PUBLIC HEALTH RESEARCH

The Status of Birth Preparedness and Complication Readiness among Rural Indian Mothers

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ABSTRACT

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Introduction	A cross-sectional study was conducted with the aim to explore the present status of birth preparedness and complication readiness in rural area of West Bengal and determine the possible factor(s) influencing their knowledge and practice regarding this concern.
Methods	Thirty villages with homogenous characteristics were identified by cluster sampling methods from a rural block (Bhatar, Burdwan district, West Bengal) of India on April 2013 to November 2013. From every cluster 7 mothers who had delivered baby within the last year and were available first, interviewed consecutively using a guided questionnaire adapted from JHPIEGO Maternal and Neonatal Health Programme survey tools. Multivariate logistic regression was applied in analysis to predict how much the independent variables influenced the birth preparedness of mothers.
Results	62.4% mothers were found to be well prepared. Trained birth attendants and health facilities were identified before delivery in 81.9% and 78.1% cases respectively. Mode of transportation for complication management or delivery was pre-decided by about 60% of family. Only 35.7% family saved money for the same purpose. Logistic regression revealed that well preparedness increased 11 times with every new pregnancy, but it did not depend on caste and education status of the mothers.
Conclusions	The overall birth preparedness status of the rural mothers is poor and they acquire more knowledge regarding birth preparedness from their self experience rather than from existing health system.
Keywords	Birth preparedness - Complication readiness - Cross-sectional study - Rural mothers - Parity.

INTRODUCTION

Maternal mortality ratio strongly reflects the overall effectiveness of a health system. According to sample registration system 2007-2009 maternal mortality rate of India was 212 per 100000 live births[1]. Though the maternal mortality ratio of West Bengal state is better (145 per 100000 live birth), still it is far away from the national target level (<100 per 100000 live birth)[2]. The life threatening complications in pregnancy and most of the deaths are avoidable if they receive emergency obstetrics care timely[3, 4]. It is a tragic situation as most of these deaths are not caused by disease, but occurred due to lack of awareness and preparedness during pregnancy. Three phases of delay to access the health care facility, like delay in making in decision to seek care, delay in arrival in health facility and delay in receiving appropriate treatment after arriving at the health facility are mainly responsible for maternal deaths in most of the cases[5,6]. Birth preparedness and complication readiness (BP/CR) is the safe motherhood strategy to promote timely use of skilled maternal and neonatal care during child birth and obstetrics emergencies by reducing first, second and third level of delay.

In India where maternal mortality is high and matter of immediate concern for the nation, there are very limited published study (eg Mainly in Central state of India: Madhyapradesh- Rewa, Indore study etc) regarding birth preparedness status. Maternal literacy was found as important predictor of Birth preparedness in those Indian studies. India is the country of cultural diversity where state wise birth preparedness status is also different and predictors likely would be different. The dearth of data regarding the status of Birth preparedness and complication readiness in Eastern India motivated us to conduct the study. This study aimed to assess the knowledge and practice regarding birth preparedness and complication readiness among the mothers in a rural block of West Bengal in India, to assess the status of birth preparedness and complication readiness among them and to determine associated factors.

METHODS

This cross-sectional observational analytical epidemiological study was conducted in the Bhatar block (415.01 sq km area), situated in the Burdwan district in the state of West Bengal, India from April 2013 to November 2013. According to 2001 census report, this block comprised of 107 villages with 236397 populations[7]. Maternal and Child health care is delivered here through sub centres which cover 5000 population of villages and controlled by Rural Hospital, higher health facility of the block. During birth preparatory phase (Antenatal period, delivery) even in post natal period all the grants and maternal free health check up are provided to mothers from above health facilities under the Janani Surakha Yojna program.

Birth of a child is the important event of life for all mothers, so mothers can able to recall the steps of birth preparedness even after one year of delivery that was also evident in different studies. Mothers delivered baby either live or death within the last year (April 2012 to November 2012) were in our study population.

In the Indore city study prevalence of well preparedness of birth and complication readiness was found among 47.8% mothers[8]. On assumption of 48% prevalence of well preparedness of birth and complication readiness (as had no prior estimates of BPACR in rural level, India) and absolute precision 10% total sample size came out to be 96 using the formula $n=z^2 p q /e^2$ (where, n = sample size, z = standard normal deviate = 1.96 at 95% confidence interval, p = prevalence of birth preparedness and complication readiness, q = 1 - p, e = absolute precision). Using the design effect 2, final sample size was calculated to be (96 X 2) = 192.

From the previous year's health reports it was evident that the every village had relatively homogenous demographic and health characteristics. The clusters were mutually exclusive and collectively exhaustive. A random sampling technique is then used on any relevant clusters to choose which clusters to include in the study. Two-stage cluster sampling method was followed. A random sampling technique is applied to the elements from each of the selected cluster. So considering every village as a cluster 30 clusters (villages) were chosen by cluster sampling method from total 107 villages of Bhatar block (published in 2001 census report). Finally 210 mothers were included in the study from 30 clusters. From each cluster 7 mothers fulfilling the inclusion criteria were interviewed consecutively after taking verbal consent using predesigned and pretested schedule containing both close and open ended questions adapted from survey tools of JHPIEGO Maternal and Neonatal Health Programme[9]. This tool was developed to collect data from 6 levels (Individual, Family, Community, Provider, Facility, Policy), but we used only Individual level indexes. Out of 12 individual level indices we measured 10 indices in our study, but emphasize on only 4 indices to measure BP/CR. This tool was developed in USA and its validity and reliability has been checked and applied in different countries including India[10].

Data were collected by interviewing responded mothers meticulously after taking verbal consent and antenatal care related data were collected from health records. Mothers were not accused for their wrong practices, but were appreciated indeed for the well practices. In that way rapport were build up with every mothers and the reality had come out through in-depth

interview. Antenatal care related data were collected from health records.

Operational definition
Birth preparedness and complication readiness was measured in respect of identification of trained birth attendant for delivery, identification of health facility for emergency, arrangement of transport and savings of money. Those mothers who followed at least three steps out of four birth preparedness and complication readiness practice were considered as well prepared. The remaining mothers were considered less prepared[8,9,11].

According to WHO guideline, mother's knowledge had been considered as adequate when she was aware about 6 must known danger signs of pregnancy (i.e. vaginal bleeding, severe abdominal pain, fits, severe headache with blurring of vision, fever and too weak to get out of bed, fast or difficult breathing)[12]. To determine socioeconomic status of the mothers modified Dr B.G. Prasad Socio-economic Scale (2011) was used[13].

Ethical approval
The study was conducted after obtaining approval and necessary permission from Institutional Ethics Committee (IEC) of Burdwan Medical College & Hospital.

Statistical analysis
Data were entered in Microsoft Excel worksheet (Microsoft, Redwoods, WA, USA) and were analyzed using IBM SPSS software, version 19.0 (Statistical Package for the Social Sciences Inc, Chicago, IL, USA) and Microsoft Excel. P values of <0.05 were considered as statistically significant. Factors which were found to be statistically significant in bivariate analysis were considered for multivariate logistic regression to predict how much the independent variables influenced the birth preparedness of mothers.

RESULTS
Socio-demographic data
Out of 2194 eligible mothers of the block total 210 mothers (10.4%) were included in our study by cluster sampling method. All mothers who were approached for the interview co-operated and participated in the study willingly. Mean age of the mothers was 22.4±3.7 years. The study population predominately belonged to Hindu religion (70%). Among them 63.3% were from scheduled caste and scheduled tribe family. All of the mothers were house wives and 56.7% were literate, 74.8% belonged to lower socio economic status and 64.8% were living in joint families. Primipara was common among the study populations (64.2%).

Table 1 Distribution of mothers according to socio-demographic characteristics and the level of birth preparedness and complication readiness. n=210

Socio Demographic Characteristic	Category of birth preparedness and complication readiness		Total	Test of significance
	Well prepared	Less prepared		
Age (in years):				Fisher's exact p value= p=0.889
18-24	89(67.9)	60(75.9)	149(71)	
25-30	36(27.5)	16(20.3)	52(24.8)	
>30	6(4.6)	3(3.8)	9(4.2)	
Religion:				χ^2=50.231,df=1, p=0.000
Hindu	115 (87.8)	32(40.5)	147 (70)	
Muslim	16 (12.2)	47 (59.5)	63 (30)	
Caste (among Hindu) : [n=147]				χ^2=6.098, df=1, p=0.014
General	49(42.2)	5(16.1)	54 (36.7)	
Schedule caste & Schedule tribe	67 (57.8)	26 (83.9)	93 (63.3)	
Educational status:				χ^2=7.096, df=1,p=0.008
Illiterate	47(35.9)	44 (55.7)	91(43.3)	
Literate	84 (64.1)	35 (44.3)	119(56.7)	
Parity:				χ^2=21.825,df=1, p=0.000
1	68(51.9)	67 (84.8)	135 (64.2)	
≥2	63 (48.1)	12(15.2)	75(35.8)	
Type of family:				χ^2=0.991,df=1, p=0.32
Joint	81(61.3)	55(68.9)	136(64.8)	
Nuclear	50(38.7)	24(31.1)	74(35.2)	
Socio economic status*:				χ^2=0.021,df=1, p=0.886
Middle	33 (25.2)	20 (25.3)	53 (25.2)	
Lower	98 (74.8)	59 (74.7)	157(74.8)	

No. of antenatal check up				χ2=10.759, df=1,
Inadequate (<4)	80 (61.1)	29 (36.7)	109 (47.6)	P=0.061
Adequate (≥4)	51 (38.9)	50 (63.3)	101(52.4)	

According to modified Dr B.G. Prasad Socio-economic Scale (2011)

Knowledge

Regarding knowledge about the danger signs of pregnancy, 46.7% mothers could tell at least one danger sign. Of them, 86% had very limited knowledge (one or two danger signs out of six). Only 64.8% mothers heard about the Janani Surakha Yojana (centrally sponsored maternity benefit scheme) and most of them (99.3%) got the information from health personnel. Among them 84.6% mothers had knowledge about the available financial assistance under that scheme. Only 24.8% mothers knew about the available transport facilities under Nischay Yan Yojana (financial assistance for transport during delivery or complication management). Only one fifth of the mothers had knowledge about the all available facilities under these two schemes.

Table 2 Knowledge of mothers about the birth preparedness and complication readiness

Variables			Number (%)
Danger signs during the pregnancy (n=210)	Number of danger signs known	1	53(25.2)
		2	32(15.2)
		3	5(2.5)
		4	8(3.8)
	No knowledge about danger signs		112(53.3)
Janani Surakha Yojna	Heard about the programme (n=210)	Yes	136(64.8)
		No	74(35.2)
	Source of Information about the programme n= 136*	Radio	19 (14)
		TV	42 (30.9)
		Health personnel	135(99.3)
	Knowledge about available financial assistance (n=136)	Present	115 (84.6)
		Absent	21 (15.4)
Availability of transport services under Nischay Yan Yojana (n =210)		Known	52 (24.8)
		Not known	158 (75.2)
Availability of facilities under JSY & NYY		Known	42 (20.0)
		Not known	168 (80.0)

Multiple Responses

Planning and Practice

Maternal health

About 70% mothers planned to deliver their child in the health institutions and rest planned to deliver at home. Home delivery by local traditional birth attendant was planned by 18.1% mothers. Skilled or trained birth attendants were identified before delivery in 81.9% cases and health facilities were identified before in 78.1% cases for dealing emergency situations. Only 35.7% family saved money for the purpose of delivery or complication management. Mode of transportation for complication management or delivery was pre-decided by about 60% family. Finally 62.4% mothers were found well prepared in this study.

Table 3 Assessment of four steps of birth preparedness and complication readiness. (n=210)

Steps of birth preparedness and complication readiness	Yes (%)	No (%)
1. Identified skilled or trained birth attendant for delivery	172 (81.9)	38 (18.1)
2. Identified health facility for emergency	164 (78.1)	46 (21.9)
3. Arranged transport	128 (61)	82 (39)
4. Saved money	75 (35.7)	135 (64.3)

Birth Preparedness and Complication Readiness

Antenatal care was received by 86.7% mothers at least once in case of their last pregnancy. Among them only 34.6% were registered timely (within the first trimester). Tetanus toxoid was received adequately by 89% mothers during their pregnancy.

Table 4 Practice of mothers regarding birth preparedness and complication readiness. (n =210)

Practice		Variables		Number (%)
Antenatal Care	Antenatal visit	Done		182 (86.7)
		Not done		28 (13.3)
	1st antenatal check up (n = 182)	<12 weeks		63 (34.6)
		12-28 weeks		109 (59.9)
		>28 weeks		10 (5.5)
	Total no. Antenatal visits	< 4		81(44.5)
		4-7		64(35.2)
	(n = 182)	>7		37 (20.3)
	Source of antenatal care (n = 182)	Government health facility		153 (84.1)
		Private health facility		10 (5.5)
		Both		19 (10.4)
	Tetanus Toxoid immunization (n = 210)	Adequate Dose		187(89)
		Inadequate Dose		16 (7.7)
		Not Received		7(3.3)
Planning of birth preparedness and complication readiness	Planning of delivery	Institutional delivery		147 (70)
		Home delivery	By trained person	25(11.9)
			By untrained person	38 (18.1)
	Saving of money for birth	Yes		75 (35.7)
		No		135 (64.3)
	Deciding mode of transportation for complication management or delivery	Yes		128 (61)
		No		82 (39)
Practice of delivery and complication management	Place of delivery	Institution		147 (70)
		Home		63 (30)
	Type of transport service availed	Government		32 (15.2)
		Private		115 (54.8)
		Not used		63 (30)
	Birth attendant	Skilled birth attendant	Doctor	136(64.8)
			Nurse	11 (5.2)
		Unskilled birth attendant	Trained birth attendant	25 (11.9)
			Untrained birth attendant	38 (18.1)
	Care Seeking Behaviour in case of Serious Health Problem of mothers (N=21)	Government setting		16 (76.2)
		Private setting		5 (23.8)
Practice of mothers regarding	Initiation of Breast feeding	Early		171 (81.4)
		Late		39 (18.6)

neonatal care	Colostrum Feeding	Yes	193 (91.9)
		No	17 (8.1)
	Pre lacteal feeding	Yes	80 (38.1)
		No	130 (61.9)
	Exclusive Breast feeding	Yes	46 (21.9)
		No	164 (78.1)

Regarding place of delivery, 70% mothers delivered in the health institutes as they planned. In 18.1% cases children were delivered at home by untrained local birth attendant. Private transport system was used by 54.8% mothers during child birth or complication management. Complication raised during pregnancy in case of 10% mothers and among them 76.2% received care from government settings. Most of the mothers (76.2%) received government health care facilities during pregnancy for the treatment of serious health problems. Among the beneficiaries only 50% mothers received money from Janani Surakha Yojana.

Neonatal care
Accordance to mother colostrums feeding was done by 91.9% mothers and breast feeding was initiated timely in 81.4% cases. But 38.1% mothers offered honey or sugar water to their baby as pre lacteal feed according to their local customs or belief. About one fifth (21.9%) of mothers could not provide breast milk exclusively to their baby.

Bivariate analysis
On bivariate analysis it was found that mothers who belonged to Hindu religion, general caste, literate and had multiparity, were well prepared in case of birth preparedness and complication readiness which was statistically significant (p<0.05). There was no significant relationship between age group, type of family, socio-economic status, no. of antenatal check up and birth preparedness and complication readiness.

Multivariate regression analysis
The model of logistic regression was significant, as evident from omnibus chi-square test (P = 0.000). All the independent variables together can explain between 29.4% to 39.8% variance of the dependent variable (well preparedness), as evident from Cox & Snell and Nagelkerke R square. Regression model can correctly predict 57.6% of low preparedness and 90.2% of the well preparedness. Overall, the model predicts 77.4% of the well preparedness property correctly, as shown by classification table. Birth preparedness and complication readiness was found statistically significant with religion and parity, but had no significant relationship with caste and education. Mothers who had single time more experience of pregnancy were found 11 times more prepared [Adjusted Odd Ratio =11.547, (95% CI=2.592-51.446), p=0.001]. Hindu mothers were found about 7 times more prepared than Muslim mothers [Adjusted Odd Ratio =7.486, (95% CI=1.975-28.378), p=0.003].

Table 5 Logistic regression model for the predictors of birth preparedness and complication readiness

Multiple logistic regression: Test of Model fit

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	48.915	11	.000
	Block	48.915	11	.000
	Model	48.915	11	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	63.646[a]	.294	.398

Classification Table[a]

		Predicted		
		VAR00010		Percentage
Observed		LP	WP	Correct

Step 1	VAR00010	LP		23	10	57.6
		WP		4	47	90.2
	Overall Percentage					77.4

a. The cut value is .500

		Univariate analysis				Multiple logistic regression			
				95% C.I.				95% C.I.	
		P value	Odd ratio	Lower	Upper	P value	Odd Ratio	Lower	Upper
Step 1[a]	Religion	0.000	9.533	3.890	23.364	.003	7.486	1.975	28.378
	Caste	0.614	0.846	0.442	1.620	.871	.938	.435	2.025
	Education	0.061	2.057	0.967	4.375	.783	1.227	.286	5.257
	Parity	0.001	2.230	1.921	5.493	.001	11.547	2.592	51.446

Variable(s) entered on step 1: Religion (Hindu=1, Muslim=0), Caste (General =1, SC& ST=0), Education (Literate=1, Illiterate=0) Parity (Para1=0, Para 2= 1, Para3= 2).

Well preparedness= 1, less preparedness=0

C.I, Confidence Interval; Exp (B), Exponential beta

DISCUSSION

In perspective of the scarcity of knowledge in the field of Birth preparedness and complication readiness at rural West Bengal, the present study was conducted in a rural block to explore the present status and factors influencing their knowledge and practice.

In our study it was found that full antenatal care coverage (≥ 4 antenatal check-up) was received by 48% mothers that was far away from our National population policy, 2000 target (achievement of 89% full antenatal coverage within the year 2010). Knowledge of danger sign of obstetrics complications is the first step in the appropriate and timely referral for essential obstetrics care [6]. But about half of the study population had no knowledge about the danger signs of the pregnancy. That indicates though 86.7% mothers received at least one antenatal check up but received poor quality of counselling services. Health care providers were not more concerned with basic preventive advices.

Janani Surakha Yojana, a centrally sponsored maternity benefit scheme is running throughout India since year 2005 and providing financial assistance to 19 or more years aged below poverty lined mothers for first two live births [14]. But the study revealed that only 20% mothers had knowledge about the all facilities of both Janani Surakha Yojana and Nischay Yan Yojana scheme. Only 54.8% mothers were aware about the available financial assistance under Janani Surakha Yojana that was much lower than the observation of Kushwah SS et al. (78.1%) but knowledge about available transport services under Nischay Yan Yojana were better (In present study - 24.8% and Kushwah SS et al. study 18.6%) [15].

Money was saved for the purpose of delivery or complication management by 35.7% family that was close to the Rewa district study findings (44.2%) [15], but much lower in respect to Indore slum study (76.9%) [8].

In comparison to Agarwal S et al study (29.5%) we found that 1.4 times higher percentages of family decided mode of transportation before delivery or complication arise, [8] but lesser than Kushwah SS et al observations (79.7%) [15].

In the present study 70% delivery had been done in institution that was lower than the target of National population policy 2000 (80% institutional delivery within 2010). In the present study we have found that more mothers (81.9%) had been delivered their child by trained persons in compare to another two studies of India [Rewa district (71.1%) and Indore slum study (66.5%)] [8,15].

In bivariate analysis statistical significant association have been found between birth preparedness and complication readiness and literacy of mothers that corroborates with In multivariate logistic regression model ultimately we found that parity and religion were the good predictors of birth preparedness. Those mothers had parity more, they were found well prepared. It indicates that birth preparedness level being improved from their previous experiences. What difficulties they had felt during previous pregnancy they tried to make over in next pregnancy, but existing health facility failed to provide satisfactory level of birth preparedness towards primipara mothers who were totally unexperienced. Our findings corroborated with the findings of different studies of African continent [16, 17], and were not in consonance with the Kushwah SS et al. and Hailu M et al. findings [15, 18]. We also found that preparedness of Muslim mothers were less than Hindu mothers. Although no such finding was found yet after extensive literature such in this regard, but religion is the important field of concern in this rural block of West Bengal. It might

be due to persistent conservative attitude of the rural Indian Muslim community regarding outdoor exposure of females. It reflects that our health system have failed to counsel them properly and create a resistant community within the block.

No significant relationship has been found between well preparedness and maternal literacy status that is contradictory observation with the different study findings conducted in African continent [18-20] and India [8, 15]. It revealed that traditional education is not sufficient for well preparedness. Besides the well understanding power of mothers; good explanatory, careful, long durable, repeated counselling from health facility is essential to bring necessary improvement in birth preparedness level.

CONCLUSIONS

The present study reflects the poor status of birth preparedness and complication readiness of rural Indian mothers and provides an overview on baseline data for further studies. Multi parity was found as a strong predictor of well preparedness in our study that indicates most of the mothers acquired knowledge from their previous experiences. So mothers should be made more aware in this regard during antenatal visits and provide emphasis on effective counselling process. Health care providers should give more attention on scheduled tribe, scheduled caste, illiterate and Muslim people because low level of birth preparedness and complication readiness is more concentrated among them. Available government facilities regarding delivery and complication management should be explained more clearly. Antenatal outreach sessions should be introduced in the national or state level programmes for promoting birth preparedness and complication readiness among the rural mothers.

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