Pregnancy Intention and Antenatal Care Use in Two Rural North Indian States

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Abstract

Objectives: Many studies have shown strong effects of pregnancy intention on antenatal care (ANC) behaviour in developed countries, but studies from developing settings have shown mixed results. Few investigators have utilized a prospective measure of pregnancy intention. This paper will analyze the association of pregnancy intention and the utilization of antenatal services in two states in northern India, using a prospective measure of whether a future pregnancy would be wanted or unwanted.

Methods: A prospective cohort study was conducted between 1998 and 2003 in Jharkhand and Bihar, India, of 2028 women with one or two pregnancies resulting in the live births of singleton infants during the study period.

Results: Antenatal care utilization was not found to be significantly associated with prospective pregnancy intention (OR=1.18 [95% CI 0.91, 1.52]). Among women who received ANC (N = 701), initiation of care was not delayed in unwanted pregnancies. Significant differences existed between the numbers of women who reported their pregnancy unwanted retrospectively compared with prospectively. These differences were not associated with the utilization of antenatal care services or timing of care initiation. The exception to these findings were women who consistently reported their pregnancies unwanted both before and after conception, who were twice as likely to delay ANC initiation as women with consistently wanted pregnancies.

Conclusions: Demographic characteristics of reproductive-age women, such as age and parity, seem to predict more closely the use of ANC services than pregnancy intention in Bihar and Jharkhand. Delayed ANC initiation may be significantly associated with unwanted pregnancy, but only when pregnancies were most decisively identified as unwanted.

Introduction

Family planning and antenatal care (ANC) services are both highly underutilized in the rural North Indian states of Bihar and Jharkhand. As a consequence, high numbers of unwanted pregnancies are reported (IIPS and Macro Int. 2007), and such pregnancies have been linked to poor maternal health behaviours and infant outcomes (Gipson et al. 2008). A large volume of literature has examined the relationships between unwanted pregnancy and maternal health behaviours, the vast majority of which has been produced in the United States. Specific to antenatal care initiation, these domestic studies have largely found a positive association between unwanted pregnancy and delayed initiation of ANC services and decreased frequency of visits (Gipson et al. 2008). The few studies completed internationally (Marston and Cleland 2003; Magadi et al. 2000; Gage 1998; Eggleston 2000; Ni and Rossignol 1994) have yielded mixed results. Additionally, these are retrospective studies of pregnancy intention, a method recently questioned by Koenig et al. (2006) and Stephenson et al. (2008), given the limitations of retrospective measurement.

Unwanted Pregnancy and Antenatal Care Studies in Developed Countries

In the United States and Europe, the effects of pregnancy intentions on maternal behaviours during pregnancy such as smoking, drug and alcohol use, caffeine intake and vitamin use have generally been shown to be nominal or mixed (Gipson et al. 2008; Korenman et al. 2002; Joyce et al. 2000; Kost et al. 1998). However, significant effects of pregnancy intention on antenatal care behaviours have been demonstrated in developed settings. According to Gipson et al. (2008) and Pagini and Reichman (2000), numerous studies have found a significant positive effect between unwanted pregnancy and delayed initiation of antenatal care, as well as the total number of antenatal care visits. Moreover, the delay in initiating antenatal care persisted among unwanted pregnancies, even after controlling for the delayed recognition of the pregnancy (Kost et al. 1998).

The applicability of these findings to a developing setting such as rural India, however, is questionable. For instance, many of these studies found that the antenatal care effects of pregnancy intention were modified by marital status, with an increased effect for unmarried women (Korenman et al. 2002; Kost et al. 1998). Where social standards of early and almost universal marriage are found, such as in Bihar and Jharkhand, the modifying effects of marriage may be nonexistent. Additionally, use of antenatal care is quite normative in the United States and Europe, but this is not the case in northern India. Only 3.5% of births receive late or no antenatal care in the US, while in Bihar, 65.9% of pregnant women did not receive a single ANC visit. (National Center for Health Statistics, 2007; IIPS and Macro 2007) Such dramatic differences in the perception and utilization of antenatal care and the context of unwanted pregnancy question the validity of US studies for a developing setting such as rural northern India.

Unwanted Pregnancy and Antenatal Care Studies in Developing Setting:

Far fewer studies exist from developing countries examining the relationships between unwanted pregnancy and antenatal care, and only one study has included an Asian country: the Philippines (Marston and Cleland 2003). Moreover, these investigations have not demonstrated the strong relationships seen in the developed-setting studies, instead generating mixed results. For instance, a study performed by Magadi et al. (2000) in Kenya found delayed initiation of antenatal care with unwanted or mistimed pregnancy status, while a separate study by Gage (1998) in Kenya and Namibia found no significant relationship between pregnancy intention and antenatal care initiation during the first trimester. Findings from a five-country study by Marston and Cleland (2003) highlight the heterogeneity of these associations. Significant associations between delayed

antenatal care initiation and unwanted pregnancy were found in two countries (Peru: OR=1.39 [95% CI 1.24, 1.56]; the Philippines: OR=1.21 [95% CI 1.01, 1.46]), while two countries showed no association (Bolivia: OR=1.17 95% [CI 0.98, 1.40]; Kenya: OR=1.20 [95% CI 0.90, 1.59]), and a protective effect was demonstrated in one country (Egypt: OR=0.79 [95% CI 0.66, 0.95]) (Marston and Cleland, 2003).

According to Gipson et al. (2008), the studies already performed in developing settings have significant methodological issues. Kost et al. (1998) demonstrated the importance of controlling for the delayed recognition of pregnancy among those that were unintended; such adjustments were not made in the developing-setting studies. Complex modelling was also found to be lacking in these studies. Finally, nearly all of the studies performed to date have utilized a retrospective measurement of pregnancy intention, a measurement approach recently questioned by Koenig et al. (2006).

Prospective vs. Retrospective Measurement of Unwanted Pregnancy

Pregnancy intention has historically been determined retrospectively, either during antenatal visits or immediately following the birth of the baby (Joyce et al 2002; Lakha and Glasier 2006; Koenig et al. 2006; Schünmann and Glasier 2006; Gipson et al. 2008). However, several researchers have identified temporal inconsistencies between pregnancy intention statuses measured during pregnancy and after birth (Joyce et al. 2002; Bankole and Westoff 1998). When comparing retrospective measures of pregnancy intention data established during pregnancy with prospective data gathered prior to pregnancy conception, Koenig et al. (2006) found that the retrospective measures significantly underestimated the proportion of unwanted pregnancies. The inconsistencies in retrospective measurements are largely thought to arise from maternal rationalization of the pregnancy and inevitable birth after conception, shifting the status from unwanted to wanted (Bankole and Westoff 1998; Koenig et al. 2006; Joyce et al. 2002).

Study Objectives

This analysis examines associations between prospectively determined pregnancy intention and maternal ANC behaviours in the developing setting of rural North India. Pregnancy intention was determined by prospective measures of whether a future pregnancy would be wanted or unwanted. We hypothesized that women with unwanted pregnancy are less likely to access antenatal care, compared to women with wanted pregnancies. Additionally, among women who received one or more antenatal checkups, we hypothesized that initiation of care is delayed more often in unwanted pregnancies.

Methods

Study Setting

Bihar and Jharkhand are two rural states in eastern North India with a combined population larger than that of Mexico, the world's 11th most populous country (Government of Bihar 2001). With the highest poverty rate in India, nearly 40% of Bihar lies below the poverty line, and this poverty is mainly rural (World Bank 2005). The status and autonomy of women in this region is far less than that of women in South India. Bihar has the worst female literacy statistics in India, with 62.1% of women reporting illiteracy; Jharkhand has the third worst female illiteracy rate, at 58.5%. A higher proportion of women require permission from their husbands to seek medical assistance, including antenatal care (46.6% and 38.8% in Bihar and Jharkhand, respectively, vs. 26.8% in the southern state of Tamil Nadu). Many other indicators of female status and autonomy are lower in Bihar and Jharkhand than the country average, including household decision making and age at first marriage, while general fertility rates and teenage pregnancy rates are higher than average (IIPS and Macro 2007).

Antenatal care utilization in Bihar and Jharkhand is significantly lower than in the rest of the country. Only 34.1% and 58.9% of mothers in Bihar and Jharkhand, respectively, received at least one antenatal care visit, compared with an average of 94% in South Indian states. Additionally, the frequency and quality of ANC indicators for the two states, as measured by the number of ANC

component services provided at each visit, are significantly worse than those for the whole of India (IIPS and Macro 2007).

mData

The National Family Health Survey-2 (NFHS-2) was carried out in 1998–1999 to gather state-level and national-level information on fertility, family planning, infant and child mortality, reproductive health, child health, nutrition of women and children, and the quality of health and family welfare services. Demographic data on households and information regarding the quality and availability of village services were collected. Data specific to women's health issues were gathered, including socio-demographic characteristics; fertility behaviour and intentions; use, knowledge and quality of family planning services; and maternal and child healthcare. A two-stage stratified systemic design was used to ensure that the sample was representative of corresponding areas of the state. Response rates for NFHS-2 were high for the two states represented in this study, averaging 96.2% (IIPS and ORC Macro 2000). Questions from NFHS-2 provided the basis for the prospective baseline of fertility preferences for the sample population. The cross-sectional data gathered were valuable, but did not provide insights about temporal associations.

A follow-up study was conducted in 2002–2003, in which women from four rural Indian states who had completed the NFHS-2 survey were re-interviewed. Data from only two of these states, Bihar and Jharkhand (part of Bihar at the time of the NFHS-2 study), are included in this analysis, because antenatal care utilization is almost universal in the other two states included in the follow-up survey, Tamil Nadu and Maharashtra. As previously stated, 34.1% and 58.9% of the population in Bihar and Jharkhand had at least one antenatal visit according to the NFHS-2 survey, compared with over 90% in both Tamil Nadu and Maharashtra (IIPS and ORC Macro 2000).

NFHS-2 Follow-up Study Questionnaire

The follow-up questionnaire is shown in Appendix 1. It was printed both in English and Hindi, the state language of Bihar and Jharkhand. Survey questions addressed respondents' background characteristics, reproductive behaviour and intentions, quality of family planning care, use of family planning methods and services, antenatal care and immunization, women's status and domestic violence, and included an event calendar covering the intervening months between the baseline (NFHS-2) and the follow-up survey (to assess inter-survey pregnancies, pregnancy outcomes and monthly contraceptive use status). Women who resided in rural areas, were married, were usual residents of the household, had completed the NFHS-2 survey and were aged 15–39 at the time of the NFHS-2 survey were eligible to participate. Participants were first informed verbally about the follow-up interview and were subsequently asked to provide written consent to be re-interviewed.

Response rates of the NFHS-2 follow-up survey were 80.4% and 81.8% from Bihar and Jharkhand, respectively. Reasons cited for not agreeing to participate in the follow-up study included out-migration, having not actually been interviewed for the NFHS-2 survey and "located but not re-interviewed." Analyses showed that non-responders were generally similar to survey responders but were slightly younger in Bihar and in Jharkhand. Additionally, respondents and non-respondents had similar age distributions until age 39, after which they diverged. Non-responders were more literate and of higher socio-economic status.

Definition of Unwanted Pregnancy

For the purposes of this analysis, determination of future unwanted pregnancies was made prospectively during the initial NFHS-2 survey, when women were asked when they wanted to bear their next child. Responses were categorized (as soon as possible, within 2 years, after 2 years or do not want more children) and provided the prospective measure of birth intention. Three to four years later, during the NFHS-2 follow-up survey, these same women provided information on recent births, including those occurring during the inter-survey period. Pregnancies occurring in women

who had indicated they did "not want more children" or were recorded as sterilized on the NFHS-2 survey were defined as unwanted pregnancies.

Previous literature has often stratified wanted/planned, mistimed and unwanted pregnancies (D'Angelo et al. 2004; Eggleston 2000; Joyce et al. 2000; Kost et al. 1998). Because the mistimed pregnancies are ultimately wanted, and because studies have shown reduced or non-significant differences between the wanted and mistimed compared to the differences between wanted and unwanted groups (Marston and Cleland 2003; Eggleston 2000), in this study mistimed pregnancies were included with wanted pregnancies.

Measurement of Antenatal Care Utilization and Initiation

The NFHS-2 follow-up survey asked women a series of questions regarding their most recent pregnancy, including whether or not they sought an antenatal checkup, whether a health worker visited the home for an antenatal checkup, the gestational month during which first antenatal care was received and the number of antenatal checkups during the pregnancy (Appendix 1). In this analysis, women who received one or more antenatal checkup visits either in a clinic or at home were considered to have received antenatal care. Additional data describing the gestational month of antenatal service acquisition provided a measure of the timing of these visits. Utilizing the gestational month provided, the timing of these visits was grouped into initiating care during the first 5 months of gestation or after. Previous studies from developing settings have defined early entry into ANC as 3–6 months (Marston and Cleland 2003; Eggleston 2000); the first 5 months were chosen to define early entry in this analysis because it was expected that the vast majority of women would have recognized their pregnancy by this time.

Analyses

The main outcomes measured in this analysis were a binary measure of any antenatal care service provision (1, received care; 0, care not received) and a binary measure representing the early and late periods of pregnancy during which antenatal care was first provided (0, initiation of care during first 5 months' gestation; 1, initiation of care after 5 months). All bivariate analyses were carried out using the z-statistic test of proportion equality. Logistic regressions used explanatory variables identified by previous literature, and the model controlled for age, parity, maternal education, paternal education, an index of autonomy and an index of assets. Only the first, singleton births to women during the study interval were included for the ANC utilization analysis. The autonomy index was scored on a scale of 1 (low) to 3 (high), and it represents a measure of independence felt by the women interviewed. The index was determined by counting the weighted responses to 13 questions regarding household decision making. An asset index was scored on a scale from 1 (low) to 3 (high). It was created by counting the number of assets held by the household, including presence and type of toilet, electricity, radio, television, bicycle, motorcycle, car, refrigerator and telephone. An asset index score of 1 indicates one household asset, 2 indicates two to three household assets and 3 indicates more than four household assets. Some explanatory variables were found to be insignificant at the a = 0.05 level but were maintained in the model to elucidate their relationships in this analysis.

A multivariate logistic regression was executed stepwise to predict the odds of seeking antenatal care in Bihar and Jharkhand. Next, interaction terms between covariates were tested individually; all were found to be insignificant and no interaction terms were included in the final model for antenatal care utilization (Table 3). The model was validated using the Pearson's c2 goodness-of-fit test.

A second stepwise logistic regression was carried out in the same manner to predict the timeliness of first antenatal service utilization among women who had received care (Model E). Due to smaller sample sizes, many covariates used in the model were categorized into fewer groups than in the previous models (A–D).

Finally, the prospective measures of pregnancy intention gathered during the NFHS-2 survey in 1998–1999 were compared with the retrospective measures captured during the NFHS-2 follow-

up survey. In the NFHS-2 follow-up, women were asked, "At the time you became pregnant with (name of child), did you want to become pregnant then, did you want to wait until later, or did you not want to become pregnant at all?" Responses were then grouped as either "wanted," representing the responses "wanted then" and "wanted later," or "unwanted," representing the response that the pregnancy was wanted "not at all." The retrospective analyses in this study were based on the first child born during the study interval, which was the first child birthed after the participant declared her future pregnancy intentions during NFHS-2 and the same pregnancy utilized for the prospective analysis. Z-tests of proportional equality were performed to examine the similarities between prospective and retrospective measures of unwanted pregnancy. All analyses were carried out using Stata 10.0 software (StataCorp, LP, College Station, TX).

Results

In total, 3666 women from Bihar and Jharkand states were re-interviewed in the follow-up study. Of these interviewees, 2079 women aged 18-49 experienced at least one pregnancy during the inter-survey period. The final study population included 2028 (97.5%) women who had one or two pregnancies and complete data (Figure 1). Unwanted pregnancy accounted for 637 (31%) of pregnancies in this study (Table 1). Approximately 80% of the women included in this study resided in Bihar. Over 83% reported having no formal education, while over 47% of husbands had no schooling. Thirty-three percent of households surveyed were identified by NFHS-2 survey classification as members of the scheduled caste or tribe, while an additional 52% of participating households were identified as "other backward class." The dominant religion was Hindu (81.3%), and Islam was also prevalent (17.6%). Women reporting unwanted pregnancies were significantly more likely to be over the age of 30 than those reporting wanted pregnancies (p = .000). Having more than four children was also found to be a significant predictor of unwanted pregnancy (p = .000).

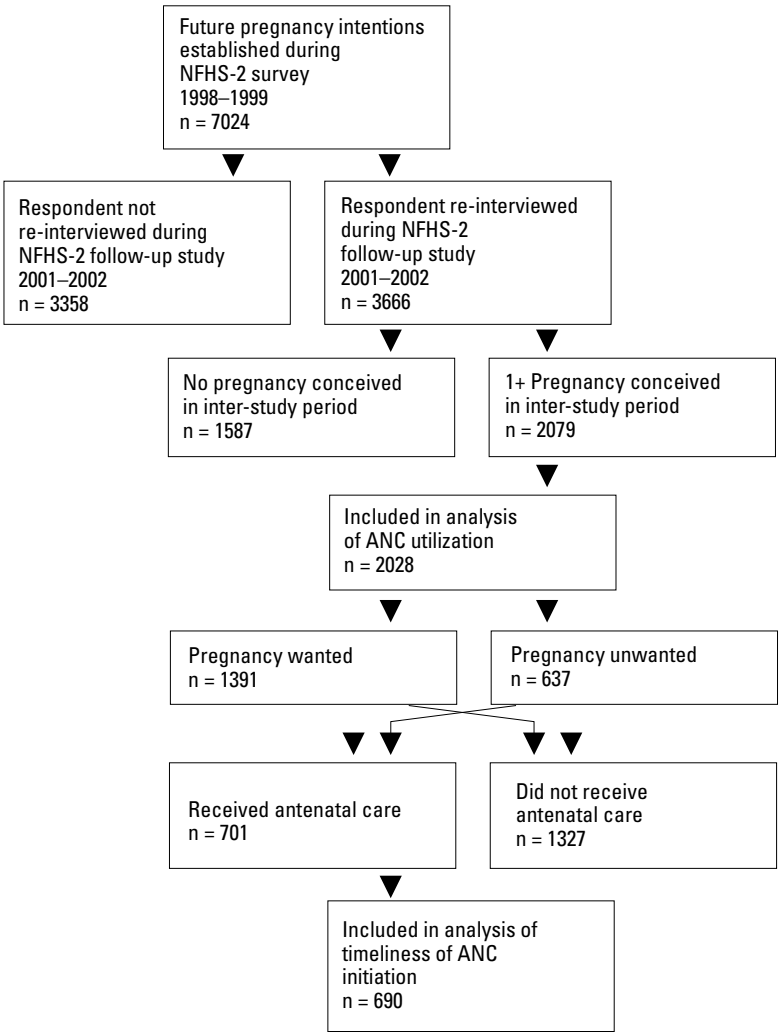
Table 1. Demographic indicators of study participants, stratified by prospectively determined pregnancy intention of most recent pregnancy, Bihar and Jharkhand states, India

No. (%)	Total (%)	Wanted	Unwanted	p-value
Total	2028 (100.0)	1391 (68.6)	637 (31.4)	.000a
Antenatal care				
Yes	701 (34.6)	512 (36.8)	189 (29.7)	.080
No	1327 (65.4)	879 (63.2)	448 (70.3)	.010a
Age (yrs)				
24	624 (30.8)	574 (41.3)	50 (7.9)	.000a
25–29	671 (33.1)	513 (36.9)	158 (24.8)	.005a
30–34	482 (23.8)	231 (16.6)	251 (39.4)	.000a
35–39	197 (9.7)	57 (4.1)	140 (22.0)	.002a
40+	54 (2.7)	16 (1.2)	38 (6.0)	.441
State				
Bihar	1620 (79.9)	1102 (79.2)	518 (81.3)	.326
Jharkhand	408 (20.1)	289 (20.8)	119 (18.7)	.631
Parity				

0–2 children	544 (26.8)	530 (38.1)	14 (2.2)	.006a
3–4 children	754 (37.2)	566 (40.7)	188 (29.5)	.006a
5–6 children	448 (22.1)	202 (14.5)	246 (38.6)	.000a
>6 children	282 (13.9)	93 (6.7)	189 (29.7)	.000a
# Born during study time interval				
1 child	1301 (64.2)	842 (60.5)	459 (72.1)	.000a
2 children	727 (35.9)	549 (39.5)	178 (27.9)	.005a
Maternal education				
No education	1695 (83.6)	1148 (82.5)	547 (85.9)	.076
Primary	96 (4.7)	76 (5.5)	20 (3.1)	.661
Secondary	213 (10.5)	151 (10.9)	62 (9.7)	.796
Higher	24 (1.2)	16 (1.1)	8 (1.3)	.297
Paternal education				
No education	964 (47.5)	633 (45.5)	331 (52.0)	.055
Primary	249 (12.3)	173 (12.4)	76 (11.9)	.912
Secondary	619 (30.5)	444 (31.9)	175 (27.5)	.285
Higher	196 (9.7)	141 (10.1)	55 (8.6)	.750
Asset index				
Low	1451 (71.6)	973 (70.0)	478 (75.0)	.997
Med	364 (18.0)	259 (18.6)	105 (16.5)	.997
High	213 (10.5)	159 (11.4)	54 (8.5)	.085
Caste				
Scheduled caste/tribe	674 (33.2)	460 (33.1)	214 (33.6)	.898
"Other backward class"	1065 (52.5)	740 (53.2)	325 (51.0)	.508
Other	289 (14.3)	191 (13.7)	98 (15.4)	.696
Religion				
Hindu	1650 (81.3)	1133 (81.5)	517 (81.2)	.885
Muslim	357 (17.6)	243 (17.5)	114 (17.9)	.926
Christian	9 (0.4)	5 (0.4)	4 (0.6)	.966
Other	12 (0.6)	10 (0.7)	2 (0.3)	.948
Autonomy index				
Low	712 (35.1)	523 (37.6)	189 (29.7)	.052
Med	1022 (50.4)	699 (50.3)	323 (50.7)	.905
High	294 (14.5)	169 (12.2)	125 (19.6)	.082

TABLE FOOTER: asignificant at a=0.05.

Figure 1.



ANC = antenatal care.

Antenatal Care Outcome

Only 701 (35%) of women had received at least one antenatal checkup. The unadjusted odds of receiving any antenatal care were significantly lower if the pregnancy was unwanted (OR=0.75 [95% CI 0.61, 0.92]), but this significance was lost in the adjusted model (Tables 2, 3). Women with more than two children were significantly less likely to receive care, regardless of pregnancy intentions. Age and parity were shown to be major confounders of pregnancy intention on antenatal care utilization. Both maternal and paternal education above primary schooling were found to be significant positive predictors of seeking ANC services. Individuals with high asset scores were significantly more likely to receive care, regardless of pregnancy intention, as were women with a high autonomy index (Table 3).

Timeliness of Antenatal Care Initiation

Of the 701 women who had received antenatal services, 690 (98.4%) were included for the timing of care analysis due to completeness of data. Among these women, 418 (60.6%) had received their first

antenatal care services during the first 5 months of gestation, while 272 (39.4%) received them after the fifth month. Women with unwanted pregnancies had no delayed care utilization, compared with women who had wanted pregnancies (Table 2). Additionally, no demographic indicators predicted delayed entry to care (Table 4).

Table 2. ANC outcomes by prospectively determined pregnancy intention, Bihar and Jharkhand, India

	Total N (%)	Wanted N (%)	Unwanted N (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
ANC					
No	1327 (65.4)	879 (63.2)	448 (70.3)	1.00	1.00
Yes	701 (34.6)	512 (36.8)	189 (29.7)	0.72 (0.59, 0.89) a	1.18 (0.91, 1.52)
Month of ANC initiation					
≤5 months	418 (60.6)	310 (61.5)	108 (58.1)	1.00	1.00
>5 months	272 (39.4)	194 (38.5)	78 (41.9)	1.15 (0.82, 1.62)	1.24 (0.83, 1.85)

ANC = antenatal care.
a significant at a = 0.05.

Table 3. Unadjusted and adjusted odds of receiving ANC among women who had 1 or 2 pregnancies during the study interval (n = 2028), Bihar and Jharkhand, India

Characteristic	Nested number	Antenatal care N (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Pregnancy intention				
Wanted	1391	512 (36.8)	1.00	1.00
Unwanted	637	189 (29.7)	0.72 (0.59, 0.88)	1.18 (0.91, 1.52)
Age				
≤24 yrs	624	259 (41.5)	1.00	1.00
25–29 yrs	671	248 (37.0)	0.83 (0.66, 1.03)	1.10 (0.84, 1.43)
30–34 yrs	482	138 (28.6)	0.57 (0.44, 0.73)a	0.89 (0.64, 1.25)
35–39 yrs	197	44 (22.3)	0.41 (0.28, 0.59)a	0.79 (0.49, 1.28)
40+ yrs	54	12 (22.2)	0.40 (0.21, 0.78)a	0.82 (0.39, 1.74)
Parity				
1–2 children	544	269 (49.4)	1.00	1.00
3–4 children	754	255 (33.8)	0.52 (0.42, 0.65)a	0.48 (0.37, 0.62)a
5–6 children	448	119 (26.6)	0.37 (0.28, 0.48)a	0.41 (0.28, 0.58)a
>6 children	282	58 (20.6)	0.26 (0.19, 0.37)a	0.34 (0.21, 0.54)a
Maternal education				
No education	1695	507 (29.9)	1.00	1.00
Primary	96	41 (42.7)	1.75 (1.15, 2.65)a	1.07 (0.69, 1.68)

Secondary	213	135 (63.4)	4.06 (3.01, 5.46)a	1.95 (1.36, 2.81)a
Higher	24	18 (75.0)	7.03 (2.77, 17.81)a	2.77 (1.00, 7.65)a
Paternal education				
No education	964	250 (25.9)	1.00	1.00
Primary	249	75 (30.1)	1.23 (0.91, 1.67)	1.14 (0.83, 1.56)
Secondary	619	261 (42.2)	2.08 (1.68, 2.58)a	1.57 (1.23, 2.00)a
Higher	196	115 (58.7)	4.05 (2.95, 5.58)a	1.84 (1.23, 2.76)a
Asset index				
Low	950	250 (26.3)	1.00	1.00
Med	849	310 (36.5)	1.61 (1.32, 1.97)a	1.11 (0.85, 1.44)
High	229	141 (61.6)	4.49 (3.31, 6.07)a	2.01 (1.42, 2.86)a
Autonomy index				
Low	712	246 (34.6)	1.00	1.00
Med	1022	351 (34.3)	0.99 (0.81, 1.21)	1.17 (0.94, 1.45)
High	294	104 (35.4)	1.04 (0.78, 1.38)	1.51 (1.11, 2.06)a

ANC = antenatal care.
a significant at a = 0.05.

Table 4. Logistic regression analysis of initiating ANC services after the first 5 months of gestation (n =6 90), Bihar and Jharkhand, India

Characteristic	**Adjusted OR (95% CI)**
Pregnancy intentions	
Wanted	1.00
Unwanted	1.24 (0.83, 1.85)
Age	
≤29 yrs	1.00
30+ yrs	1.01 (0.67, 1.51)
Parity	
1–3 children	1.00
4+ children	0.90 (0.61, 1.34)
Maternal education	
No edu+ primary	1.00
Secondary+ higher	0.82 (0.51, 1.30)
Paternal education	
No edu+ primary	1.00

Secondary+ higher	0.71 (0.50, 1.30)
Asset index	
Low	1.00
Med	0.95 (0.63, 1.43)
High	0.73 (0.45, 1.18)
Autonomy index	
Low	1.00
Med	0.99 (0.71, 1.39)
High	0.65 (0.39, 1.07)

Retrospective Versus Prospective Pregnancy

To examine the validity of the prospective measures of pregnancy gathered during the original NFHS-2 and used during this analysis, the prospective measures were compared with the retrospective assessments of the same pregnancies taken later, during the follow-up survey. Significantly fewer women reported retrospectively that their pregnancies were unwanted than prospectively (p = .000) (Table 5), and, in fact, 68% of prospectively measured unwanted pregnancies were later deemed wanted in the retrospective survey (Figure 2). It was somewhat unexpected to find that a full one third of pregnancies retrospectively identified as unwanted were originally considered wanted in the prospective measure. Similar to the prospective data, the retrospective analysis showed no difference in the odds of antenatal care among women with unwanted pregnancies compared to those with wanted pregnancies (retrospectively OR=1.13 [95% CI 0.83, 1.54]; prospectively OR=1.18 [95% CI 0.91, 1.52]).

Figure 2. Diagram showing distribution of prospectively and retrospectively determined pregnancy intentions, Bihar and Jharkhand, India (n = 2028)

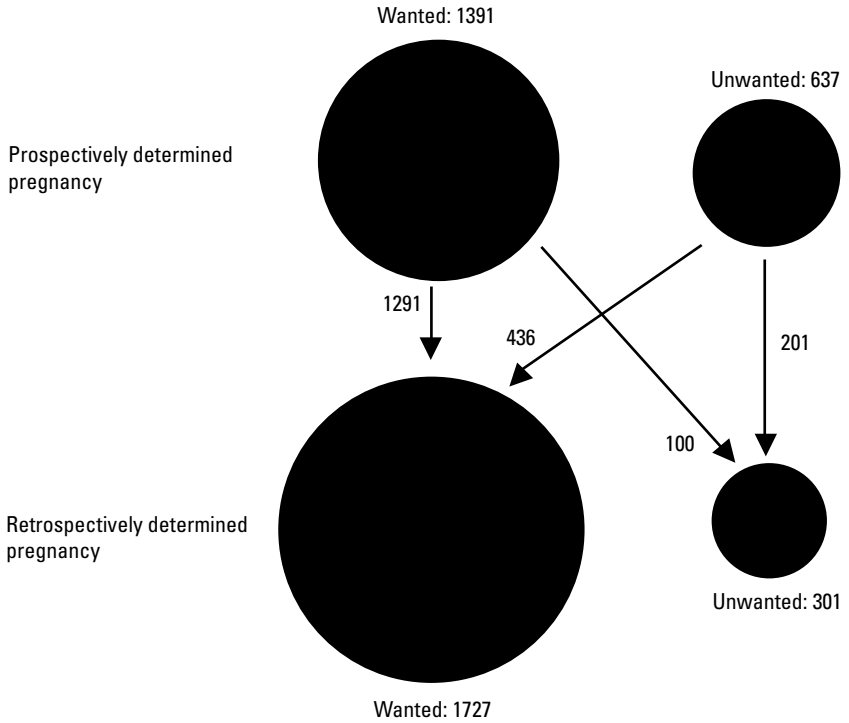


Table 5. Comparison of prospectively reported numbers of unwanted pregnancy (measured on the NFHS-2 survey) with prospectively reported numbers of unwanted pregnancy (measured on the NFHS-2 follow-up survey), Bihar and Jharkhand, India

	Total	Prospective unwanted N(%)	Retrospective unwanted N(%)	p-value
ANC				
Yes	701	189 (27.0)	88 (12.6)	.008a
No	1327	448 (33.8)	213 (16.1)	.000a
Month of ANC initiation				
≤5 months	418	108 (25.8)	46 (11.0)	.040a
>5 months	272	78 (28.7)	47 (17.3)	.151

NC = antenatal care.
a significant at a = 0.05.

Women who consistently qualified their pregnancy as either wanted or unwanted, both prior to and after conception (n = 1492), were analyzed separately using the same logistic models in an effort to assess the associations of consistently unwanted pregnancies upon antenatal care outcomes. Results showed no difference in utilization of antenatal services among women with consistently unwanted pregnancies compared with women who consistently identified their pregnancies as wanted. Unlike the previous analyses, however, women with consistently unwanted pregnancies were twice as likely to delay ANC initiation, compared to women with consistently wanted pregnancies (consistently reported OR=2.08 [95% CI 1.06, 4.11]); prospectively OR=1.24 [95% CI 0.83, 1.85]); retrospectively OR=1.63 [95% CI 0.98, 2.71]) (Table 6).

Table 6. Comparison of adjusted odds of receiving any ANC and delayed initiation ANC services by definition of pregnancy intention, Bihar and Jharkhand, India

	Prospectively unwanted		Retrospectively unwanted		Consistently unwanted	
	N	Adjusted OR (95% CI)	N	Adjusted OR (95% CI)	N	Adjusted OR (95% CI)
ANC	2028		2028		1492	
No		1.00		1.00		1.00
Yes		1.18 (0.91, 1.52)		1.13 (0.83, 1.54)		1.09 (0.71, 1.67)
Month of ANC initiation	690		690		527	
≤5 months		1.00		1.00		1.00
>5 months		1.24 (0.83, 1.85)		1.63 (0.98, 2.71)		2.08 (1.06, 4.11)a

Note. Reference group for pregnancy intention in all three categories: wanted pregnancies.
ANC = antenatal care.
a significant at a = 0.05.

Discussion

Results from this analysis indicate that parity best predicts the receipt of antenatal care services in North India, whereas pregnancy intention failed to significantly affect ANC utilization in the final model. The inability of pregnancy intention to predict ANC utilization was in line with some studies (Gage 1998) but not others (Eggleston 2000; Magadi et al. 2000). The importance of parity in

predicting antenatal care usage is in keeping with the study by Marston and Cleland (2003), which found that birth order and family size were more important predictors of antenatal care use than pregnancy intention. Though they represent different characteristics of women, age, parity and pregnancy intention are closely related in many developing settings like North India. Additional models demonstrated that age and parity largely confounded the effect of pregnancy intention in this analysis.

The lack of association between prospectively determined unwanted pregnancy and delayed initiation of ANC in the final adjusted model was not in accordance with published literature (Magadi et al. 2000; Eggleston 2000; Marston and Cleland 2003). However, the results of the same model using only consistently unwanted pregnancies did yield results consistent with previous work. Such findings may indicate that the degree of association between pregnancy intention and antenatal care timeliness may be dependent upon the strength of the mother's feelings toward the pregnancy. Delayed entry into care by mothers with unwanted pregnancies had been found in previous studies and was hypothesized to result from delayed recognition of pregnancy symptoms and time lost to pregnancy termination (Kost et al. 1998). Indeed, in their analysis of pregnancy intention and maternal antenatal care behaviours, Kost et al. (1998) emphasized the importance of controlling for delayed recognition of pregnancy and/or delays due to pregnancy termination decision making when analyzing the timing of the first ANC visit. Though such controls could not be included in this analysis due to limitations in the survey, the conservative use of the first 5 months of gestation representing "early" entry into care conceivably allowed for delayed pregnancy realization and decisions to terminate.

Implicit in the definition of unwanted pregnancy as it is used in this analysis is the assumption that women's prospectively determined reproductive intentions remained fixed throughout the inter-survey period. Results from this analysis indicate that this assumption may be largely correct, but not universal. One hundred (4.9%) women in the study prospectively determined any future pregnancies to be wanted, but after the subsequent birth of a child, unexpectedly retrospectively identified the pregnancy as unwanted. Such findings may illustrate the dynamic nature of pregnancy intentions.

Pregnancy intentions of women with live births were measured in this study, which failed to account for pregnancies that were either spontaneously or intentionally terminated. By not including such pregnancies, sample selection bias may have affected the antenatal care utilization rates found in this analysis. Additionally, grouping mistimed with wanted pregnancies may have underestimated the relative differences found between unwanted pregnancies and the wanted group. Only women's pregnancy intentions were sought in the survey, so no information about the pregnancy intentions of husbands was included; they may carry greater weight in this paternalistic society.

Two important aspects of antenatal care were not considered in this study, namely frequency and quality of ANC. Kost et al. (1998) clearly illustrated the expected associations of delayed first antenatal visit with the total number of visits during pregnancy. In Bihar and Jharkhand, women received their first ANC visit at an average 4.4 months, but nearly 40% of women did not initiate care until the sixth month of gestation or later. It is expected that late initiation of care directly impacts the frequency of ANC visits, as women with delayed initiation will have less gestation time to receive the recommended additional three visits. The quality of ANC has been shown to vary across India, and quality of care in northern states including Bihar and Jharkhand was found to be substandard (Rani et al. 2008). With no measures of the quality of care included in the NFHS-2 follow-up survey (Appendix 1), quality assessment was not possible in this study. It is probable, however, that for the 33% of women in this study who received ANC, the quality of the service was severely lacking.

According to Gipson et al. (2008), previous studies from developing settings have found that pregnancy intentions are related to maternal antenatal care behaviours, but such findings have been modest, varied greatly by country context and lacked stringent methodology. The results of the adjusted analyses in this paper did not support Gipson's assessment, finding no association of prospective pregnancy intention status upon antenatal care utilization. The effects of pregnancy intention upon utilization of care were found to be heavily confounded by the effects of age and

parity, perhaps indicating that such demographic measures may be better predictors of antenatal care usage. In the timeliness of care analysis, no association between prospectively defined unwanted pregnancy and delayed ANC initiation was found, yet when only pregnancies deemed consistently wanted or unwanted were considered, delayed entry to care was indeed established. Thus, it is possible that the effects of pregnancy intention upon the timeliness of ANC initiation may be related to the strength of the feelings toward the pregnancy, and mothers with the strongest feelings of pregnancy unwantedness may be at the highest risk of late care. These findings illustrate the complexity of pregnancy intention and maternal ANC behaviours.

Conclusions

Fundamentally, utilization rates of antenatal care services require improvement throughout Jharkhand and Bihar, regardless of pregnancy intention. In this analysis, it was shown that maternal antenatal care behaviours were not affected by the mother's desire for a future pregnancy prior to its conception. With the health and survival benefits of antenatal care clearly established for both mother and child, this study highlights the importance of reducing maternal and child morbidity and mortality by targeting women with demographic profiles showing reduced likelihood of ANC utilization, such as having more than four children and an age above 30 years. Results also indicate that women with the strongest feelings of unwantedness toward their pregnancies had delayed entry to care, highlighting a vulnerable subset of mothers with unwanted pregnancies. This study demonstrated inadequacies in family planning among study participants, as 37% of the women re-interviewed during the follow-up survey (n = 2079) reported two or more prospectively determined unwanted pregnancies during the inter-survey period. If the utilization of antenatal care dramatically increases, as it has in South India (Rani et al. 2008; IIPS and Macro Int. 2007), perhaps incorporating family planning referrals and/or services into antenatal visits may help prevent additional unwanted pregnancies. Finally, retrospective measures of pregnancy intention were found to under-report the proportion of unwanted births in this study; as validated in other recent studies (Koenig et al. 2006; Stephenson et al. 2008), prospective measures of fertility preferences are preferred.

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APPENDIX 1. NFHS-2 Follow-up Survey

I would now like to collect some information about all the live birth (s) which you have had since March, 1, 1999, whether currently alive or not.
RECORD NAMES OF ALL THE LIVE BIRTHS IN 204. RECORD TWINS AND TRIPLETS ON SEPARATE LINES AND MARK WITH A BRACKET. FIRST COMPLETE 205-207 FOR EACH OF THE BIRTH (S).
THEN FOR EACH BIRTH, STARTING FROM 208 ASK HORIZONTALLY FOLLOWING THE SKIP PATTERN. MOVE TO NEXT BIRTH (S). AT THE END OF THE TABLE GO TO 216.

204	205	206	207	208	209	210	211	212	213	214	215
at name was ven to your irst, next) hy since ır 1, 1999?	ASK AND RECORD SINGLE OR MULTIPLE STATUS.	Is (NAME) a boy or a girl?	In what month and year was (NAME) born? PROBE: What is his/her birthday?	Is (NAME) still alive?	IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	IF ALIVE: Is (NAME) living with you?	IF DEAD: How old was (NAME) when he/she died? IF "1 YEAR" PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH, MONTHS IF LESS THAN TWO YEARS, OR YEARS.	At the time you became pregnant with (NAME), did you want to become pregnant then, did you want to wait until later, or did you not want to become pregnant at all?	Were you using any contraceptive method when you became pregnant with (NAME)?	Which method were you using?	Thinking back to the time you became pregnant with (name), how did you feel about the pregnancy? Please look at this picture and tell me how happy or unhappy you were to be pregnant. SHOW & EXPLAIN DIAGRAM ON NEXT PAGE. RECORD NUMBER BELOW.
01 (NAME)	SING..1 MULT..2	BOY...1 GIRL..2	MONTH..... YEAR..	YES..1 NO...2 211	AGE IN YEARS 212	YES..1 NO...2 212	DAYS....1 MONTHS..2 YEARS...3 212	WANTED THEN.....1 WANTED LATER.....2 NOT AT ALL.....3	YES.....1 NO.....2 215	01 02 03 04 05 06 07 08 09 96	
02 (NAME)	SING..1 MULT..2	BOY...1 GIRL..2	MONTH..... YEAR..	YES..1 NO...2 211	AGE IN YEARS 212	YES..1 NO...2 212	DAYS....1 MONTHS..2 YEARS...3 212	WANTED THEN.....1 WANTED LATER.....2 NOT AT ALL.....3	YES.....1 NO.....2 215	01 02 03 04 05 06 07 08 09 96	
03 (NAME)	SING..1 MULT..2	BOY...1 GIRL..2	MONTH..... YEAR..	YES..1 NO...2 211	AGE IN YEARS 212	YES..1 NO...2 212	DAYS....1 MONTHS..2 YEARS...3 212	WANTED THEN.....1 WANTED LATER.....2 NOT AT ALL.....3	YES.....1 NO.....2 215	01 02 03 04 05 06 07 08 09 96	
04 (NAME)	SING..1 MULT..2	BOY...1 GIRL..2	MONTH..... YEAR..	YES..1 NO...2 211	AGE IN YEARS 212	YES..1 NO...2 212	DAYS....1 MONTHS..2 YEARS...3 212	WANTED THEN.....1 WANTED LATER.....2 NOT AT ALL.....3	YES.....1 NO.....2 215	01 02 03 04 05 06 07 08 09 96	

CODE FOR Q214 01 PILL, 02 IUD/LOOP, 03 INJECTABLES, 04 DIAPHRAGM/FOAM/JELLEY,
05 CONDOM, 06 FEMALE STERILIZATION, 07 MALE STERILIZATION, 08 PERIODIC ABSTINENCE, 09 WITHDRAWAL,
96 OTHER

SECTION 3C. ANTENATAL CARE

360	CHECK 202C ONE OR MORE BIRTHS SINCE MARCH 1, 1999 ☐ v	NO BIRTHS SINCE MARCH 1, 1999 ☐ → (SKIP TO 401)	
361	ENTER THE LINE NUMBER, NAME, AND SURVIVAL STATUS OF ALL BIRTHS SINCE MARCH 1, 1999 IN THE TABLE. ASK THE QUESTIONS ABOUT EACH BIRTH SEPARATELY, BEGIN WITH THE LAST BIRTH (YOUNGEST CHILD). ONLY RECORD INFORMATION RELATED TO THE LAST TWO BIRTHS IN THIS PERIOD. Now I would like to ask you some questions about the health of your children born since March 1, 1999 . (We will talk about one child at a time.)		
	LINE NUMBER FROM Q. 204	LAST BIRTH ☐☐	NEXT-TO-LAST BIRTH ☐☐
	FROM Q. 204 AND Q. 208	NAME _____ ALIVE ☐ v DEAD ☐ v	NAME _____ ALIVE ☐ v DEAD ☐ v
362	When you were pregnant with (NAME), did you go for an antenatal check-up?	YES.....1 NO.....2	YES.....1 NO.....2
363	When you were pregnant with (NAME), did any health worker visit you at home for an antenatal check-up?	YES.....1 NO.....2	YES.....1 NO.....2
364	CHECK 362 AND 363:	YES IN EITHER ☐ v NO IN BOTH ☐ v (SKIP TO 367)	YES IN EITHER ☐ v NO IN BOTH ☐ v (SKIP TO 367)
365	How many months pregnant were you when you first received an antenatal check-up?	MONTHS..... ☐☐	MONTHS..... ☐☐
366	How many times did you receive antenatal check-ups during this pregnancy?	NO. OF TIMES..... ☐☐	NO. OF TIMES..... ☐☐
367	→	GO BACK TO 362 IN NEXT COLUMN; OR, IF NO BIRTHS, GO TO 368	GO TO 368