

Retention of Maternal Health Care Utilization and Its Impact on Neonatal Mortality in India

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Abstract

The study examines the interrelationship between neonatal mortality and maternal health facility utilisation using data from the fourth round of the National Family Health Survey. Understanding the interrelationship between neonatal mortality and maternal health facility utilisation is a must to successfully achieve the sustainable development goals that intended to reduce under-five mortality and increase maternal health care utilisation. The study population consists of 190,797 women who gave birth to their last child alive or death prior to the date of survey. The study finds that there is a significant retention in the full ANC visits and safe delivery among those women who have attended at least one ANC visits irrespective of the regions. And, women who have not attained any formal education and belonging to household with lower wealth status are more deprived of accessing full ANC and safe delivery. Child born to a woman who do not attend full ANC and post-natal check, who have not initiate breastfeeding within one hour and having complication during pregnancy and delivery are at higher risk of neonatal deaths.

Keywords: neonatal; mortality; retention; maternal; healthcare.

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Introduction:

The world has been experiencing a remarkable decline in the rate of under-five mortality in recent decades (Darmstadt et al. 2003; Wang 2013). However, at least four million newborns die within one month, of which 75 percent die within the first week (Lawn et al. 2005; Kumar et al. 2014). Thus, to achieve sustainable development goals, a substantial reduction in neonatal mortality is required. A study in the Global Burden of Diseases also suggests that to reduce the burden of under-five mortality, particular focus should be given on reducing neonatal mortality (Wang et al. 2013). The low-and-middle-income countries hold the highest shares of the proportion of neonatal and under-five mortality due to their poor access to quality health care (Lawn et al. 2005). The majority of these new-born die without skilled care (Zelalem et al. 2014). The access to quality maternal and newborn health care services in these low-and-middle-income countries is repressed due to various reasons viz. health system functionalities, cultural, socioeconomic and demographic factors (Zelalem et al. 2014).

Prior studies reported a highly significant association between neonatal mortality and maternal health care utilisation (Kumar et al. 2014; Kananura et al. 2017). The mother who had maternal complications, less than 4+ ANC visits, and not consumed 90 or more IFA tablets during pregnancy and who do not receive postnatal care within two weeks significantly increased the risk of neonatal mortality (Kumar et al. 2014). Also, congenital malformations, tetanus, small for gestational age, diarrhoea, pneumonia, intrapartum-related birth asphyxia, and consequences of low birth weight are some other well-known factors causing the death of a new-born (Marsh et al. 2002; Lawn et al. 2005; Kinney et al. 2010; Waiswa et al. 2010; Chou 2015; Kananura et al. 2017). Due to its inadequate health facilities equipped with inexperienced health workers and lack of stocks of essential medicine and supplies, the low-and-middle-income countries can't address all these causes (Dogba & Fournier 2009; Penfold et al. 2013). Low birth weight is also a significant risk factor for newborn deaths (Kinney et al. 2010; Kassar et al. 2013; Hussein et al. 2016). However, the deaths from low birth weight can be averted by taking up some simple measures such as – warmth, feeding, hygiene and early treatment of infection (Marsh et al. 2002; Kinney et al. 2010).

Approximately one-fourth of all global neonatal deaths happen in India (Lawn 2005; Wang et al. 2013; Save the Children Association 2013). It was estimated that 60 percent of all under-five deaths are in neonates, and 82 percent of them under one year of life (IIPS & ICF 2017). India has a massive population of around 1393 million, and it is necessary to have relevant information at the regional levels with improved estimates and causes of deaths before the age of five years. This will help formulate and disseminate child survival resources appropriately, particularly for those states with a higher proportion of under-five mortality (Black et al. 2010; Minnery et al. 2013; Dettrick et al. 2014). In India, there

exist a wide variation in the survival status of children below five years of age between more impoverished socioeconomic strata and wealthier socioeconomic strata. The child born to wealthy parents has higher survival chances than the child born in poor parents (Save the Children Association 2013). Besides, the maternal and child health care utilisation such as ANC attendance, skilled delivery assistance, and postnatal care in India is still below average. In India only 51 percent of women aged 15 to 49 years had at least fourth ANC visits, and only 27 percent of the new-born had postnatal checks within two days of birth (IIPS & ICF 2017). But these services are the mainspring for assessing the risk of the newborn during pregnancy, labour and after delivery (Marsh 2002; Zelalem et al. 2010). Furthermore, a crucial cohesive nature exists between access to maternal and child health care services and under-five mortality (WHO 2005; Sines et al. 2007; Million Death Study Collaborators 2010; Liu et al. 2012; Nguyen et al. 2013; Dettrick et al. 2014).

Therefore, understanding the interrelationship between neonatal mortality and maternal health facility utilisation is a must to successfully achieve sustainable development goals intended to reduce under-five mortality and increase maternal health care utilisation.

Aim of the Study:

Overall, this paper examines the interrelationship between neonatal mortality and maternal health facility utilisation using data from the fourth round of the National Family Health Survey.

Methods and Materials:

Data: The study used data from the fourth round of the National Family Health Survey (2015-16). It is a large-scale, multi-round survey conducted in a representative sample of household throughout India. The study included 190,797 women who gave birth to their last child alive or death prior to the date of survey. Detailed information on sampling procedures and data collection can be obtained from the [National Family Health Survey \(rchiips.org\)](http://rchiips.org).

Outcome variable: The outcome of interest for the study was the death of the children before one month of age. Children who died before one month was assigned the number 1. While those children who survived one month were assigned the number 0.

Explanatory Variable: The major explanatory variable are - full ANC (Yes, No), safe delivery (Yes, No), post-natal check (Within 2 days, 2+ days, No PNC), early initiation of breastfeeding (Yes, No) and maternal complications during pregnancy and delivery (Yes, No). Full ANC is defined for those women who received four or more antenatal checks, received at least one tetanus toxoid injection, and took iron and folic acid tablets or syrup for 100 days or more. Safe delivery is defined for those women who deliver their children at the health facility and assisted by skilled personal. Post-natal check is

defined for those women who received post-natal care within two days after birth. Early initiation of breast feeding is defined as those put to breastfeed immediately or within one hour after birth. Maternal complication during pregnancy and delivery includes – having difficulty with vision during daylight, convulsion not from fever, swelling of leg, body or face, breech presentation, prolonged labour and excessive bleeding. Apart from these, factors like age at birth (less than 20 years, 20 to 30 years, 31 to 34 years, 35 to 49 years), place of residence (rural, urban), mother’s level of education (no education, primary, secondary, higher), religion (Hindu, Muslim, Christian, others), caste (SC, ST, others), wealth index (poorest, poorer, middle, richer, richest), type of birth (singleton birth, multiple birth), birth order of the child (1, 2 to 3, 4 and above) and sex of the child are also considered for the study.

Methods: The multiple logistic regression model was used to assess the effect of maternal health care utilization on under-five mortality. The odds ratio was presented with 95% confidence interval.

The logistic regression having a dependent variable with probability p is defined as,

$$\ln \frac{p}{1-p} = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_j X_j$$

Where p is the probability of dying before the age of five years.

We examine the retention of mothers in the health system. Retention will be defined as being in the system for the three levels of maternal care viz. antepartum, intrapartum and postpartum period of care. For this assessment, those mothers who had at least one antenatal visit as antenatal care is the starting point for maternal healthcare services. In addition, we also assess the maternal health care coverage and its inequality by wealth index and mother’s level of education. The pattern or type of inequalities have to be assessed to fully understand the implications of the inequalities (Barros & Victora 2013).

Results:

Retention of mothers in health system:

Figure 1 represents the retention of mothers in the health system in different regions of the country. Retention in health system was considered as being in the system for all the three levels of maternal care. We observed a significant increase in the number of full ANC visits and safe delivery among those women who have attended at least one ANC visit irrespective of all the regions. However, the ANC visits do not seem to impact much on the post-natal care. Of all the six regions, the prevalence of full ANC visits and safe delivery is lowest in central region and highest in souther region. Whereas postnatal check within two days after birth is highest in the northern region followed by the central region.

[Figure 1 Here]

[Table and Figure provided below]

Maternal health care coverage and its inequality by wealth index and mother's level of education:

Figure 2 represents the Lorenz curve showing the maternal health care coverage and its inequality by wealth index and mother's level of education. The difference in the maternal health care coverage inequality is higher with wealth status compared to educational status. Women who have not attained any formal education and belong to a household with a lower wealth status are more deprived of accessing full ANC and safe delivery than those who belong to a household with a higher wealth status. But we observed no significant difference in assessing post-natal checks within two days between different socioeconomic and educational statuses. A similar pattern can be seen across all the regions of the country.

[Figure 2 Here]

[Table and Figure provided below]

Determinants of Neonatal Mortality:

Table 1 represents the association of socio-demographic and maternal care variables with neonatal mortality. Compared to women who have not attended post-natal check, women who have attended post-natal check within 2 days (OR = 0.235; 95% CI = [0.197, 0.281]) and post-natal check in 2+ days (OR = 0.628; 95% CI = [0.577, 0.684]) has lesser risk of neonatal mortality. Similarly, women who have attended full ANC (OR = 0.889; 95% CI = [0.802, 0.985]) has lesser risk of neonatal mortality. Women who initiate breastfeeding after 1 hour (OR = 4.594; 95% CI = [4.284, 4.926]) and had complication during pregnancy and delivery (OR = 1.229; 95% CI = [1.145, 1.319]) has higher risk of neonatal mortality. Compared to singleton birth, multiple birth (OR = 9.127; 95% = [7.908, 10.534]) has the higher risk of neonatal mortality. Similarly, male children are at a higher risk of neonatal death compared to female children. And higher the birth order, the newborn are less likely to die. Age at birth 35 to 49 years has a higher risk of neonatal death than age at birth less than 20 years. While higher the household wealth status lesser is the risk of neonatal death.

[Table 1 Here]

[Table and Figure provided below]

Conclusion:

The study finds a significant increase in the number of full ANC visits and safe delivery among those women who have attended at least one ANC visit irrespective of all the regions. And, women who have not attained any formal education and belong to a household with a lower wealth status are more deprived of accessing full ANC and safe delivery than those who belong to a household with a higher wealth status. A child born to a woman who does not attend full ANC and post-natal check, who does not initiate breastfeeding within one hour and has complications during pregnancy and delivery is at higher risk of neonatal deaths.

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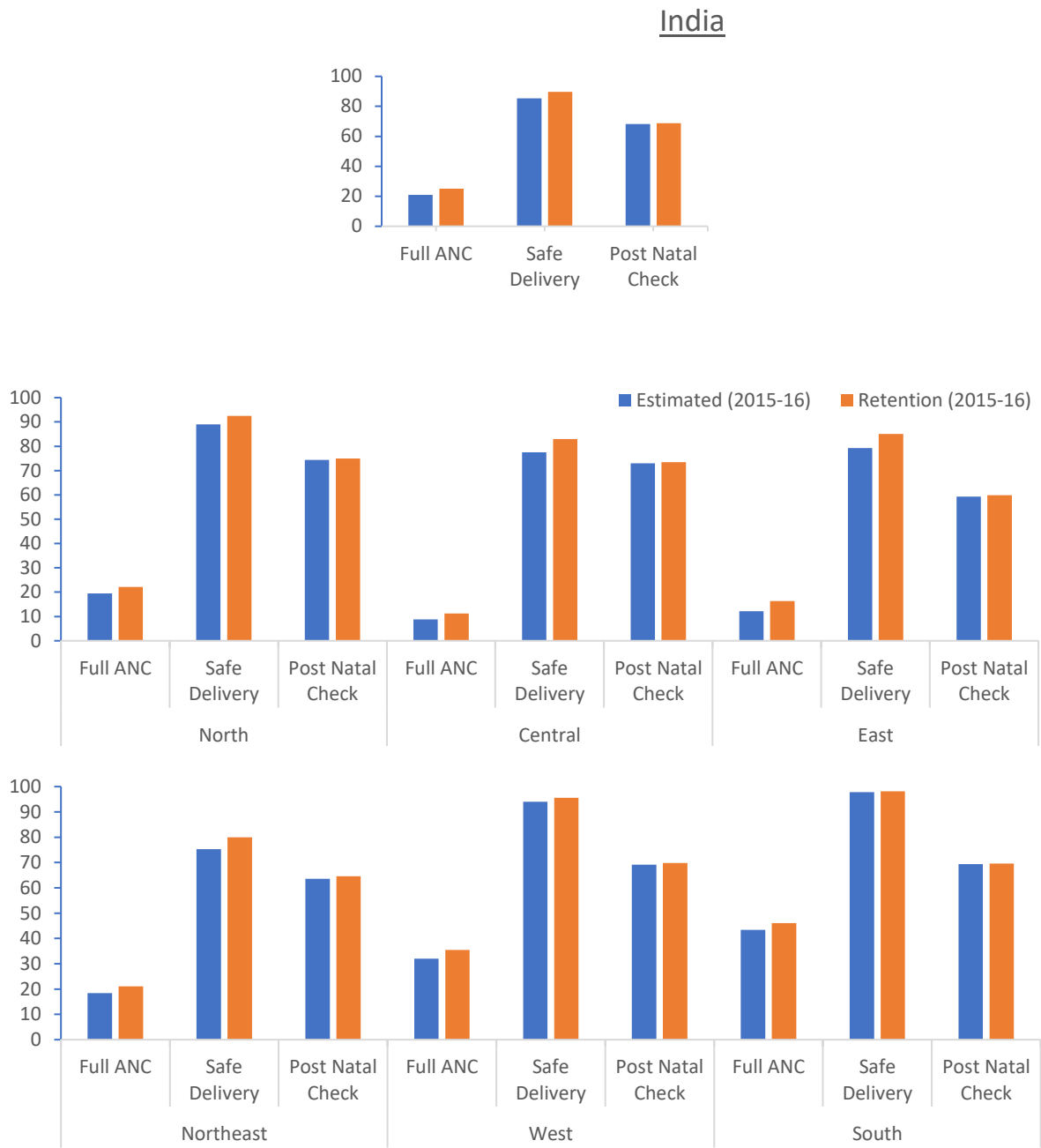


Figure 1: Retention of mothers in the health system.

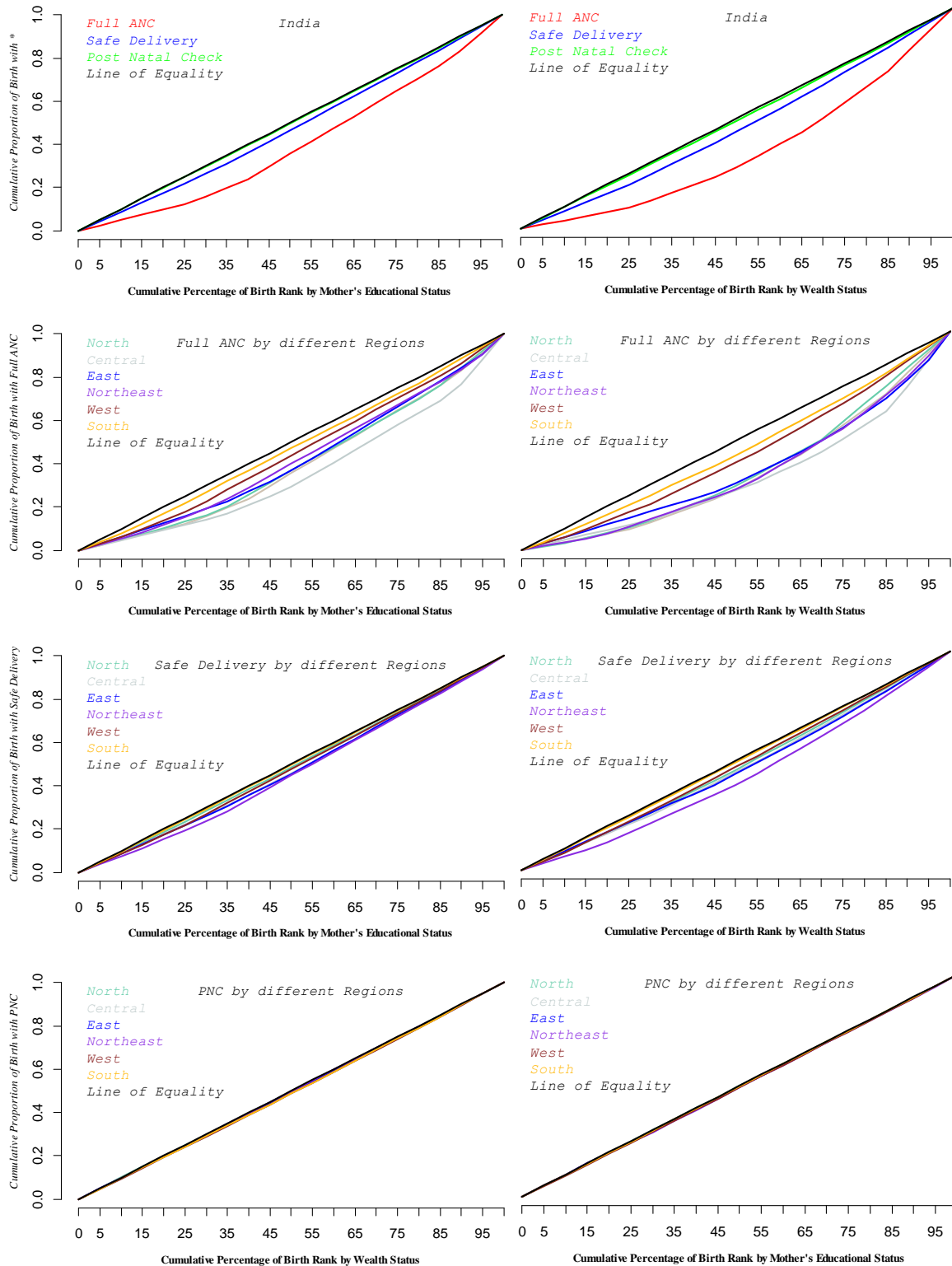


Figure 2: Lorenz Curve showing the maternal health care coverage and its inequality by wealth index and mother's level of education

Table 1: Association of socio-demographic and maternal care variables with neonatal mortality.

| | OR | | 95% CI | |
|---|-------|-----|--------|--------|
| Care Related Characteristics | | | | |
| <i>Post-Natal Care (PNC)</i> | | | | |
| No ® | | | | |
| PNC in 2+ Days | 0.235 | *** | 0.197 | 0.281 |
| PNC within 2 days | 0.628 | *** | 0.577 | 0.684 |
| <i>Full Antenatal Care</i> | | | | |
| No ® | | | | |
| Yes | 0.889 | ** | 0.802 | 0.985 |
| <i>Safe Delivery</i> | | | | |
| No ® | | | | |
| Yes | 1.018 | | 0.937 | 1.106 |
| <i>Initiation of Breastfeeding</i> | | | | |
| Immediately / Within 1 Hour | | | | |
| After 1 Hour | 4.594 | *** | 4.284 | 4.926 |
| <i>Complication During Pregnancy & Delivery</i> | | | | |
| No ® | | | | |
| Yes | 1.229 | *** | 1.145 | 1.319 |
| Maternal Characteristics | | | | |
| <i>Age at Birth</i> | | | | |
| Less than 20 ® | | | | |
| 20 to 30 | 0.912 | | 0.809 | 1.029 |
| 31 to 34 | 1.128 | | 0.963 | 1.322 |
| 35 to 49 | 1.408 | *** | 1.192 | 1.664 |
| <i>Place of Residence</i> | | | | |
| Rural ® | | | | |
| Urban | 0.977 | | 0.892 | 1.070 |
| <i>Level of Education</i> | | | | |
| No Education ® | | | | |
| Primary | 1.112 | ** | 1.010 | 1.225 |
| Secondary | 0.934 | | 0.856 | 1.019 |
| Higher | 0.708 | *** | 0.603 | 0.832 |
| <i>Religion</i> | | | | |
| Hindu ® | | | | |
| Muslim | 0.941 | | 0.859 | 1.032 |
| Christian | 0.766 | *** | 0.651 | 0.901 |
| Others | 0.762 | *** | 0.630 | 0.923 |
| <i>Caste</i> | | | | |
| SC ® | | | | |
| ST | 0.855 | *** | 0.766 | 0.955 |
| Others | 0.837 | *** | 0.771 | 0.909 |
| <i>Wealth Index</i> | | | | |
| Poorest ® | | | | |
| Poorer | 0.966 | | 0.886 | 1.054 |
| Middle | 0.812 | *** | 0.734 | 0.899 |
| Richer | 0.616 | *** | 0.544 | 0.698 |
| Richest | 0.497 | *** | 0.426 | 0.580 |
| Child Characteristics | | | | |
| <i>Type of Birth</i> | | | | |
| Singleton Birth ® | | | | |
| Multiple Birth | 9.127 | *** | 7.908 | 10.534 |
| <i>Birth Order</i> | | | | |
| 1 ® | | | | |
| 2 to 3 | 0.707 | *** | 0.653 | 0.766 |
| 4 and Above | 0.872 | ** | 0.783 | 0.971 |
| <i>Sex</i> | | | | |
| Male ® | | | | |
| Female | 0.928 | ** | 0.871 | 0.990 |
| Constant | 0.019 | *** | 0.016 | 0.022 |

Note: *** p-value < 0.01 & ** 0.01 < p-value < 0.05; OR - Odds Ratio; CI - Confidence Interval;