weekly*. 29:1300-1308.
- Ghosh, S. 1989. Child Health and Survival-Its Relationship with Maternal Health. In Singh, S.N. et al. (ed.) *Population Transition in India Vol. I*. Delhi, India: B. R. Publishing Corporation. 267-280.
- Goldman, N. and A.R. Pebley. 1994. Childhood Immunization and Pregnancy-Related Services in Guatemala. *Health Transition Review*. 4:29-44.

- Govindasamy, P. and B.M. Ramesh. 1997. Maternal Education and the Utilization of Maternal and Child Health Services in India, National Family Health Survey Subject Reports, Number 5. Mumbai, India: International Institute for Population Science and Calverton, USA: Macro International Inc.
- International Institute for Population Sciences (IIPS) and ORC Macro. 2000. National Family Health Survey (NFHS-2), 1998-99: Mumbai, India: IIPS.
- Kanitkar, T. and R.K. Sinha. 1989. Antenatal Care Services in Five States of India. In Singh, S.N. et al. (ed.) Population Transition in India Vol. II. Delhi, India: B.R. Publishing Corporation. 201-212.
- Karve, I. 1998. Kinship Organization in India. Third edition. Mumbai, India: Asia Publishing House.
- LeVine, R.A., S.E. Levine, A. Richman, F.M.T. Uribe, C.S. Correa, and P.M. Miller. 1991. Women's Schooling and Child Care in the Demographic Transition: A Mexican Case Study. *Population and Development Review*. 17: 459-496.
- Maddala, J. 1977. Econometrics. Singapore: Mcgraw-Hill Book Company.
- Majumdar, P.K., R. Tiwari, B. Ram and B.N. Bhattacharya. 1994. Study on Utilization of Maternity and Child Health Services in Rural Jammu, India. *Health and Population Perspectives and Issues*.17:4-34.
- Obermeyer, C.M. and J.E. Potter. 1991. Maternal Health Care Utilization in Jordan: A Study of Patterns and Determinants. *Studies in Family Planning*. 22: 177-187.
- Obermeyer, C.M. 1993. Culture, Maternal Health Care and Women's Status: A Comparison of Morocco and Tunisia. *Studies in Family Planning*. 24: 354-365.
- PRC Ambathurai. (Population Research Centre, Gandhigram Institute of Rural Health and Family Welfare Trust) and IIPS (International Institute for Population Sciences). 1992. National Family Health Survey, Tamil Nadu. Mumbai, India: International Institute of Population Sciences and Ambathurai, India: PRC.
- Registrar General, India. 1994. SRS Based Abridged Life Tables, 1986-90, Occasional Paper No.1 of 1994. New Delhi, India: Vital Statistics Division, Ministry of Home Affairs, Govt. of India.
- Registrar General, India. 1996. Sample Registration Bulletin. New Delhi, India: Vital Statistics Division, Ministry of Home Affairs, Govt. of India.
- Registrar General, India. 2001. Census of India 2001. Provisional Population Totals. Paper 1 of 2001. New Delhi, India: Census Commissioner, India.
- Roy, T.K. and V. Jayachandran. 1996. Is Living Condition Important for Determining Fertility and Child Loss Experience? An Empirical Investigation based on NFHS". Paper Presented at XIX Annual conference of Indian Association for the Study of Population, Baroda.
- Shariff, A. 1999. India Human Development Report: A profile of Indian States in the 1990s. New Delhi, India: Oxford University Press.

**Appendix Table 1. Logit Regression Results for Indicators of Antenatal Care,
Tamil Nadu, India, NFHS, 1992**

Characteristics	Pregnant Woman who Were Visited by Health Worker		Pregnant Woman who Went for Antenatal Check-up	
	Rural	Urban	Rural	Urban
	Odds ratios			
Standard of Living index				
Low (Ref.)	1.000	1.000	1.000	1.000
Medium	1.209	1.237	0.979	0.798
High	0.573*	0.322**	3.321	2.269
Caste/Religion				
Hindu non SC/ST (Ref.)	1.000	1.000	1.000	1.000
Hindu SC/ST	0.963	1.083	0.753	0.647
Muslim	1.037	0.563*	1.430	5.289*
Christian	0.942	1.254	0.898	0.907
Education of the Woman				
Illiterate (Ref.)	1.000	1.000	1.000	1.000
Literate/Primary	0.848	1.070	0.943	1.202
Middle completed	0.806	0.926	1.317	0.870
High school +	1.231	0.898	1.548	2.039
Work Status of the Woman				
Non-working (Ref.)	1.000	1.000	1.000	1.000
Working at home	0.913	0.602	0.945	1.121
Working away home	1.242*	1.364	0.859	0.859
Order of Birth				
1 (Ref.)	1.000	1.000	1.000	1.000
2	0.967	1.024	0.913	1.133
3	1.327*	1.137	0.840	0.744
4 +	1.093	0.926	0.682**	0.598
Constant	-0.382	-1.664	2.169	3.424
-2 Log likelihood	1584.72	652.14	1233.77	309.94
Number of Births@	1185	651	1185	651

Note: ** p< 0.01; * p< 0.05; Ref.: Reference category.

@: Number of births may differ from Table 1 and 2. Only those observations with valid values for all the explanatory variables are included in the logit regressions.

**Appendix Table 2. Logit Regression Results for Indicators of Delivery Care,
 Tamil Nadu, India, NFHS, 1992**

Characteristics	Institutional Care for Delivery		Professional Assistance at Non-institutional Delivery	
	Rural	Urban	Rural ^a	Rural Hindus
Odds Ratios				
Standard of living index				
Low (Ref.)	1.000	1.000	1.000	1.000
Medium	0.807	0.545*	0.764	0.977 ^b
High	2.461**	4.663**	2.387**	
Caste/Religion				
Hindu non SC/ST (Ref.)	1.000	1.000	1.000	1.000
Hindu SC/ST	0.817	0.836	0.847	0.903
Muslim	1.235	0.744	1.194	-
Christian	0.731	1.694	0.735	-
Education of the Woman				
Illiterate (Ref.)	1.000	1.000	1.000	1.000
Literate/Primary	0.998	1.068	1.003	0.765
Middle completed	1.377	1.321	1.333	2.605 ^{c**}
High school +	1.421	1.273	1.365	
Work Status of the Woman				
Non-working (Ref.)	1.000	1.000	1.000	1.000
Working at home	1.287	2.043	1.302	1.036 ^d
Working away home	0.646**	0.595	0.654**	
Order of Birth				
1 (Ref.)	1.000	1.000	1.000	1.000
2	1.037	0.800	1.046	1.021
3	0.913	0.975	0.926	0.867
4 +	0.663**	0.803	0.707	0.912
Antenatal Care				
No antenatal care received (Ref.)	-	-	1.000	-
Health worker visited home, women did not go for check-up	-	-	0.953	-
Woman went for check-up	-	-	1.857**	-
Constant	0.605	3.004	0.138	-0.830
-2 Log likelihood	1418.10	377.76	1389.33	581.67
Number of Births@	1185	651	1185	631

Note: ** p < 0.01; * p < 0.05; Ref.: Reference category.

@: Number of births may differ from Table 1 and 3. Only those observations with valid values for all the explanatory variables are included in the logit regressions.

a: The variable "Antenatal care" is used as an additional explanatory variable in this model.

b: Medium and High Standard of Living categories combined.

c: Middle School completed or higher educational level.

d: Working at home or away from home.