

## Original Article

## Continuum of maternal health care in India



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## ARTICLE INFO

## Article History:

Received 6 October 2019  
Revised 16 May 2020  
Accepted 7 October 2020

## Keywords:

Continuum of care  
Prenatal care  
Institutional delivery  
Postnatal care  
Child death  
Child loss  
India

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## ABSTRACT

**Introduction:** India accounts for 20% of global preventable pregnancy-related deaths, which can be averted through a proper continuum of care (CoC). The paper aims at identifying the association between previous experiences of child death on the CoC for the recent child.

**Methods:** The study is based on DLHS-4 (2012-13), which includes 89,696 women who had delivered at least two births during the last five years. Bivariate and multivariate techniques were used to analyze the data.

**Results:** More than 11% of women who did not experience child loss and about 14% of women with child loss did not receive any of the three services, namely prenatal care, institutional delivery, and postnatal care. About 12% of women with an experience of child loss had completed the entire CoC compared to only 10% of those without child loss.

**Conclusion:** Women who had experienced child loss were more likely to opt for the CoC than women who did not have a previous history of child loss. This reflects that women might have become more conscious and would not want to suffer a child loss again. This paper aims to discern possible solutions such as educating women on the importance of the continuum of care by health workers through increased capacity building, community participation, effective health education and communication, use of mHealth, etc.

## Introduction

Maternal health is one of the most vital aspects to ensure healthy living and to promote well-being as laid out by Target 3 of Sustainable Development Goals (SDG) (1). It is indispensable to avert maternal deaths to achieve the proposed SDG targets of reducing Maternal Mortality Rate (MMR) and universal access to maternal health care. India has made significant strides in reducing MMR from 130 in 2014-2016 to 122 in 2015-17; still, there is a long way to overhaul maternal healthcare (2). A profound understanding is required of the factors contributing to maternal deaths, which could be averted if a proper continuum of care (CoC) is provided to the mothers (3-6).

CoC is a concept that integrates prenatal care, obstetric care, and postnatal care. It aids in improving maternal and child health and curbing maternal mortality rates (7). Earlier studies have dealt with maternal health care in terms of separate entities such as prenatal care, obstetric care, and postnatal care (4,8,9). Few recent studies have shifted focus to the CoC as a complete course of care (6,10-13). During the past decade, many studies on countries such as Africa,

Pakistan, Cambodia have reported the levels, trends, and differentials of CoC (10,6,14). The recent studies have primarily focused on the number of women availing of these services and not on the dropouts (11,15).

Understanding the CoC factors is vital because drop-out is a sort of risk factor for poor maternal health (15). Some researchers have tried to determine the reasons for the low CoC completion rate and drop-outs (6,13). Some studies have brought to light that women who have experienced child loss are more likely to opt for institutional delivery; however, none of the previous studies have focused on the CoC for such women or attempted to compare the CoC between women with and without child loss. However, the relation between the experience of child loss and utilization of CoC remains unanswered and is yet to be studied. Studies show that women with experience of a child loss would prefer to deliver another child in replacement for the lost child. This is referred to as the 'insurance effect' in demographic literature (16). Women who have experienced child death become more conscious of their next child and

thus tend to complete the entire course of the continuum. Under this background, the study attempts at identifying the association between previous experiences of child death and the CoC of the recent child. This study hypothesizes that if a mother has an experience of child death, she will more likely ensure proper childcare for recent pregnancy.

## Methods

### Data

The study is based on the fourth round of the District Level Household and Facility Survey (DLHS-4) conducted during 2012-13, covering 20 states and India's six union territories. DLHS- 4 is one of the largest surveys done in all non-empowered action group (non-EAG) states in India, which provides district-level data on health indicators to assist policymakers and program administrators involved in decentralized planning, monitoring, and evaluation (17). The survey provides detailed information about pregnancy, prenatal care, delivery, Janani Suraksha Yojana (JSY) beneficiaries, postnatal care, and other maternal and child health issues. Multi-Stage stratified sampling was adopted. Among the 3,19,695 ever-married women in the age group 15-49 years interviewed in the first stage, 1,18,436 women who had pregnancies after January 1, 2008, until 2013 were included in the study. Out of these, 89,696 women who are the samples of the study were selected from the non-EAG states who delivered at least two children during the last five years from the survey's date. Of the 89,696 women, 89,156 women did not experience any child loss before the recent birth, while 540 women experienced at least one child loss before the most recent birth. Child loss refers to the death of a child between 0 to 59 months. Figure 1 shows this relationship between CoC and child loss in a pictorial form.

### Outcome variables

CoC is defined as the integrated service delivery for mothers and their children throughout the lifecycle; pre-pregnancy, pregnancy, childbirth, post-delivery period, and childhood (7). However, in this study, we have included prenatal care, institutional delivery, and postnatal care, which covers care from conception to post-delivery period and is explained through the following indicators:

**Prenatal care:** It includes three prenatal care visits, two tetanus toxoid (TT) injections, and administering of 100 iron and folic acid (IFA) tablets as per the 2005 guidelines put forth by the MoHFW(18). Though the WHO recommends 4 prenatal care visits, the Government of India recommends a minimum of 3 visits at this stage due to factors such as time, distance, decision making, etc. which prevent women from undergoing regular check-ups. Once there is adequate health education, four or more visits might be recommended (19).

**Delivery care:** Institutional delivery refers to delivery that takes place under the supervision of trained health personnel at a medical institution (20).

**Postnatal care:** Check-up underwent by the woman within 48 hours of her delivery.

These CoC indicators were then used to construct a binary CoC variable: "1" representing women who completed full CoC (received all the three components i.e. prenatal care, institutional delivery, and postnatal care) and "0" (Partial or no CoC) otherwise.

## Independent variables

The independent variables in the study are (i) socio-demographic characteristics that include age, educational attainment of women, religion, caste, and economic status of the households (ii) contextual factors that include place and region of residence, and (iii) birth factors - order of the child and financial assistance received for delivery. The age of the women is grouped in 15-24, 25-34, and 35 and above years. Education is broadly categorized into- no education, primary, secondary, and higher than secondary. The country is divided into five regions-North, South, East, West, and North-East. The religion of the household is grouped as Hindu, Muslim, and Others. The caste of the household is divided into four categories-Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBCs), and others. The child's birth order is divided into first, second, third, fourth, and higher birth orders. The households' economic status is categorized into five quintiles-poorest, poor, middle, rich, and the richest quintiles. Financial assistance that the women received for delivery was grouped into the JSY scheme or other schemes.

### Statistical analysis

The data were analysed using SPSS 20.

## Results

Table 1 shows the socio-economic and demographic characteristics of women by the survival status of their previous child. Table 1 depicts that the majority of women with and without child loss belonged to the Hindu religion, rural areas, and Western India. One-fifth of the women belonged to the poorest wealth quintile. It is appalling to note that one-fifth of the women with child loss had no education. The husbands' educational status was better than the women, with around two-thirds being secondary or higher educated. One-fourth of the women with no history of child loss had no formal education while this figure was less than 1% for the husbands. In both groups, around 75% of women had not received any government financial assistance. The low coverage of JSY may be due to an increased focus on the EAG states. According to a study, JSY has not been as successful as expected due to trust in traditional birth attendants and approaching the health facility only in case of complications as there is a perceived notion among some women that birth is a natural process that does not require institutional care (21).

### Differentials in terms of utilization of maternal care

Table 2 shows the components of CoC by the survival status of the previous child. Around half the women in both categories had three or more prenatal care visits. There is not a significant difference in terms of the recommended 100 or more IFA intake in both categories. Around seven out of ten women with or without child loss had taken two or more TT injections. There is a 1% difference between both categories for undergoing full prenatal care. No stark difference was observed in terms of giving precedence to private over public facilities due to child loss. Irrespective of the previous child's survival status, more than 70% of the women have had institutional deliveries. Out of 540 women with experience of child death, 12.4% completed the entire CoC course compared to 10.5% women without child loss.

**Table 1.** Socio-economic and demographic characteristics of women from Non-EAG states in India according to survival status of the previous child

Background characteristics	Women without child loss		Women with child loss	
	Ns	%	Ns	%
<b>Place of Residence</b>				
Rural	54,872	61.5	364	67.4
Urban	34,284	38.5	176	32.6
<b>Region</b>				
North	18,791	21.1	169	31.2
East	8,024	9.0	46	8.5
North-East	14,916	16.7	83	15.4
West	30,698	34.4	212	39.3
South	16,727	18.8	30	5.5
<b>Religion</b>				
Hindu	59,459	66.7	351	65.1
Muslim	9,865	11.1	65	12.0
Others	19,831	22.2	124	22.9
<b>Caste</b>				
SC/ST	37,870	42.5	278	51.4
OBC	28,903	32.4	153	28.4
Others	22,382	25.1	109	20.1
<b>Women's age</b>				
15-24	29,873	33.5	235	43.4
25-34	50,471	56.6	279	51.6
Above 35	8,812	9.9	27	4.9
<b>Women's education</b>				
No education	17,780	19.9	137	25.4
Primary	30,949	34.7	240	44.5
Secondary	29,355	32.9	134	24.8
Higher	11,072	12.4	29	5.4
<b>Husband's education</b>				
No education	575	0.6	4	0.6
Primary	30,354	34.0	252	46.6
Secondary	30,536	34.3	152	28.1
Higher	27,690	31.1	133	24.7
<b>Wealth Index</b>				
Poorest	17,648	19.8	136	25.2
Poor	21,013	23.6	142	26.2
Middle	17,586	19.7	101	18.6
Rich	17,050	19.1	96	17.8
Richest	15,859	17.8	66	12.2
<b>Birth order</b>				
First	33,014	37.0	0	0.0
Second	32,136	36.0	264	48.9
Third	12,715	14.3	141	26.1
Fourth and higher	11,291	12.7	135	25.0
<b>Financial assistance received</b>				
JSY	16,972	19	112	20.7
Other govt. schemes	3,764	4.2	21	4.0
No assistance received	68,413	76.7	407	75.3

**Table 2.** Percentage distribution of all maternal care utilization according to the survival status of the previous child

Outcome variables	Women without child loss		Women with child loss	
	Ns	%	Ns	%
<b>Prenatal care visit</b>				
No visit	21,415	24.0	122	22.5
Less than 3 visits	20,498	23.0	134	24.9
3 or more than 3 visits	47,243	53.0	284	52.6
<b>IFA tablets taken</b>				
No IFA	31,602	35.4	190	35.2
Less than 100	42,788	48.0	253	46.9
100 or more	14,766	16.6	97	18.0
<b>TT injection</b>				
At least once	26,638	29.9	160	29.7
Twice or more	62,517	70.1	380	70.3
<b>Prenatal care</b>				
No prenatal care	16,410	18.4	93	17.3
Partial prenatal care	61,408	68.9	372	69.0
Full prenatal care	11,337	12.7	74	13.7
<b>Place of delivery</b>				
Institutional (public + private)	70,909	79.5	398	73.8
Private	41,896	47.0	241	44.6
Public	29,013	32.5	157	29.1
Home	18,246	20.5	142	26.2
<b>Postnatal check-up done within 48 hours of delivery</b>				
Yes	53,902	60.5	325	60.1
No	35,254	39.5	215	39.9
<b>Continuum of care</b>				
No CoC	9,254	10.4	64	11.9
Partial CoC	70,556	79.1	409	75.8
Full CoC	9,345	10.5	67	12.4

### Factors related to the completion of CoC

Table 3 shows the adjusted odds ratio (OR) and its 95% confidence interval (CI) of the CoC variable compared to the reference category that was adjusted for previous death and the other covariates. After adjusting other covariates in the model, women who have experienced child loss were two times more likely to opt for the CoC than women with no experience of child loss. Women from the Southern and the Western regions were more likely to complete the CoC as compared to those from the Northern region, whereas those from the Eastern and North-east regions were less likely to complete the CoC. Women belonging to other religions were 0.15 times less likely to complete the continuum than Hindu women. Women in the age groups 25-34

were less likely to complete the CoC. Women with primary education and higher were more likely to complete the CoC than women with no education. Women with educated husbands were more likely to complete the CoC than women with husbands with no education. Women who belong to OBC were most likely to opt for full CoC than SC/ST women. Financial assistance did not have a significant impact on completing the continuum. Compared to the first birth, women with higher birth orders were less likely to complete the continuum. There was no significant difference in availing CoC by the wealth quintile groups. The women from urban areas were more likely to avail CoC as compared to those from rural areas. Functional and pathway enrichment analysis.

**Table 3.** Adjusted odds ratio of continuum of care by background characteristics

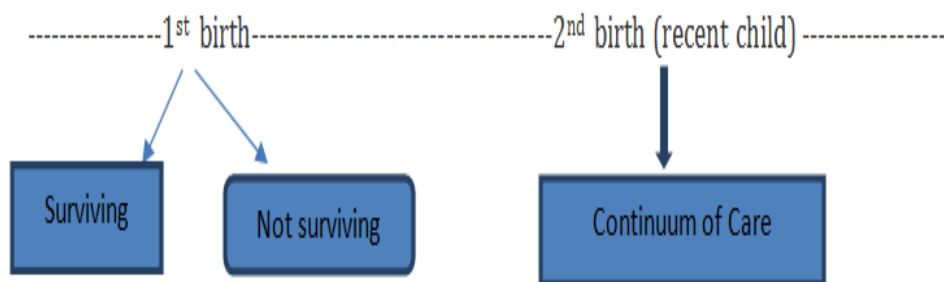
Background characteristics	Exp ( $\beta$ )	95% CI	
		Lower	Upper
<b>Child loss</b>			
Women without previous child loss	1.00		
Women with previous child loss	2.07	1.57	2.73
<b>Region of residence</b>			
North	1.00		
East	0.79	0.62	0.83
North-east	0.63	0.52	0.72
West	3.91	3.32	4.56
South	5.93	4.81	6.937
<b>Religion</b>			
Hindu	1.00		
Muslim	0.93	0.86	1.02
Others	0.85	0.77	0.95
<b>Women's age</b>			
15-24	1.00		
25-34	0.82	0.79	0.89
Above 35	0.75	0.70	0.82
<b>Women's education</b>			
No education	1.00		
Primary	2.46	2.23	2.73
Secondary	1.43	1.33	1.55
Higher	1.19	1.12	1.28
<b>Husband's education</b>			
No education	1.00		
Primary	1.32	1.79	1.98
Secondary	1.15	1.09	1.21
Higher	1.42	1.79	1.86
<b>Caste</b>			
SC/ST	1.00		
OBC	1.26	1.18	1.35
Others	0.98	0.93	1.04
<b>Financial assistance</b>			
JSY	1.00		
Other govt. scheme	0.78	0.74	0.82
No assist PNCe	0.74	0.67	0.82
<b>Birth Order</b>			
First	1.00		
Second	0.37	0.33	0.42
Third	0.45	0.41	0.51
Fourth and higher	0.52	0.46	0.58
<b>Wealth Index</b>			
Poorest	1.00		
Poor	2.21	2.00	2.45
Middle	1.65	1.52	1.79
Rich	1.38	1.28	1.48
Richest	1.21	1.13	1.29
<b>Place of Residence</b>			
Rural	1.00		
Urban	1.13	1.07	1.19

**Table 4.** Percentage distribution of women by different types of maternal health services among those with experience of child death and without child death

3 or more prenatal visits	2 TT	100 IFA	ID	Postnatal care	Women without child loss (%)	Women with child loss (%)
+	+	+	+	+	10.5	12.4
-	-	-	-	-	11.4	14.1
+	+	-	+	+	24.8	24.5
-	+	-	+	+	11.2	9.4
+	+	-	+	-	6.6	6.5
-	-	-	+	+	5.6	5.7
Other combinations					29.9	27.4

+ indicates that women have received the service.

- Did not receive the service



**Figure 1.** The pictorial representation of the relationship between CoC and child loss

Table 4 shows the percentage of women with and without child loss who received the various possible combinations of maternal health care. There was a 3% difference between both the categories who did not receive any of the three services. Women with child loss were more likely to complete the CoC. This could be linked to the ‘insurance effect’ wherein women become more conscious post child loss and hence tend to complete the CoC. The proportion of women who have dropped out of the CoC by not completing the full course of IFA constitutes the highest. This may be due to forgetfulness, smell, and taste of the tablets, false beliefs about the tablet's side effects such as nausea, abdominal cramps, gastritis, etc. (22-24). A probable reason for the low proportion of dropout regarding taking at least 100 IFA tablets and undergoing postnatal check-up could be due to the increasing importance attributed to prenatal visits, which in turn impact institutional deliveries. Women who come for prenatal check-up are well encouraged to opt for institutional deliveries (25). A low proportion of women turn up a postnatal visit. This could be due to the women's incentives for institutional deliveries and the fact that women are then encouraged by the health workers to come for a postnatal check-up (26).

**Discussion**

CoC aids in better maternal and child health and helps bring down the maternal mortality rates (6). Previous studies on CoC have focused mainly on the level, trends, determinants, and dropouts (10,6,14). The relation between child loss and CoC is a relatively less explored area, and the present study tries to fill this gap using the DLHS-4 data. The results show that 13% of women without child loss and 14% of women with child loss had full prenatal care. We stress the need for improved prenatal care coverage through interventions that involve stronger political commitment, community participation, awareness, and

health systems strengthening by the government, as mentioned in previous studies (19, 27-29).

In India's non-EAG states, there has been effective coverage of significant maternal health interventions compared to the EAG states in terms of institutional delivery and postnatal care which is one of the main reasons we chose to do this study in non-EAG states (29). The study has also established that only around 12% of the women have completed the continuum. This is a smaller group as pointed out in previous studies (30). We feel that more women should be made aware of the importance of completing the entire course of care through increased capacity building, community participation, effective health education and communication, the use of mHealth, etc.

About one-fourth of women with a previous experience of child loss constituting the highest group dropped out from the IFA course as part of prenatal care services and then opted for institutional delivery followed by postnatal care (22-24). Among women with child loss, 60.1% had their postnatal check-up within 48 hours of delivery, and among those who did not have child loss, 60.5% had their postnatal check-up within 48 hours. In both cases, around 30% did not opt for the check-up, which accounts for a high drop-out rate. Many women tend to neglect postnatal care (4,31,32). The reasons for this negligence may be early discharge and the women being unable to reach the facility within 48 hours of delivery (13, 33).

Women who have experienced child death were significantly more likely to utilize all CoC components compared to women who did not experience child loss. The difference could be probably because women tend to become more conscious because of child loss and desire to replace a dead child with a healthy child or to ensure against childlessness. Compared to the Northern region, women from the Southern and Western regions were about six and four times more likely to opt for CoC respectively, which is in line with the previous studies (4,14). This could be due to affordable and safe service delivery



provided by the Southern states, backed by proper infrastructure.

Education has been found to have a significant impact on the CoC (15). Women and their partner's education exert considerable influence on the utilization of maternal healthcare (8). Many studies have stated that husband's participation can help in improving maternal health (8,35-37). In the same line, this study has also confirmed that husband's education positively impacts the completion of CoC. Greater emphasis should be laid to educate men and women in this regard and women in particular as their education is still hampered at various levels (38).

Women belonging to other religions (Christianity, Buddhism, Sikhism, Jainism, and others) were less likely to opt for maternal care compared to Hindu women. However, Muslim women did not have a significant relationship with the CoC in contrast to a previous study finding (8). Women from OBC were most likely to opt for full CoC as compared to SC/ST women. Caste still exerts an influence on the services despite actions taken by the government (39). JSY, the conditional cash transfer scheme started in 2005 by the Indian government to encourage women to opt for institutional delivery and postnatal check-up has improved utilization of maternal care (4). The findings reflect that compared to women who have received financial assistance through JSY, women who received financial assistance from other schemes and who did not receive any form of financial support were less likely to opt for the continuum of maternal care.

There is no significant difference in the CoC utilization by the wealth quintile groups, which is in line with a few previous studies (13). This could be accorded to fear of not availing care leading to negative consequences. However, this finding is in contrast to some past studies (8, 40), which have shown that women from poor households were slightly more likely to opt for CoC than women from higher quintile households. The odds of CoC among women with birth order of two and above are lower than women with a birth order of one, which is consistent with earlier studies (4,34). The study also highlighted the rural, urban differentials for the completion of the CoC. The urban women tended to complete the continuum may be due to their education and income levels (8). Along with it the urban areas have more nearby hospitals whereas in rural areas the women have to travel a greater distance to access the healthcare facilities. (41).

The study reflects that women who have experienced child loss are more likely to opt for full CoC than women with no child loss experience. Active implementation of the continuum of maternal health reflects the performance of the health service system. This aids in better public health planning. The proportion of women who undergo the complete CoC can also be linked to the cash incentives that they receive through the JSY which promotes institutional delivery. There has not been any scheme introduced by the government for postnatal care and continuum as a whole. The health workers, and the patients, need to be incentivized to improve the effectiveness of CoC. The socio-economic and demographic determinants facilitate a greater understanding of the factors that contribute to the CoC as there have been disparities in these determinants which translate into only a particular segment of the population utilizing the services.

## Conclusion

This study has attempted to gain an insight into the pivotal factors that shape the CoC. The results of the study could greatly help in providing comprehensive maternal services where there is underutilization. With the Government of India

recognizing the importance of CoC within the purview of curbing maternal mortality rates through the recent RMCH-A, there has been an effective provision of maternal services and hence a reduction in maternal mortality rates. But there is still a huge chunk of women who are not covered under the scheme and even if covered; they do not utilize the scheme effectively. Low utilization and acceptance levels can be attributed to a plethora of social and cultural factors. Engaging people from the communities would encourage women to complete the course of care. The concept of providing incentives to pregnant women who opt for institutional delivery apparently increased the rates and hence if women who complete the entire course of the continuum are incentivized appropriately, it would motivate them and might inspire other women in the community. The interventions by the government should be targeted at reducing regional disparities. Also, women must be clearly explained about the importance of each component of care to improve their stand on their decisions, taking into consideration the socio-cultural norms and practices.

## Ethical disclosure

The study is based on a DLHS-4 dataset that is available in the public domain for research purposes and hence no formal approval from the institutional review board is required. Therefore, no ethics statement is required for this study.

## Acknowledgement

Nothing to declare.

## Author contributions

Conceived and designed the experiments: PD, RR. Performed the experiments: RR. Analysed the data: RR. Contributed reagents/materials/analysis tools: PD RR. Wrote the paper: RR, AG, and PD. All the authors have studied and accepted responsibility for all content of this manuscript.

## Conflict of interest

No conflict of interest has been declared by the authors.

## Funding/support

No support funding.

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