Reducing Maternal Mortality One District at a Time

A district level analysis of the utilization of skilled birth attendants in four districts of Bihar

ളാൽ

Christina M. Chang
MPH Candidate 2008
Capstone Advisor: Dr. Hugh Waters
April 30, 2008

Chang, Christina M.
MPH Candidate 2008

ABSTRACT

This study examines the patterns, determinants, and disparities between the poorest and least poor households in the utilization of skilled birth attendants at delivery in four districts of Bihar - West Champaran, Jehanabad, Samastipur, and Katihar. Using the 2002 District Level Household Survey (DLHS), we ran logistic regression models to estimate the effect of covariates on the utilization of skilled birth attendants. The results show that the determinants of assisted delivery are different in each of the four districts. Mother's education matters to a great degree for Samastipur and Katihar, but does not have statistically significant effects in West Champaran and Jehanabad. Religion and caste/tribe associations only matter in Jehanabad, where being Hindu or belonging to a scheduled caste/tribe reduces the odds of using a skilled attendant. Wealth status matters only in Jehanabad, Samastipur, and Katihar. Wealth effects are minimal after controlling for other covariates in West Champaran. Inter-district differences are very likely due to the unique problems faced by each district. The results indicate that more contact with health workers via antenatal visits may increase the utilization of skilled birth attendants.

We also discuss policies adopted by countries that have successfully reduced maternal mortality to inform future policy efforts in Bihar. We conclude that Bihar should increase the number of facilities and competent health personnel, provide free or subsidized transport services, make decisions using a participatory community-based approach, and implement an information system that records maternal deaths.

Chang, Christina M.
MPH Candidate 2008

CONTENTS

Chang, Christina M.
MPH Candidate 2008

1. INTRODUCTION

The World Health Organization (WHO) estimates that 529,000 women die each year due to maternal complications (*UNICEF India - Health*). India alone accounts for almost 26% of global maternal deaths per year, the highest proportion of maternal deaths attributed to any one country. In recent years, India has made great strides to reduce its maternal mortality ratio (MMR). In 1997-1998, India's MMR was estimated to be 398 per 100,000 live births (Paul, 2007). In 2001-2003, India's MMR stood at 301, a 24% reduction in a short span of five years. At this rate, experts estimate India will reach a MMR of 160 by 2015 (Paul, 2007). Although this means India will miss its MDG target, which is set at 109 per 100,000 live births, we have reason to believe faster decline is possible if the right strategies are put into place.

India's current strategy for reducing MMR has been the promotion of institutional deliveries and deliveries by trained persons (National Commission on Population -GOI, 2003). In fact, the National Population Policy, created in 2000 by the National Commission on Population aims to achieve 80% institutional deliveries and 100% deliveries by trained persons by 2010 (National Commission on Population -GOI, 2003). To accelerate its efforts, the Government of India (GOI) initiated the National Rural Health Mission (NRHM) in September 2004. The NRHM launched Janani Evam Bal Suraksha Yojana ("Mother and Child Protection Scheme"), a conditional transfer program that gives mothers approximately 1400 rupees (US $34) in rural areas and 1000 rupees (US $25) in urban areas for registering with a clinic and giving birth in either a public or private institution (Special Task Force - Bihar, 2007). Although the program looks promising, its effects would be minimal if other strategic initiatives are not in place. For instance, there must be a sufficient number of midwives and health workers that can travel to remote rural areas to inform women about the program. It also depends on the availability of adequate facilities equipped with drugs, linked to blood banks, and staffed by professionals and competent health personnel.

Chang, Christina M.
MPH Candidate 2008

Nationwide initiatives like Janani Evam Bal Suraksha Yojana have the potential to address access barriers and increase institutional deliveries, however the extent to which they are successful highly depends on the current status of public health infrastructure and availability of human resources in each state. In summary, nationwide initiatives tend to ignore the diverse needs of individual states. In order to accelerate the decline in MMR, the GOI should identify and strive to meet the unique needs of each state, especially those with relatively higher MMRs.

This paper looks specifically at Bihar, a state in the northern region of India. Bihar has a MMR of 371, the fourth highest MMR in India. In order to reduce MMR at greater speed, the GOI should focus its attention on Bihar, a state with an unacceptably high MMR. In addition to having one of the highest MMRs, Bihar has one of the widest disparities in regards to maternal health service utilization between the poor and the better-off. Based on our analysis of the DLHS, we found that only 14% of women from the poorest wealth quintile delivered in an institution or by a skilled birth attendant, while 63% of women from the richest wealth quintile did. Diving deeper, the data show that even wider disparities exist at the district level. In order to reduce MMR in the state of Bihar, policies and programs should emphasize equitable access to health services as a primary objective. Ensuring equitable access to maternal health services is crucial to accelerating MMR reduction because improving the worst-off in society will undoubtedly move the state faster towards achieving better health for all (Institute of Policy Studies, Sri Lanka, 2003). More important is what this means on the ground. Reproductive health policies with equity as a focus means that the poorest women, often the women who need maternal health services the most will have access to lifesaving services that were previously only within the reach of the wealthy.

1.1. OBJECTIVE

The main objective of this study is to explore patterns, determinants, and disparities between the poor and better-off in the proportion of deliveries attended by a skilled birth attendant in four districts of Bihar - West Champaran, Jehanabad, Samastipur, and Katihar. The paper also reviews policy options that aim to improve the proportion of deliveries by skilled attendants.

2. BACKGROUND

2.1. BIHAR

Bihar is located in the northeast part of India and is surrounded by Uttar Pradesh to the west, Nepal to the north, West Bengal to the east, and Jharkand to the south. Bihar is one of the most populous states in the country with approximately 83 million people (Special Task Force - Bihar, 2007). Bihar is also one of the most poverty-stricken states in India. Almost 40% of the state's population lies under the poverty line (Sundberg & Kaul, 2005). This is the highest percentage of people living under the poverty line in any single state of India. The majority of the poor live in rural areas. Urbanization is low compared to other states at 10.5% (DFID, 2008). As much as one-third of the urban population lies under the poverty line (DFID, 2008). Caste and religious characteristics are also closely linked to poverty. Scheduled tribes have greater odds of being poor compared to upper castes, Muslims, and other backward classes (Sundberg & Kaul, 2005). The World Bank describes the government of Bihar as highly centralized and characterized by personal politics, making institutional decision-making nearly impossible (Sundberg & Kaul, 2005). The government of Bihar has been criticized for its lack of transparency and responsiveness to citizen needs. The state also struggles with high levels of corruption (Sundberg & Kaul, 2005).

Relative to other states, Bihar has extremely low rates and large socioeconomic differences in the use of maternal health services. Based on an analysis of the DLHS, we found that Bihar has the lowest proportion of women delivering in institutions or by skilled birth attendants (Figure 2.1).

Only 26.81% of women deliver in institutions or by skilled birth attendants in Bihar. In contrast,

90.28% of women in Tamil Nadu deliver in institutions or by skilled birth attendants. The data also

show that intra-state inequalities exist. Figure 2.2 illustrates the stark differences in inequalities

between worse and better performing states.

Figure 2.1 Proportion of skilled birth attendant utilization in Bihar, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, and all of India, (DLHS, 2002)
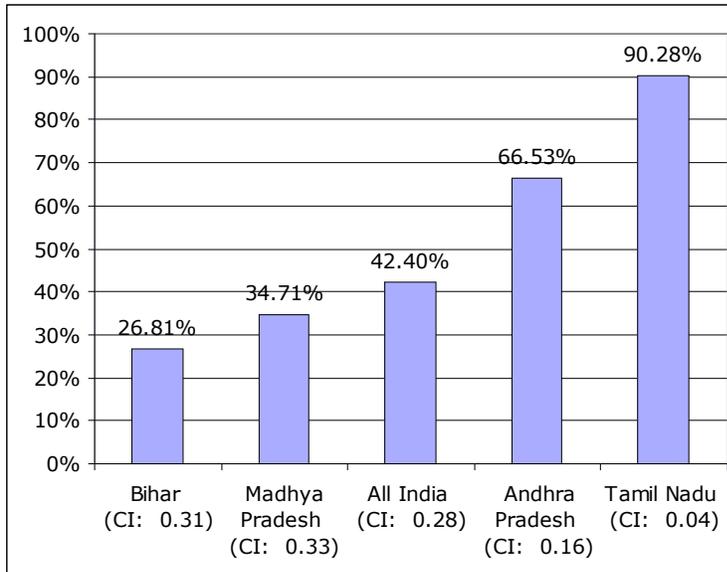

Figure 2.2 Concentration index for utilization of skilled birth attendants in Bihar, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, and all of India, (DLHS, 2002)
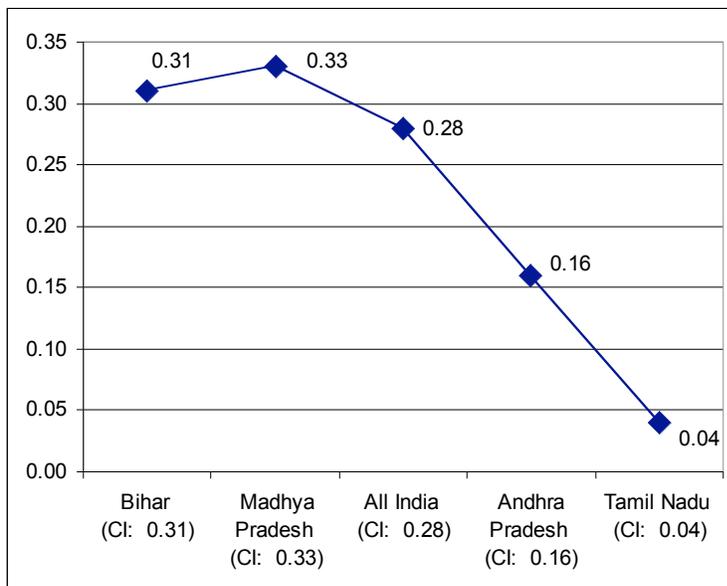
2.2. REPRODUCTIVE CHILD HEALTH PROGRAM

In an effort to improve maternal health and child survival across all states, the GOI with the support of the World Bank implemented the Reproductive Child Health (RCH) project in 1997. One of the specific aims of RCH was to strengthen the health system to reduce maternal health risks for women especially in poor rural areas, urban slums, and districts with high concentrations of scheduled tribes and castes (Government of India, 1996).

RCH is a national initiative implemented at the state level. It was intentionally designed this way in an attempt to meet the unique needs of the states. Results from RCH I, which was initiated in 1997 and closed in 2002 resulted in mediocre outcomes, especially for Bihar. One of the main lessons learned from RCH I was the need to decentralize more to states and for the majority of the functions even further to the district level. RCH II was launched recently in 2006-2007. One of the two major changes that occurred in RCH II was a call for further decentralization to the states and district governments. The second was a commitment to help vulnerable groups, including scheduled castes/scheduled tribes, the urban poor, and the geographically unreachable.

2.3. CONCEPTUAL FRAMEWORK

The Delay Model, a pioneering framework for maternal mortality by Maine & Thaddeus outlines the three delays that lead to maternal mortality – the delay to seek care, the delay to identify and reach an adequate institution, and the delay to receive adequate and appropriate treatment (Thaddeus & Maine, 1994). In the Delay Model a delay at any phase can lead to maternal death. We used this model as the foundational basis from which we created a larger conceptual model. Figure 2.3 illustrates our conceptual model. It depicts both demand- and supply-side barriers that lead to the three delays discussed by Maine and Thaddeus.

Demand-side factors generally affect Delay 1 - deciding to seek care. Previous encounters with the health system directly affect the perceived quality and benefits of delivering in institutions

or by skilled attendants. Negative experiences deter individuals from future utilization of health services. Likewise, positive experiences usually encourage future use of health services. The model also illustrates that the actual quality of institutions directly impact how individuals perceive health services. If, for example, health workers treated poor or disadvantaged patients worse than wealthier patients, the poor may be less inclined to use health services in the future. This can lead to differential use of services by socioeconomic status.

The cost of healthcare in the form of formal and informal payments affects utilization of health services as well. User fees act as barriers to access for those who cannot afford to pay. One of the main issues with informal payments is that individuals cannot anticipate how much services will cost them. The unpredictable nature of health care costs in a system where informal payment are common further deters households from seeking care. Published prices can at least inform households whether some services are affordable.

The education level of the mother affects how well she can process information about health. Educated women are also better navigators of the health system. For example, they are more likely to know how to apply for government programs and benefits.

Cultural, religious, and community norms affect the appropriateness of women to seek care outside the community. Husbands and family members with decision-making power often dictate whether women are able to receive care in institutions. In countries that experience high rates of maternal mortality, death due to maternal complications is perhaps an accepted and normal occurrence. The gravity of maternal death is unappreciated. Maternal death is an unfortunate, tragic, and unavoidable risk that every woman must face when bearing children. Consequently, women may not comprehend the need for skilled assistance or costly trips to health facilities.

The availability and affordability of substitutes also affect the utilization of maternal health services. Traditional birth attendants may be more affordable and culturally appropriate. Also, home

deliveries are more affordable compared to institutional deliveries. In addition to affordability, home delivery is perhaps the more comfortable option compared to roughing dilapidated roads to deliver in an institution.

Distance and travel costs directly influence a woman's decision to deliver at home or in an institution. In rural regions, women often do not have access to vehicles, public transportation, and in some cases, proper roads. In cases where public or private transportation are available, women from poorer households often cannot afford the fees. The urban poor must also find ways to overcome travel and distance barriers.   The urban poor are usually located in slums, which tend to be located further away from proper healthcare facilities.

Supply-side factors generally affect Delay 3 – receiving adequate and appropriate care. Quality factors include the wage, availability, and competence of health workers. Birth attendants, nurses, and doctors should be trained to perform comprehensive emergency procedures (CEmOC) especially if based in institutions. Frontline health workers such as village-based midwives should be confident enough to conduct normal deliveries. They should also be trained to identify, manage, and refer complications to CEmOC facilities (Dept. of Reproductive Health and Research (RHR), WHO, 2002). An adequate supply of skilled health workers is required to improve geographical reach. Health workers should also be given suitable wages to avoid problems with absenteeism. Health workers should also be trained and motivated to serve the needs of the poor rather than discriminating against them or asking for informal payments. The quality and cleanliness of the facility is also critical. Making sure there is running water, delivery theaters, and private rooms are essential to meeting the cultural needs of women. The availability of supplies, drugs, and blood banks are also crucial to providing appropriate care.

Facility location and hours of operation are also very important supply-side factors. Facilities should be distributed so that women who live in remote rural areas have access to institutions. First referral units should be linked to CEmOC facilities via a reliable transport system.

Effective communication of health information to both mothers and their families is essential. Delay 1 can be eliminated if proper training is provided to mothers and family members to identify symptoms that require the assistance of skilled attendants. Empowering mothers to know when and where to go are also critical. Community health workers should also communicate information regarding exemptions and other targeting programs. It is important to recognize that health communication alone cannot change the health seeking behavior of women; her ability to synthesize and process health information is related to her level of education. It is also important to recognize that decision-making power often lies with a woman's husband or other family members. Community health workers should identify these decision-makers and target health information to those individuals.

Figure 2.3   Conceptual framework depicting demand- and supply-side factors that influence the Three Delays
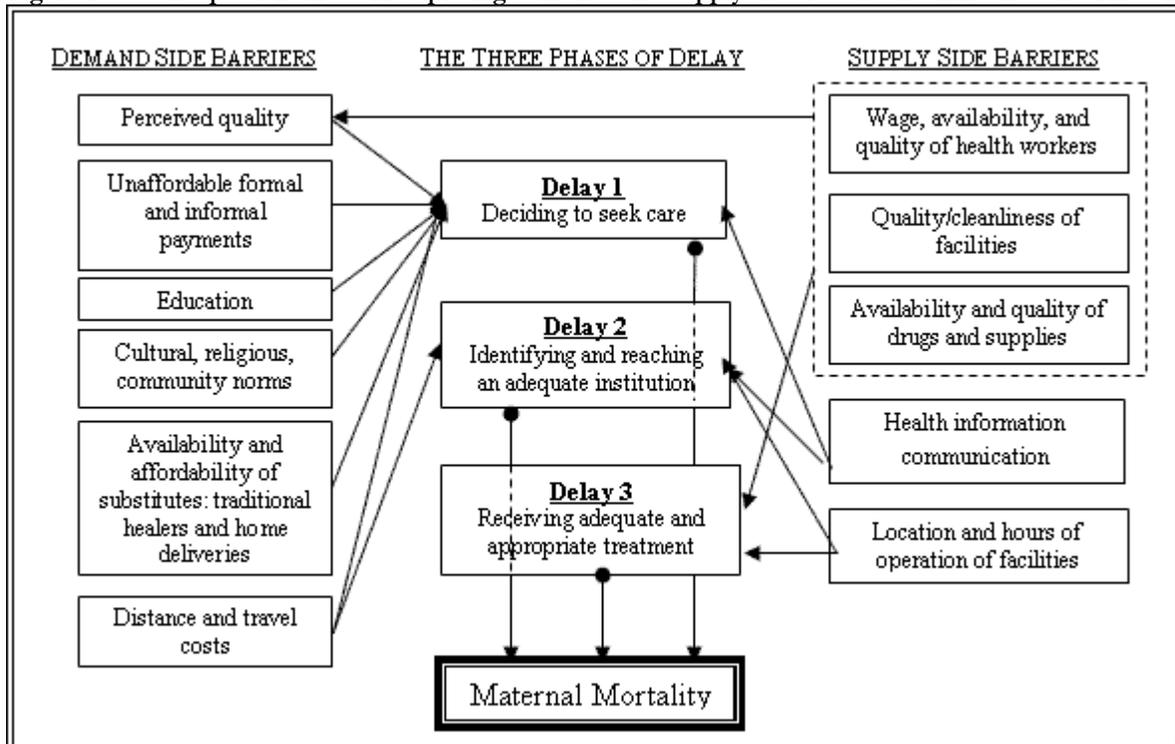
3. DATA AND METHODOLOGY

3.1. DATA SOURCE

In 1998-1999 the GOI initiated a district level household survey across all the states of India as a monitoring and evaluation tool for the RCH program. The survey was conducted in two rounds, first in 1998-1999 in 504 districts and again in 2002-2004 in 593 districts. Each round was conducted in two phases. Due to data availability issues, we used data from the first phase of round II, which covered 295 districts of India. For state level analysis of Bihar, we had 18 out of 38 districts available for review (47% of districts). Our analysis only included observations of women who experienced pregnancy between 1999 and 2002. We excluded induced and spontaneous abortions. The final dataset included 11,630 observations for the state of Bihar. For district level analysis, we analyzed 712 observations from West Champaran, 561 observations from Jehanabad, 629 observations from Samastipur, and 606 observations from Katihar.

3.2. VARIABLES

We identified the utilization of skilled birth attendants as our dependent variable. "Skilled birth attendants" is defined as institutional deliveries plus deliveries conducted by a skilled attendant for deliveries conducted at home. We combined skilled delivery and institutional deliveries since deliveries conducted by a skilled attendant are highly associated with the place of delivery. We chose skilled care as our main outcome variable because of the critical role skilled birth attendants play in maternal health. The majority of maternal deaths are preventable if complications are identified and treated in a timely fashion. The largest threat of death due to pregnancy occurs during labor, delivery, and within 24 hours after delivery (M. Koblinsky et al., 2006). According to WHO, direct causes such as hemorrhaging, sepsis, obstructed labor, anemia, and eclampsia make up over 70% of maternal deaths (Khan, Wojdyla, Say, Gülmezoglu, & Van Look, Paul FA, 2006). Postpartum hemorrhage is the most common cause of death in Asia, accounting for nearly 31% of maternal

deaths (Khan et al., 2006). Postpartum hemorrhage can occur without warning and can result in

death within two hours from the onset of bleeding (Deller & DeCamp, 2008). Skilled birth

attendants are trained to identify, manage, and refer complications in pregnant mothers to a

CEmOC facility. CEmOC facilities are equipped to perform cesarean section, blood transfusions,

and administer appropriate drugs. Institutional deliveries and skilled birth attendants, therefore, play

a critical role in reducing maternal mortality.

We chose the explanatory variables based on their theoretical and empirical importance as

well as their availability in the DLHS dataset. Household wealth status was the main independent

variable of interest. Household wealth status was measured using an asset index approach. An asset

index measures living standards by using data on household amenities and possessions such as a

bike, automobile, radio receiver, household materials such as wood or concrete flooring, and access

to superior sources of household necessities such as water. Studies suggest a close relationship

between asset and consumption approaches for measuring wealth, indicating that an asset index is a

reasonable proxy for standard of living (O'Donnel, Wagstaff, Van Doorslaer, & Lindelow, 2008).

Other socioeconomic characteristics were chosen for analysis as well. The variables used

were education of the mother, education of her husband, age of the woman at delivery, caste,

religion, and locality (urban or rural). Recent studies in Bangladesh and Uttar Pradesh found

antenatal care (ANC) visits as a strong predictor for skilled birth attendant utilization (Pallikadavath,

Foss, & Stones, 2004) (Anwar, Killewo, Chowdhury, & DeCamp, 2004). This study therefore

included ANC visits in the model. The year of delivery was also included as a control variable.

3.3. METHODS

We ran four logistic regression models to analyze the effects of the explanatory variables on

the utilization of skilled birth attendants in the four selected districts of Bihar. The DLHS provides

hierarchical clustered data. Women were clustered within households, households within villages,

Chang, Christina M.
MPH Candidate 2008

villages within districts, and districts within states. With clustered data we cannot assume that each

observation is independent of each other; rather the model should account for the fact that women

within the same villages are related to each other through common village characteristics. We

therefore adjusted the standard errors to account for clustering effects. The outcome of interest was

a dichotomous variable where the presence of a skilled birth attendant was assigned a value of 1 and

the absence of a skilled birth attendant was assigned a value of 0.

4. RESULTS

4.1. DISTRIBUTION BY DISTRICT

All districts have low rates of utilization, however some are lower than others. Figure 4.1

shows the percentage of women who utilized skilled birth attendants by district. Jehanabad has the

highest proportion of women who deliver with skilled assistance. Samastipur has the smallest

proportion of women who deliver with skilled assistance.

Figure 4.1 Proportion of women who utilized skilled birth attendants at delivery in four selected districts of Bihar, (DLHS, 2002)
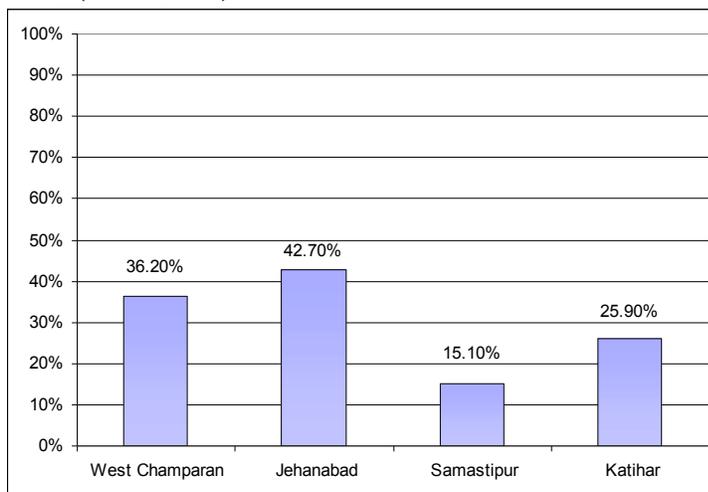
4.2. DISTRIBUTION BY WEALTH QUINTILE

Bivariate analysis shows that socioeconomic status, defined by wealth quintiles are strongly

associated with the utilization of skilled birth attendants. Figure 4.2 illustrates the percentage of

deliveries attended by a skilled birth attendant by wealth quintile. Inequality is highest in Samastipur

(CI: 0.40) and lowest in West Champaran (CI: 0.05). In Samastipur, less than 5% of women in the

poorest quintile utilized skilled birth attendants at delivery and 54% of women in the richest quintile

did. Regardless of wealth, it appears that women in West Champaran had access to skilled care at

delivery. Among women in Jehanabad, the poorest women utilized less skilled care at delivery than

the richest (CI: 0.23). In Katihar, the disparities between the rich and poor are also apparent (CI:

0.29).

Figure 4.2   Proportion of women who utilized skilled birth attendants by wealth quintiles in four selected districts of Bihar, (DLHS, 2002)
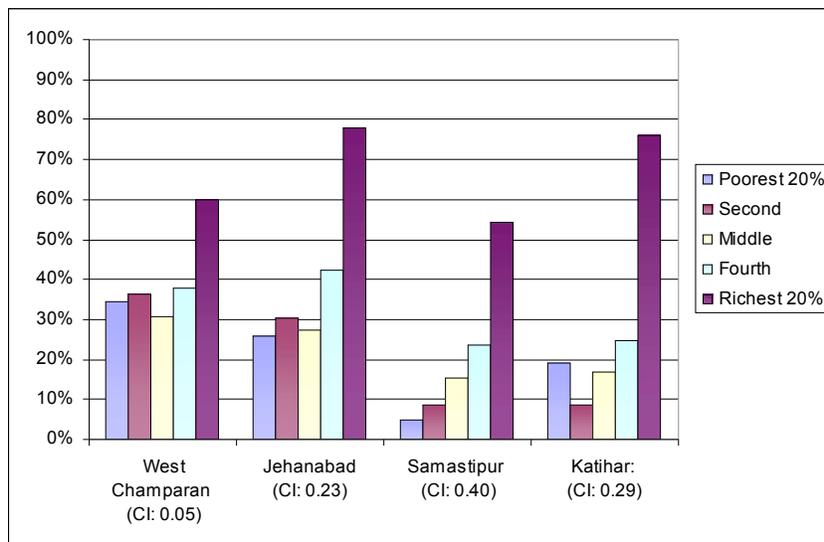
4.3. MULTIVARIATE ANALYSIS

Table 4.1 provides the results from our multivariate logistic regression models. After

adjusting for sociodemographic characteristics, socioeconomic status remained a significant

predictor for the utilization of skilled birth attendants for Jehanabad, Samastipur and Katihar.

After adjusting for all covariates, the effect of wealth on utilization became minimal and no longer

statistically significant in West Champaran. After adjusting for the effects of other covariates,

mothers from the richest quintile were 3.1 times more likely in Jehanabad, 8 times more likely in

Samastipur, and 3.4 times more likely in Katihar to utilize skilled birth attendants than mothers from

the poorest quintile. The effect of wealth on the utilization of skilled attendants was greatest in

Table 4.1 Odds ratios for sociodemographic correlates of skilled birth attendants at delivery in four selected districts in Bihar, (DLHS, 2002)

Characteristic	West Champaran (CI: 0.05)	Jehanabad (CI: 0.23)	Samastipur (CI: 0.40)	Katihar (0.29)
Wealth Quintile				
Q1: Poorest 20%				
Q2: Second	0.89	1.11	1.78	0.34***
Q3: Middle	0.71	0.97	3.30***	0.70
Q4: Fourth	0.73	1.39	3.64***	0.62
Q5: Richest 20%	1.18	3.13***	8.00***	3.37***
Education of Mother				
No formal education				
1-4 years	0.75	2.00	0.64	0.73
5-9 years	1.19	0.74	1.08	1.47
10 + years	1.66	1.08	4.73***	3.78***
Education of Husband				
No formal education				
1-4 years	1.35	4.22***	2.47*	2.08*
5-9 years	1.35	1.03	1.71	1.20
10 + years	1.99***	1.64*	0.60	2.29**
Religion				
Muslim				
Hindu	1.02	0.50***	0.83	1.20
Other	-	-	-	11.85
Caste/Tribe				
Sc/ST				
Other backward caste	0.84	1.40	0.86	0.54*
Other	1.25	3.22*	0.51	1.05
Number of ANC Visits				
No visits				
1 visit	0.72	1.73	4.99***	2.81***
2 visits	0.78	4.77***	3.98***	2.45***
3 visits	1.71	6.09***	9.57***	2.71***
4 visits	3.36***	4.69***	20.58***	2.55**
Age of Mother at Delivery				
12-19 years				
20-24 years	0.86	0.81	1.28	1.77
25-29 years	1.07	0.59	0.54	0.63
30-34 years	0.86	0.83	0.83	0.88
35 + years	0.59	0.85	0.50	1.28
Year of Delivery				
1999				
2000	1.15	1.43	1.56	1.05
2001	1.37	1.21	2.54**	1.14
2002	1.03	1.95*	1.03	1.56
Type of Locality				
Rural				
Urban	1.21	1.26	3.67*	0.80
N	712	561	629	606

***significant at the α=0.01 level **significant at the α=0.05 level * significant at the α=0.10

Samastipur. The concentration index of 0.40 indicates that Samastipur is also the most unequal district.

We found that the mother's level of education was a statistically significant predictor for the utilization of skilled birth attendants for the two lowest performing districts, Samastipur and Katihar. Mothers with 10 or more years of schooling were 4.7 times more likely in Samastipur and 3.4 times more likely in Katihar to deliver with skilled assistance than mothers with no formal education.

We found that the husband's level of education was positively associated with the utilization of skilled birth attendants in all districts. In West Champaran, women with educated husbands were 2 times more likely to deliver by skilled birth attendants than women with uneducated husbands. In Jehanabad, women with educated husbands were 4 times more likely to deliver with skilled assistance than women with uneducated husbands. Husband's education level increased the odds of assisted delivery in Samastipur and Katihar, however the effect was statistically significant only at the $\alpha=0.10$ level.

The effect of religion was significantly associated with the use of maternity care in Jehanabad and Katihar. In Jehanabad, compared to Muslims, Hindus had a 50% reduction in the odds of using skilled attendants. Under bivariate analysis, the effect of being Hindu in other districts increased the odds of using skilled attendants; however after adjusting for other covariates, the effect was reduced and no longer significant.

Household caste was associated with the utilization of skilled attendants only in Jehanabad. Households belonging to non-scheduled castes and tribes were 3.2 times more likely than schedule castes and tribes to use skilled birth attendants. Under bivariate analysis, when compared to scheduled castes and tribes, women belong to non-scheduled castes and tribes were associated with

an increase in odds of using skilled attendants. However after adjusting for other covariates, this effect was no longer significant.

We found that ANC visits were strongly associated with an increase in odds of using skilled attendants in all districts. Women with four or more ANC visits were 3.4 times more likely to deliver using a skilled attendant in West Champaran when compared to women with no ANC visits. In Jehanabad, women with 2 or more ANC visits were associated with an increase in odds of using skilled attendants. In both Samastipur and Katihar, women with 1 or more ANC visits were associated with an increase in odds of delivering with the assistance of skilled personnel.

The effect of age generally showed a reduction in odds of skilled assistance at birth with increasing age. The effect of age was only statistically significant in Jehanabad. Women between the ages of 25 and 29 were 40% less likely than women 19 years of age and younger to deliver with skilled assistance.

Under bivariate analysis, place of residence (urban or rural) was a statistically significant predictor of assisted delivery for all districts. However, after adjusting for other covariates, place of residence remained statistically significant only for Samastipur. Women in urban areas in Samastipur were 3.7 times more likely to use skilled attendants then women in rural areas.

5. DISCUSSION

5.1. INEQUALITIES IN SKILLED BIRTH ATTENDANT UTILIZATION

This study attempted to assess the inequalities in the utilization of skilled birth attendants in four districts of Bihar, a state with extremely low levels and large socioeconomic differences in the use of maternal health services. District level analysis revealed that the degree of inequality between the poorest and richest quintiles vary by district (Table 5.1). Women living in West Champaran and Jehanabad are approximately 3 times more likely to delivery with the assistance of a skilled attendant than women in Samastipur. Women from Katihar are 50% more likely than women in Samastipur

to deliver by skilled birth attendants. Samastipur has the smallest proportion of women delivering

by skilled birth attendants among the four districts. Interestingly, we found that Samastipur is also

the most unequal district as indicated by a concentration index of 0.40. In Samastipur, only 5% of

women in the poorest quintile utilized skilled birth attendants during delivery. Clearly, women in the

poorest quintile in Samastipur are unreached by health services. On the other hand, West

Champaran has one of the highest proportions of women utilizing skilled attendants at delivery.

West Champaran is also the most equal district as indicated by a concentration index of 0.05. The

significant rich-poor gap in the utilization of skilled birth attendants in Samastipur may be due to

distinct issues faced by the people in that district. It is evident that the poorest households in the

lowest performing districts are currently the least reached and perhaps the most difficult to reach.

Programs and policies should prioritize the lowest performing districts, identify their unique

situation, and find ways to reach the poorest households, since it is the poorest households within

these districts that are currently the most underserved and unreached by health services. Policies are

discussed extensively in Section 6.

Table 5.1   Differential use of skilled birth attendants after controlling for sociodemographic factors by district, (DLHS, 2002)

District	Rich-Poor OR	Q1	Q2	Q3	Q3	Q5	Total	CI	CI Std Error
Samastipur	Ref. Cat.	4.8%	8.6%	15.4%	23.5%	54.2%	15.1%	0.3980	0.1162
Katihar	1.48**	19.1%	8.5%	16.8%	24.7%	76.1%	25.9%	0.2908	0.1513
Jehanabad	3.02***	25.8%	30.4%	27.3%	42.4%	77.9%	42.7%	0.2255	0.0483
West Champaran	3.59***	34.5%	36.2%	30.6%	37.8%	60.0%	36.2%	0.0532	0.0677

***significant at the   =0.01 level **significant at the   =0.05 level

5.2. ROLE OF OTHER SOCIODEMOGRAPHIC FACTORS

We found that the education level of the mother was a significant predictor for skilled

attendants at birth even after controlling for other sociodemographic variables. As illustrated in the

conceptual framework, education is associated with an individual's ability to access and synthesize

information regarding their health and ways to receive healthcare services. Our findings suggests that Bihar should strengthen female education to improve overall maternal health.

We also found that women with educated husbands had an increase in odds of utilizing skilled birth attendants. An educated husband perhaps can better understand health messages regarding his wife's pregnancy. He may also have more knowledge and understand how his family can finance costs associated with institutional deliveries. More importantly, an educated husband may be able to recognize complications and understand the need for assistance by a skilled attendant. This finding suggests that Bihar should strengthen not only female education, but education for all its citizens.

Underutilization by caste and religion was only apparent in Jehanabad. For Jehanabad, reaching the marginalized may require targeting scheduled castes and tribes. Policy efforts should also try and understand the cultural barriers that lead Hindu women to underutilize skilled birth attendants.

Our analysis also found that antenatal care was strongly correlated with the utilization of skilled birth attendants. Initially, early identification and management of high risk pregnancies were believed to have enormous value in reducing maternal mortality. However, studies have not been able to prove that antenatal care directly influences maternal mortality. This is probably the case since the majority of maternal deaths occur during labor, delivery, and within 24 hours of delivery. Although studies have not been able to show that antenatal care can reduce maternal mortality, our analysis shows that antenatal care is still a critical component of improving maternal health (McDonagh, 1996). We found that antenatal care has high predictive value for the utilization of skilled attendants at delivery, a strategy that has reduced maternal mortality all over the world, including Malaysia and Sri Lanka. If conceptualized and executed properly, policies that aim to

expand the number of women they reach through antenatal visits may also improve the proportion of women delivering in institutions or by skilled attendants.

5.3. POLICY OPTIONS

5.3.1. A DIFFICULT PROBLEM

Designing policy solutions for Bihar is not a simple task. Low rates and inequalities in maternal health service utilization are difficult policy problems to resolve in any region of the world, let alone a place like Bihar where resources are limited and politics are driven by personal rather than public interest. In addition to unfavorable political conditions, the nature of the problem itself is complex. For one, polices that aim to reduce maternal mortality interact with policies in other sectors. In both Sri Lanka and Malaysia, rapid decline in maternal mortality can be attributed to the implementation of a synergistic package of health and social development services (Pathmanathan et al., 2003). Both countries recognized the interactive effect of taking a multi-sectoral approach to attacking high rates of maternal mortality. By implementing programs affecting health, education, water, sanitation, and rural development, both countries were able to create dramatic and lasting improvements in maternal health.

Also, changes in MMR require a long period to become apparent. Based on the experience of countries like Sri Lanka, Malaysia, and Sweden, the World Bank estimates that maternal mortality can be halved every 7-10 years. Keeping in mind that these countries were considered to have experienced "rapid" decline, efforts to reduce maternal mortality in Bihar will very likely be slow and require persistent and sustained efforts.

And finally, the multi-causal nature of the problem makes it even more challenging. As described earlier in the conceptual framework, both demand- and supply-side factors feed into three delay phases that directly lead to maternal death. The conceptual framework also illustrates that demand- and supply-side factors interact with each other. For example, actual quality of facilities and

health personnel feed into perceived quality. The government's ability to effectively communicate in a culturally appropriate manner interacts with the individual's education level.

Clearly, the policy problem in question is complex in nature and simple nationwide, perhaps even statewide solutions based on generalities and assumptions will likely fail. States should provide overall policy guidance, however districts will need to customize their implementation strategies based on both quantitative and qualitative data from village members and leaders. The state should release their decision-making power to the districts, oversee district plans to ensure they meet statewide goals, respond to district needs immediately, and perhaps most crucial to success, provide visionary leadership.

5.3.2. KOBLINSKY'S DELIVERY CARE MODELS

Koblinsky et al. identified four basic delivery care models (M. Koblinsky, Campbell, & Heichelheim, 1999). We summarize Koblinsky's findings in Table 5.2. Successful countries like Honduras and Sri Lanka moved from model 1 to model 2, 3, or 4 within several years to achieve a substantial reduction in maternal mortality. The DLHS provides quantitative data from which districts can learn which model they currently follow and which model they can feasibly move towards. The data reveal that the majority of women in the four districts of Bihar deliver at home (71.2% in West Champaran, 65.1% in Jehanabad, 88.8% in Samastipur, and 87.1% in Katihar). Among deliveries conducted at home, more than three-quarters are delivered by traditional birth attendants (Dai) in West Champaran (81.6%), Jehanabad (86.8%), Samastipur (93.7%), and Katihar (76.2%). Clearly, all four districts currently operate under model 1, a model that has been associated with staggeringly high maternal mortality ratios (M. Koblinsky, 2003). All districts should aim to move away from model 1 towards a model where the majority of deliveries occur with the assistance of a professional. Based on resource availability, districts should decide for themselves whether they will attempt to move from model 1 to model 2, model 1 to model 3, or take a gradual approach

from model 1 to model 2 with an end goal to achieve model 3. Model 4 is the most advanced and

generally very costly. Although the most advanced, model 4 does not necessarily achieve better

results than model 3 (M. Koblinsky, Campbell, & Heichelheim, 1999). Until Bihar is able to recover

from its current fiscal situation, Bihar should focus on moving towards model 2 or 3.

Table 5.2   A summary of Koblinsky's delivery care models

Model	Basic Description	Required factors for success	Achievable MMR	Example Countries
Model 1	Delivery conducted at **home** by community member or **traditional birth attendant**	Strong referral mechanism	No evidence that it can provide a MMR under 100 per 100,000 live births	Rural China (1996): 115
Model 2	Delivery conducted at **home** by a **professional skilled birth attendant**.	Strong referral mechanism	Has reduced MMRs to 50 or less per 100,000.	Malaysia (1970-80s):50
Model 3	Delivery conducted at a **basic essential obstetric care facility** by a **professional skilled birth attendant**. attendant	Strong referral mechanism to comprehensive emergency obstetric care	Has reduced MMRs to 50 or less per 100,000	Malaysia (1985-90s): 43 Netherlands (1983-92): 7 Sri Lanka (1996): 60
Model 4	All deliveries conducted at a **comprehensive essential obstetric care facility** by a **professional skilled birth attendant**.		Has reduced MMRs to 50 or less per 100,000 Model 4 is the most advanced, but not necessarily the most effective	Mexico City (1988): 114 United Kingdom (1992-95): 10 United States (1990-95): 12

Source:Koblinsky, Campebell, and Heichelheim (1999); The World Bank (2003).

5.3.3.   LEARNING FROM HONDURAS, INDONESIA, AND SRI LANKA

The decision to move towards model 2 or 3 depends on a host of demand- and supply-side

factors. A move towards model 2 relies on a strengthened pool of skilled attendants who either live

among or near rural villages. Model 2 must ensure that skilled attendants are confident to conduct

normal birth care. In Indonesia, knowledge tests showed that midwives were not confident to

perform specific lifesaving skills (M. Koblinsky, 2003). As a result, their ability to treat

complications has been under scrutiny. Midwife trainings should be frequent and meaningful to

ensure quality care at the village level. It is also crucial that skilled birth attendants are linked to an

emergency obstetric care facility with a reliable and affordable transportation scheme. The supply

and drug needs of skilled attendants must be regularly stocked. Lack of drugs, trainings, supplies, including mode of transportation to make house visits in remote areas, can lead to discouragement and the midwife's eventual ineffectiveness as a skilled birth attendant.

In order to move towards model 3, where the majority of births occur in institutions, each district should address the demand-side barriers that would deter utilization. For instance, policy-makers must assess the cultural appropriateness of women leaving their home or community to deliver in an institution. Districts must address access issues including transportation, service, and opportunity costs associated with institutional deliveries and their implications on equity. Facilities must be geographically accessible and affordable transportation should be provided or planned for. Based on our analysis, we found that among women who did not deliver in an institutional setting, "too far/no transportation" was the second most common reason given by women in every district. Approximately one-fifth of all women stated transportation and distance as their primary reason in West Champaran (17.8%), Jehanabad (18.5%), Samastipur (25.3%), and Katihar (20.7%). The data show that more women from the poorest households stated distance and transportation barriers as their primary reason for not delivering in an institution (Figure 5.1). Clearly, in Bihar, moving from model 1 to model 3 requires reliable transportation plans at the village level to ensure that women are transported from their villages to first referral units.

Figure 5.1 Proportion of women stating "too far/lack of transportation" as their primary reason for not delivering in an institution by quintile for selected districts of Bihar, (DLHS, 2002)
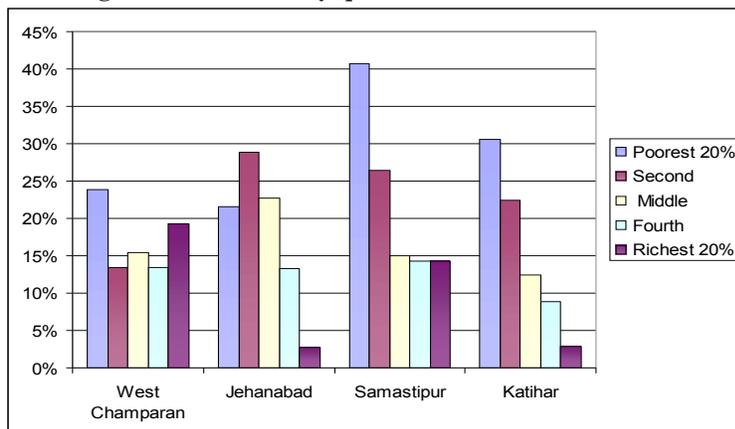
Indonesia is a good example of a country that attempted to move from model 1 to model 3, however due to unaddressed demand- and supply-side barriers, was only able to transition to model 2. Indonesia initially relied on traditional birth attendants to refer women to community-built huts for delivery. The program observed little to no utilization of these services. Indonesia refocused its maternal health efforts on the recruitment and training of midwives. The new approach relied on village-based midwives. Midwives were expected to attend normal deliveries and refer complications to facilities. As a result, Indonesia experienced a surge of deliveries attended by professionals. However, due to a host of unaddressed demand-side issues including high costs of care, lack of transportation, and cultural appropriateness of institutional deliveries, the proportion of deliveries occurring at home remained unchanged (M. Koblinsky, 2003). In creating policies that aim to move districts toward institutional deliveries, district leaders must conceptualize and address demand- and supply-side barriers that may result in wasted time and resources.

An example from Honduras suggests that model 2 may not be enough to reach an acceptable maternal mortality ratio, especially in a country with difficult to research rural areas like Bihar. Honduras, initially a model 2 country still had a startling MMR of 182 per 100,000. In an effort to reduce MMR, Honduras targeted regions with the highest maternal mortality ratios by building seven new rural area hospitals, five maternity waiting homes alongside rural hospitals, and eight birthing centers. All facilities were built with community input. Simultaneously, Honduras recruited and trained skilled birth attendants. Honduras also improved its referral system for obstetric emergencies. Honduras provided extensive training to both traditional and professional birth attendants to recognize danger signs during labor and delivery. Skilled birth attendants were also trained to identify high-risk mothers during their pregnancies. The skilled attendant referred mothers with high-risk pregnancies to maternity waiting homes to await their delivery. Maternity

waiting homes successfully addressed the geographical barrier faced by women who lived in remote rural areas of the country.

Our data analysis demonstrates that Bihari women have very little access to information. Among women who did not deliver in an institutional setting, lack of information was the primary reason stated by women in all districts for not delivering in an institution. The data show that lack of knowledge poses a major threat to maternal mortality in every district and at every wealth quintile (Figure 5.2).   As illustrated in the Delay Model, women must recognize when and who to get assistance from when maternal complications arise. The existing knowledge gap may be a direct result of having too few frontline health workers interacting with village members. In China, Indonesia, Honduras, and Sri Lanka midwives interact with village members frequently. Midwives actually live in the villages they serve in both Indonesia and China. In Sri Lanka and Honduras, although midwives do not necessarily live in the villages, they make frequent antenatal care visits. In these countries, frequent interactions with midwives may have increased the knowledge base of pregnant mothers in the villages. Based on our analysis, the number of antenatal care visits was very predictive of assisted delivery. Perhaps the educational benefits of these visits increase awareness among women, thereby increasing their odds of delivering by skilled attendants.

As mentioned earlier, the majority of births occur at home with the assistance of a traditional birth attendant. Similar to Honduras' strategy, Bihar may consider training traditional birth attendants to recognize complications and refer women to facilities. In Honduras, traditional birth attendants correctly referred women to facilities. The data suggest that these referrals were usually appropriate (M. Koblinsky, 2003). However, in Indonesia, a similar strategy did not work for them. In light of having limited resources, Bihar should carefully consider whether training traditional birth attendants would be successful for them.

Figure 5.2 Proportion of women stating "not necessary" and "lack of knowledge" as their primary reason for not delivering in an institution by quintile for selected states in Bihar, (DLHS. 2002)
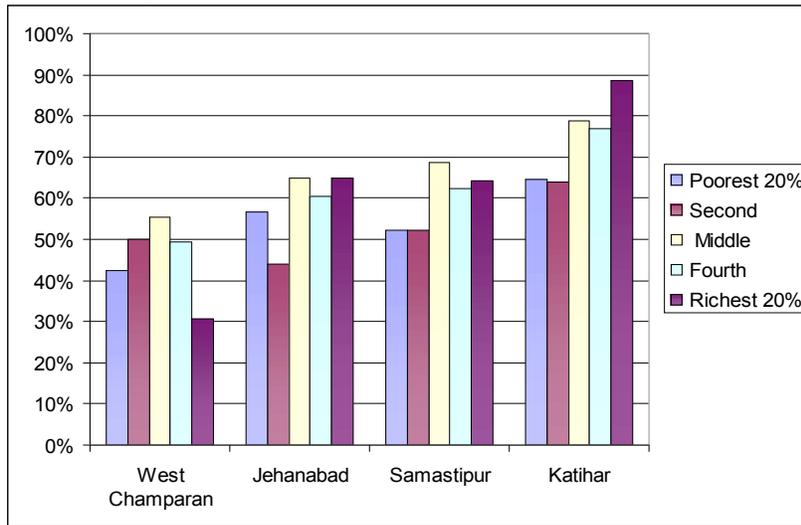
Private facilities play a significant role in providing delivery care in Bihar. Among the four states, the proportion of private facility utilization for deliveries was the smallest in West Champaran (35.6). Among private facility deliveries in West Champaran, regardless of wealth quintile, women utilized these facilities similarly. The data show that access to both government and private facilities are equally accessible across wealth quintiles in West Champaran. On the other hand, in Jehanabad 71.4% of institutional deliveries occurred in private facilities. Among all private facility deliveries in Jehanabad, less than 10% were from the poorest quintile, while the richest 40% accounted for over 66% of the deliveries in private facilities. In Samastipur, 61.3% of institutional deliveries occurred in private facilities. Among all private facility deliveries, only 6.5% were from the poorest quintile, while the richest 40% accounted for 63%. In Katihar, 57.8% of all institutional deliveries occurred in private facilities. Among private deliveries, the poorest 20% accounted for only 8% and the richest 40% accounted for 80%. Inferior quality of public facilities may be driving the overwhelming draw towards private facilities in Jehanabad, Samastipur, and Katihar. Bihar should improve the condition of existing facilities, build new facilities, or subsidize costs for poorer households.

Strategies aiming to reduce maternal mortality are context specific and no one model exists. Based on the successes and failures of other countries and our quantitative review of West Champaran, Jehanabad, Samastipur, and Katihar, there are five policy actions that should be considered:

1) Increase the number of skilled birth attendants in villages

2) Increase the number of birthing facilities embedded in a strong referral network

3) Provide free or subsidize transport services from villages to facilities

4) Make decisions using a participatory community-based approach

5) Implement an information system that records maternal deaths to monitor and evaluate district level successes

Increasing the number of skilled personnel located in villages is one of the most influential factors in reducing maternal mortality. China's barefoot doctors have contributed greatly to their reduction in MMR. Although too early to determine the impact of village-based midwives in Indonesia, a downward trend has been reported in MMR. The professionalization of midwifery was the backbone to Sri Lanka's success (Pathmanathan et al., 2003). The Sri Lankan Ministry of Health assigned midwives to each village. Midwives were responsible for antenatal care, immunizations, providing women with their expected delivery dates, and giving clear instructions regarding which hospital to go to in the event she experiences pain or reaches her due date. By asking mothers to go to a hospital on her due date, midwives managed to eliminate Delay 1. Midwives are the frontline health workers who educate mothers, provide essential medical care during their pregnancy, and coordinate and prepare the household with clear instructions on where to go and what to do when mother goes into labor. Midwives should be trained to identify and refer maternal complications to facilities. Midwives should also be able to identify high-risk pregnant mothers who should be referred to maternal waiting homes. Midwives should also be highly knowledgeable about

government programs, such as Janani Evam Bal Suraksha Yojana - programs that can help eliminate the cost barrier for many households. Midwives should do their best to identify and address the barriers their patients face.

Bihar should also upgrade existing birth facilities and build new facilities, especially in rural areas. Honduras was able to successfully reduce MMR from 182 to 108 within seven years by prioritizing the needs of the worst-off. Bihar should emulate Honduras' strategy and build facilities in districts with the highest MMR. Bihar should assess the needs of the poor in the lowest performing states and identify whether they have access to birthing facilities. Birthing facilities should be in good condition, comfortable, and attractive to mothers, especially if transportation and opportunity costs are high or in areas where home deliveries are the more acceptable substitute for institutional delivery. Birthing facilities should be well-equipped with drugs, supplies, beds, linked to blood banks, and staffed with friendly and competent health workers. Honduras was able to reach remote villages by building smaller birthing centers and maternity waiting homes between their village and nearby hospitals. Likewise, remote villages should consider building local birthing centers or maternity waiting homes to address geographical barriers.

Based on the data, transportation appears to be a major barrier, especially among the rural poor in Bihar. Villages should be given resources to transport mothers to nearby birthing centers and maternity waiting homes. Transportation between referral units and district hospitals should be free or subsidized for the poor. Transportation and distance is a major barrier among Indonesian women. In Sri Lanka, transportation costs were subsidized (Pathmanathan et al., 2003). In Malaysia, transportation fees were free (Pathmanathan et al., 2003).

Decisions should include the input of village members, village leaders, local NGOs, district officials, as well as state officials. Policymakers that implement policies and programs intended to address the needs of a community without first gaining the views of the target population may do so

inefficiently and at the stake of wasted funds, mediocre results, and a dissatisfied beneficiary population. Decision makers should elicit information from members regarding where to locate new district facilities and local birthing centers and whether maternal waiting homes are even congruent with cultural norms. A beneficiary assessment is a qualitative analytic tool used to improve the impact of a planned or ongoing intervention by eliciting the views of the intended beneficiary population regarding the intervention that is intended to improve their lives (Salmen & Amelga, 1998). There are several methods of conducting qualitative participatory community-based assessments. Any one will work as long as the opinions of the beneficiary population are included in the planning, implementation, and continual review of the intervention. In addition to playing a critical role in the planning process, regular and routine assessments will provide project managers at the district and state level a continual stream of feedback from the beneficiary group, which enables them to routinely improve and modify the program to meet the ever-changing needs of the target population. The long-term success and sustainability of a project depends on the beneficiaries of an intervention to eventually take ownership of projects that aim to improve their lives. Projects that originate from beneficiary assessments are more likely to be accepted and utilized by beneficiary population and therefore more likely to achieve long-term success and sustainability. For example, in Honduras, to address the geographical barrier, communities built the first several community birthing centers. These birthing centers were built and maintained by the communities. As local birthing centers became increasingly popular, the Ministry of Health started to build additional birthing facilities, which as discussed earlier was a major contributing factor to the country's dramatic reduction in MMR. Also, the participation of district and state officials may speed effective rollout of successful projects to other regions of the state. When state and district leaders directly observe positive change in one community, we manage to immediately gain buy-in from top decision-makers.

Lastly, and perhaps the most difficult to implement is the establishment of a civil registration system that records maternal deaths. Civil registration of maternal deaths can be used as a tool to raise the importance of maternal death in villages. In Sri Lanka and Malaysia, politicians and leaders were given reports on region-specific mortality data. These countries initiated maternal death reviews that included local investigations. These investigations involved interviews with local midwives, community leaders, district hospitals, local community clinics, and household members (Pathmanathan et al., 2003). Reviews took on a "no blame" rule where it was commonly understood that no one was to blame and findings from the investigation was purely to learn and improve the health system to avoid future deaths (Pathmanathan et al., 2003). The benefits were twofold. First, it provided direct and insightful information to decision-makers to inform appropriate programmatic changes. Second, it raised community awareness within villages regarding the importance of maternal death (Pathmanathan et al., 2003). In states like Bihar, where MMR is high, maternal death is a tragic, yet accepted part of child bearing. However, investigations bring public attention to maternal deaths and raise its importance in the community. A Medical Officer arrives in a village. She parks her vehicle and begins interviewing family members and various members of the community regarding the death of a young woman who died during child birth. Public attention like this slowly changed the cultural fabric of Sri Lanka and Malaysia – two countries that once accepted maternal death as a common result of child bearing. While a formal registration system may be difficult to implement, there may be other ways to begin recording maternal deaths. Verbal autopsies or other village norms regarding burial ceremonies could be used to begin the process.

6. CONCLUSION

Despite the inflow of programmatic funds through the RCH program, Bihar has been unable to meet the needs of women, especially poor women.   A lackadaisical political environment and

Chang, Christina M.
MPH Candidate 2008

limited government capacity makes MDG5 a challenging goal to meet in Bihar. National goals for

RCH II look promising – further decentralization and a call to serve the marginalized provide strong

visionary direction to the states. However, in Bihar it is questionable whether a policy window exists

to create effective change in maternal mortality. Kingdon explains that policies are only likely to be

taken seriously by government when three political streams run together (Buse, Mays, & Walt, 2005).

The perception of problems as a matter requiring government action, an analysis of the problem and

its solutions, and the political will to make change must come together in order to translate

recommended policy into action. This paper has demonstrated that low rates and unequal utilization

of maternal health services in Bihar is a complex problem with multiple causes and requires action

by the government to meet the needs of its people. Solutions should be culturally appropriate and

context specific and aim to reduce inequalities by focusing on remote rural areas. Potential solutions

can be drawn from the successes and failures of other countries such as Sri Lanka, Honduras and

Indonesia. However, the extent to which policy recommendations will be put into action depends

now on the political will of the state of Bihar.

Appendix A: Distributional Findings

Table A.1   Individual and household characteristics of the women who gave birth in the four years preceding the survey (DLHS, 2002) in four districts in Bihar, (%), (DLHS, 2002)

Characteristic	West Champaran	Jehanabad	Samastipur	Katihar
Wealth Quintile				
Q1: Poorest 20%	32.1	16.1	27.8	37.73
Q2: Second	14.5	13.6	22.1	18.17
Q3: Middle	26.9	18.9	25.3	14.75
Q4: Fourth	18.8	30.4	17.7	15.06
Q5: Richest 20%	7.7	21.1	7.2	14.29
Education of Mother				
No formal education	80.3	56.9	70.9	72.2
1-4 years	4.1	4.4	3.8	2.9
5-9 years	10.7	16.9	16.3	15.2
10 + years	4.9	21.8	9.0	9.7
Education of Husband				
No formal education	46.1	22.8	40.2	49.2
1-4 years	7.4	4.4	5.4	9.7
5-9 years	22.0	16.9	26.3	20.6
10 + years	24.5	55.9	28.1	20.5
Religion				
Muslim	25.1	13.4	12.7	38.2
Hindu	74.3	86.6	87.3	61.2
Other	0.5	0	0	0.6
Caste/Tribe				
Sc/ST	25.7	29.3	21.4	17.4
Other backward caste	60.2	53.7	63.7	55.4
Other	14.0	17.0	14.9	27.2
Number of ANC Visits				
No visits	68.6	67.8	79.1	66.0
1 visit	8.2	7.2	7.5	6.1
2 visits	9.0	6.0	4.4	9.0
3 visits	7.0	6.0	2.8	8.57
4 visits	7.1	12.9	6.1	10.28
Age of Mother at Delivery				
12-19 years	20.3	14.5	24.0	16.8
20-24 years	37.5	35.9	37.4	34.1
25-29 years	23.7	28.7	21.5	23.2
30-34 years	13.3	15.7	12.0	14.6
35 + years	5.2	5.2	5.2	11.2
Year of Delivery				
1999	14.3	11.5	15.1	7.8
2000	22.6	17.6	21.5	16.2
2001	39.8	31.3	42.3	26.5
2002	23.3	39.6	21.2	49.5
Type of Locality				
Rural	91.8	69.3	98.1	77.3
Urban	8.2	30.7	1.9	22.7

Table A.1 presents the distributional findings of our analysis. With the exception of Jehanabad, almost 30% of the women in each district fall within the poorest quintile, indicating that there are more women living in each household in the poorest quintiles compared to less poor quintiles. In the sample, more women than husbands are illiterate. More than two-thirds of women are illiterate with no formal education in West Champaran (80%), Samastipur (71%), and Katihar (72%). In Jehanabad, a little over half the women are illiterate with no formal education (56.9%). Approximately half the husbands have five or more years of education in West Champaran (46%), Samastipur (54%), and Katihar (41%). In Jehanabad, almost three-quarters of husbands have five or more years of education (72%). Hindu is the predominant religion in all districts, however Katihar has a slightly greater proportion of Muslims relative to other districts. The proportion of households belonging to a scheduled caste is similar across the four districts ranging from a low of 17.4% in Katihar to a high of 29.3% in Jehanabad. Close to two-thirds of the women received no antenatal care in West Champaran (68%), Jehanabad (67%), Samastipur (79%), and Katihar (66%). The majority of births were to women between the ages of 20-29.The population is predominately rural for all districts, ranging as low as 1.9% of household in Samastipur living in urban areas to a high of 30.7% of household in Jehanabad.

Figure 3 shows the percentage of women who utilized skilled birth attendants across the four districts. All districts suffer from low rates of utilization, however some more than others. Only 15% of women in Samastipur give birth with the assistance of a skilled birth attendant, where as almost 43% of women in Jehanabad do.

References

Anwar, A. T. M. I., Killewo, J., Chowdhury, M. K., & DeCamp, K. (2004). Bangladesh: Inequalities in utilization of maternal health care services - evidence from MATLAB. *HNP Discussion Paper - Reaching the Poor Program,*

Buse, K., Mays, N., & Walt, G. (2005). *Making health policy.* Berkshire, England: Open University Press.

Deller, B., & DeCamp, K. (2008). *Preventing postpartum hemorrhage.*http://www.maqweb.org/techbriefs/tb48posthem.shtml

Dept. of Reproductive Health and Research (RHR), WHO. (2002). *Global action for skilled attendants for pregnant women*

DFID. (2008). *Draft TOR: Design, interim support and implementation of bihar, strengthening urban management for inclusive growth programme* Retrieved from http://www.dfid.gov.uk/procurement/files/ojec8231tors.pdf

Government of India. (1996). *Project appraisal document, RCH I*

Institute of Policy Studies, Sri Lanka. (2003). Equity in financing and delivery of health services in bangladesh, nepal, and sri lanka. In A. S. Yazbeck, & D. H. Peters (Eds.), *Health policy research in south asia* (pp. 65). Washington D.C.: The World Bank.

Khan, K. S., Wojdyla, D., Say, L., Gülmezoglu, A. M., & Van Look, Paul FA. (2006). WHO analysis of causes of maternal death: A systematic review. *The Lancet, 367*(9516), 1066-1074.

Koblinsky, M. (2003). *Reducing maternal mortality - learning from bolivia, china, egypt, honduras, indonesia, jamaica, and zimbabwe.* Washington D.C.: The World Bank.

Koblinsky, M., Campbell, O., & Heichelheim, J. (1999). Organizing delivery care: What works for safe motherhood? *Bull World Health Organ, 77*(5), 399-406.

Koblinsky, M., Matthews, Z., Hussein, J., Mavalankar, D., Mridha, M. K., Anwar, I., et al. (2006). Going to scale with professional skilled care. *The Lancet, 368*(9544), 1377-1386.

McDonagh, M. (1996). Is antenatal care effective in reducing maternal morbidity and mortality? *Health Policy and Planning, 11*(1), 1-15.

National Commission on Population (GOI). (2003). *National population policy 2000 - OBJECTIVES.* Retrieved 04/27, 2008, from http://populationcommission.nic.in/npp_obj.htm#box2

O'Donnel, O., Wagstaff, A., Van Doorslaer, E., & Lindelow, M. (2008). *Analyzing health equity using household survey data: A guide to techniques and their implementation.* Washington D.C: The World Bank.

Pallikadavath, S., Foss, M., & Stones, R. W. (2004). Antenatal care: Provision and inequality in rural north india. *Social Science & Medicine, 59*(6), 1147-1158.

Pathmanathan, I., Liljestrand, J., Martins, J. M., Rajapaksa, L. C., Lissner, C., de Silva, A., et al. (2003). In Precker A. (Ed.), *Investing in maternal health*. Washington D.C.: The World Bank.

Paul, V. K. (2007). Meeting MDG 5: Good news from india. *The Lancet, 369*(9561), 558-558.

Salmen, L. F., & Amelga, M. (1998). *Implementing beneficiary assessment in education: A guide for practitioners (with examples from brazil)* No. 20945). Washington D.C.: The World Bank.

Special Task Force, Bihar. (2007). . New Delhi: Government of India.

Sundberg, M., & Kaul, M. (2005). *India - world bank report : Bihar - towards a development strategy.* Retrieved 4/13/2008, 2008, from http://www.worldbank.org.in/wbsite/external/countries/southasiaext/indiaextn/0,,contentM DK:20556842~pagePK:141137~piPK:217854~theSitePK:295584,00.html

Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine, 38*(8), 1091-1110.

UNICEF india - health. Retrieved 4/12/2008, 2008, from http://www.unicef.org/india/health_1341.htm