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**EDITORIAL****Newborn Care in India: Where do we stand in 2015?***Sutapa B Neogi<sup>1</sup>, Sanjay Zodpey<sup>1\*</sup>**<sup>1</sup>Indian Institute of Public Health-Delhi (IIPH-D), Public Health Foundation of India (PHFI),  
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India has made impressive gains in child survival in the past two decades. The neonatal care has evolved over the time period and is now an integral part of National Rural Health Mission (NRHM). It was the publication of the Report of the Task Force on Minimum Perinatal Care in 1982 by the Ministry of Health and Family Welfare, Government of India that prompted neonatal health as a priority.

Currently, the care and delivery of newborn services find a place in the national and state level programmes. NRHM in 2005 and the recently launched Reproductive Maternal Newborn Child Health and Adolescent (RMNCH+A) strategy of Continuum of Care approach are two of the recent milestones. Pioneering evidence on prevention and treatment of newborn illnesses through innovative strategies has raised India's contribution to global policies on newborn care.

**Burden of Newborn Deaths:**

Of the 6.6 million under-five child deaths that occur globally every year, about 44 % occur in the neonatal period (the first 28 days of life) [1]; the proportion is even higher – around 54 % – in countries from the WHO South East Asia Region (SEAR). India contributes to one-fifth of global live births and more than a quarter of neonatal

deaths. With the current Neonatal Mortality Rate (NMR) of 29 per 1,000 live births, about 70 % of infant deaths and more than half of under-five child deaths in the country fall in the neonatal period. The early neonatal mortality rate (ENMR) - deaths in the first week of life - is 23 per 1,000 live births [2]. The NMR is not uniform across the country; also, there are important rural-urban, poor-rich, gender, and socioeconomic differences in NMR. Equity is one of the cross cutting issues that requires immediate attention [3].

The Millennium Development Goal-4 (MDG-4), which stipulates a two-thirds reduction in under-five deaths by 2015, obviously cannot be achieved without ensuring a substantial reduction in the NMR. The health outcomes of newborns are shaped not just by biological factors but also by the social, economic, and cultural environment. Evidence suggests that wealth, gender, and maternal education are significant determinants of newborn health, with their impact stretching to the coverage of maternal and newborn healthcare services [4].

**Community Based Newborn Care:**

The programme on newborn care focus largely on community based care and facility based care with referral transport services serving as a link

between the two. India has contributed immensely towards generating evidence on two key domains of community based newborn care: Home-Based Newborn Care (HBNC) and community mobilization. Early evidence on the effectiveness of home visits for improving newborn survival comes from Pune study [5], Ambala study [6] and Dahanu study [7] during 1980s and early 90s. This was followed by a path breaking research on HBNC [8] in Gadchiroli (Maharashtra) in the 1990s. It consisted of a package of interventions delivered by community health workers during home visits that led to a dramatic (62%) decline in neonatal deaths. Based on this experience, HBNC program that centered around Accredited Social Health Activists (ASHAs) was introduced in 2011, and is now the main community-level programme on newborn health. Earlier in 2004, the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) programme was rolled out with inclusion of home visits by Anganawadi worker as an integral component [9].

IMNCI has been implemented in 505 districts in 27 states and 4 union territories [10]. A mix of Anganawadi workers, (ASHAs) and Auxiliary Nursing Midwives (ANMs) were trained [11]. The rapid roll out of IMNCI programme made impact on newborn health on the ground. However, its intensity appears to have reduced since 2012 when the Ministry of Health and Family Welfare decided to focus only on ANMs leaving the AWW component to the stewardship of the Integrated Child Development Scheme (ICDS) system [12].

ASHAs, the frontline workers for HBNC, are trained through four rounds of training using two modules. There are a total of over 9 lakhs ASHAs/link workers in the country, out of which, 50% completed first two rounds. The pace of uptake of the HBNC programme has been very slow [13, 14]. Of the annual rural birth cohort of over 17 million, only a small fraction of 0.4 million neonates were covered under this program by March 2013. Supportive supervision remains weak, the role of ANMs in supervision remains unclear and there are problems with quality of training and the supply of HBNC kits [15].

#### **Facility Based Newborn Care:**

Neonatal units in teaching hospitals and private hospitals have been coming up in the country since the sixties. However, the expansion was very slow [16]. In 1994, a District Newborn Care Programme was introduced as a part of the Child Survival and Safe Motherhood Programme (CSSM) in 26 districts [17]. Facility-Based Newborn Care (FBNC) in the public health system got a boost under NRHM with a nationwide creation of Newborn Care Corners (NBCC) at every point of child birth, Newborn Stabilization Units (NBSUs) at Community Health Centres, and Special Newborn Care Units (SNCUs) at district hospitals. Guidelines and toolkits for standardized infrastructure, human resources and services at each level have been developed and a system of reporting data on FBNC created. Over half a million neonates are being treated each year at SNCUs alone and the number is rising.

Till March 2014, there were 507 SNCUs, 1,737 NBSUs and 13,653 NBCCs in the country [18]. More than 600,000 babies were admitted in 2012-13, of whom nearly 90% survived [12].

**Newborn Care in Urban Areas:**

The rapid population growth in urban India has outpaced the municipal capacity to build essential infrastructures that make life in cities safe and healthy. Local and national governments alike are grappling with the challenges of urbanization, with thousands migrating from villages to cities. Thus urbanization in India has been accompanied by a concentration of poverty and urban public health has emerged as one of the most pressing priorities facing our country [19].

Newborn mortality rates in urban settings are lower than rural areas, early neonatal deaths accounts for greater proportion than late neonatal mortality [20]. The available evidence suggests that socio-economic inequalities and poor environment pose major challenge for newborn health. Moreover, fragmented and weak public health system, multiplicity of actors and fragmented capacity of public health planning further limit the delivery of quality and affordable health care service delivery. The health care is however concentrated in urban areas but, delay in deciding to seek health care, reaching a source of it and receiving appropriate care affects the health outcomes disproportionately. A few city initiatives and innovations in different states and cities have brought forth the evidences of effectiveness of different strategies [21, 22].

Recently launched national urban health mission provides an opportunity for strategic thinking and actions to improve newborn health outcomes in India. There is also an opportunity for coalescence of activities around national health mission and RMNCH+A strategy to develop feasible and workable models in different urban settings. Concomitant operational research needs to be carried out so that the obstacles, approaches and response to the program can be understood.

**Improving Access to Skilled Attendance at Birth:**

Access to skilled attendance at birth is the cornerstone of any initiative to improve maternal and newborn health. Affordability barriers often impede the utilization of existing services. To overcome these, 'Janani Suraksha Yojna', a government funded, nationwide scheme offering conditional cash transfers, was made operational in 2005 [23]. This has led to a quantum jump in the utilization of services, reflected in the increase in institutional deliveries (more than 80%) with no significant impact of neonatal mortality rate [24, 25]. Out of pocket expenditure was reported to be high and to mitigate this, Janani Shishu Suraksha Karyakram (JSSK) was launched in 2011. The scheme envisages free and cashless services to pregnant women and includes normal deliveries, caesarean operations, and also treatment of sick newborns and infants (up to one year after birth) in all government health institutions across all states/UTs. The initiative promotes institutional delivery, eliminates out-of-pocket expenses (a major barrier

to accessing health services), and facilitates prompt referral through free transport [26].

Navjat Shikshu Suraksha Karyakram (NSSK) was launched on September 2009 to improve the care at birth by training the health personnel in basic newborn care and resuscitation, prevention of hypothermia, prevention of infection, and early initiation of breast feeding. It was envisaged that at every delivery point there will be trained health care worker to impact good quality basic newborn care [27].

The country had no functional model of either emergency response systems or assured transport for pregnant women and sick newborns when NRHM was launched in 2005. Only hospital-linked private ambulance services were functional, catering to limited populations in major cities. A few experiments with ambulance services outsourced to local non-government organizations (like GVK EMRI) and successful testing of other local solutions like Haryana Swasthya Vahan Sewa and Janani Express in some states gave birth to today's National Ambulance Service (NAS). Dial 108 (for all) and 102 (for pregnant women and sick newborns) are two types of referral transport systems under NAS. The total number of ambulances available exceeds 20,000, currently [28].

#### **Technology for Improving Newborn Care:**

Until the 1990s, most of the products required for small and sick neonates, were procured through import at a high cost and with little maintenance support. Emerging demand and an informal

collaboration of neonatologists, engineers, and entrepreneurs has led to the production of indigenously produced of several high volume categories at affordable cost in India. Radiant warmers, resuscitation bags, phototherapy units, weighing scales, and other devices manufactured by Indian small-scale industries have enabled a scale-up of neonatal care in the country, particularly in medical college hospitals, district hospitals and sub-district facilities in the public sector, as a part of the NRHM. Indian products have acquired international quality standards, and are even exported to developed nations [12, 29].

Newborn care has also attracted adaptation of technologies for new, innovative products with a great potential. Apart from utilizing technologies for improving treatment of various conditions, new methods have been harnessed for reaching out to the community including mHealth [30]. Use of simple devices to screen children with low birth weight (birth weight scale), to promote breast feeding (NIFTY cup) and keep babies warm (Embrace infant warmers) are some innovations that are worth mentioning [31-33]. Swasthya slate can be used as a point-of-care diagnostic tool that incorporates multiple diagnostics and enables prophylactic and curative interventions [34]. In addition, the convergence of mobile technologies and healthcare solutions is being explored for superior health outcomes around the world. Several such mHealth solutions are also being explored in improving access to care for neonates [12].

### Research in Newborn Health

Research in neonatal health has evolved from descriptive studies to large scale epidemiological and experimental studies. In an assessment done by Narang et al in 2004, it was observed that only 11.8% of studies in four indexed Indian journals pertained to neonates [34] [35]. Out of these, a third was analytical studies, and 9% experimental. Most studies have been unicentric and small to medium scale with little possibility of impacting policy or practice change. The number and quality of research by Indian scientists has gone up in recent years. Several studies have been published in high impact journals in the past decade that have contributed to an increase in knowledge and many have the potential to influence policy not only at the national level but also at the global level [36].

One of the earliest publications that provided a reference for intra uterine growth and recognition of fetal growth retardation was by Ghosh *et al* in 1971 [37]. Since this seminal publication there have been a large collection of works on low birth weight and its associations and outcomes [38]. A multicentric quasi randomized trial conducted in four teaching hospitals in India has been able to prove the hypothesis that room air is as good as 100% oxygen for resuscitation of asphyxiated newborn babies at birth [39]. The findings of this study have been able to frame clinical guidelines that room air ventilation can be recommended for resuscitation.

Community mobilization through participatory women's groups has a potential to improve birth

outcomes. This has been successfully evaluated in diverse settings in India- Ekjut trial in Jharkhand and Odisha and Shivgarh trial in Uttar Pradesh [40]. The Ekjut trial demonstrated a reduction by 32% in the intervention clusters adjusted for clustering, stratification, and baseline differences during 3 years. The impact on ENMR was pronounced [41]. The effects were substantially stronger among the most socio economically marginalized groups. The reduction in NMR was by 59% among most marginalized as compared to 35% in less marginalized population [42]. The model is found to be sustainable according to preliminary reports. The original Ekjut trial bagged the best clinical trial global award for 2010.

To address the paucity of population-based pregnancy data, the Global Network Women's and Children's Health Research established a population-based vital registry system in 2009 to document stillbirth, neonatal mortality, and maternal mortality rates. Initial results from Belgaum and Nagpur indicate that it is feasible to implement a registry system but specific innovations are required to ensure quality and completeness of data [43]. There are two trials conducted by this network: Use of antenatal corticosteroids in preterm births to increase neonatal survival in developing countries and developing and evaluating a comprehensive intervention of community mobilization, birth attendant training and improvement of quality of care in health facilities on perinatal outcome [44, 45]. The "First Breath Trial" was designed to test the

hypothesis that training birth attendants in the WHO Essential Newborn Care (ENC) course and in a modified version of the American Academy of Pediatric Neonatal Resuscitation Program (NRP) would reduce the rate of death from all causes in the first seven days of life, among infants with weight of at least 1500gms born in rural communities in developing countries. India (Belgaum in Karnataka) was one of the six developing countries where the intervention was tested. The other sites were Argentina, Democratic Republic of Congo, Guatemala, Zambia, and Pakistan [46].

In 1993, The Fetal Care Research Foundation (FCRF), a charitable trust was formed to do research in fetal malformations, prenatal diagnosis and fetal therapy. As an offshoot of FCRF, The Birth Defects Registry (BDR) was started in the year 1996. A registry for recording birth defects involving other centres in Chennai was initiated in January 2001 [47]. In 2008, FOGSI (Federation of Obstetrics and Gynecology of India) partnered with FCRF to increase the reach of the network. The aim was to set up a surveillance system of ongoing systematic collection, analysis and interpretation of data related to birth defects. The efficiency of the model helped it in replicating it in 28 states and 3 UTs of the country. Currently, 700 hospitals are registered and 309 hospitals are contributing data [47].

Vitamin D deficiency is well documented and

its consequences are well known [48]. In a clinical trial of ascertaining the dose of Vitamin D supplementation during pregnancy, the supplementation resulted in improved infant anthropometry and maternal serum Vitamin D levels [49]. A randomized controlled trial was conducted to see the clinical outcomes of weekly vitamin D supplements on low birth weight term infants. Results suggest that though vitamin D levels increased in plasma at 6 months of age, this did not translate into beneficial outcomes [50]. The current evidence thus, does not support the recommendation of Vitamin D supplementation to all pregnant women or low birth weight infants. Similarly, although low birth weight infants have impaired zinc status, preliminary results indicate that there seems to be no substantial benefit in terms of morbidity or physical growth during infancy [51]. However, zinc could be given as adjunct treatment to reduce the risk of treatment failure in infants aged 7-120 days with probable serious bacterial infection as it decreases treatment failure [52].

### **Conclusion:**

To conclude, India's contribution to the field newborn health is significant and is now acknowledged all over the world. A lot of thrust lies on meeting the goals and "bending the curve" to reach our targets. With the current political commitment, enthusiasm and dedication, this should not be a distant dream!

**References:**

1. UNICEF, WHO, The World Bank, and United Nations. Levels & Trends in Child Mortality. Report 2013 - Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation. New York: 2013.
2. Registrar General of India. Sample Registration System (SRS) statistical report 2012. New Delhi: 2013.
3. Annual Health Survey. 2012-13. Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India.
4. Paul VK, *et al.* Reproductive health, and child health and nutrition in India: meeting the challenge. *Lancet* 2011; 377(9762): 332-349.
5. Pratinidhi A, Shah U, Shrotri A, Bodhani N. Risk-approach strategy in neonatal care. *Bull World Health Organ* 1986; 64(2): 291.
6. Datta N, Kumar V, Kumar L *et al.* Application of case management to the control of acute respiratory infections in low-birth-weight infants: a feasibility study. *Bull World Health Organ* 1987; 65(1): 77.
7. Daga S, Daga A, Dighole R *et al.* Rural neonatal care: Dahanu experience. *Indian Pediatr* 1992; 29(2): 189-193.
8. Bang AT, Bang RA, Baitule SB *et al.* Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. *Lancet* 1999; 354(9194): 1955-1961.
9. Kumar R. IMNCI factsheet for 14 states - India. Chandigarh: PGIMER; 2011.
10. Monthly programme monitoring sheets. Division of Child Health and Immunization, Ministry of Health and Family Welfare; 2013.
11. Mohan P, Kishore B, Singh S, *et al.* Assessment of implementation of integrated management of neonatal and childhood illness in India. *Journal of Health, Population, and Nutrition* 2011; 29(6): 629.
12. PHFI, AIIMS, and SC- State of India's Newborns (SOIN) 2014- a report. (Eds) Zodpey S and Paul VK. Public Health Foundation of India, All India Institute of Medical Sciences and Save the Children. New Delhi, India
13. ASHA..Which way forward? Evaluation of ASHA program. NHSRC; 2011.
14. Sixth Common Review Mission. National Rural Health Mission; 2012. Bajpai N, Dholakia RH. Improving the performance of Accredited Social Health Activists in India. Working Paper No. 1; 2011
15. Singh M, Paul V, Deorari A. The state of India's neonatal units in the mid-nineties. *Indian Pediatr* 1997; 34: 696- 701.
16. Shaping policy for maternal and newborn health: a compendium of case studies 2003 [cited 2013]. Available from: <http://www.jhpiego.org/files/MNHPolComp.pdf>
17. Monthly programme monitoring sheets. Child Health and Immunization Division. MoHFW; Government of India; 2013.
18. Report on Indian urban infrastructure and services. High Powered Expert Committee (HPEC) for estimating the investment requirements for urban infrastructure services: New Delhi; 2011.
19. Office of the Registrar General and Census Commissioner. Census of India 2011. Provisional population totals. Urban agglomerations and cities. [http://censusindia.gov.in/2011-prov-results/paper2/data\\_files/India2/1.%20Data%20Highlight.pdf](http://censusindia.gov.in/2011-prov-results/paper2/data_files/India2/1.%20Data%20Highlight.pdf). New Delhi: Ministry of Home Affairs, Government of India; 2012.
20. Shah More N, Bapat U, Das S *et al.* Inequalities in maternity care and newborn outcomes: one-year surveillance of births in vulnerable slum communities in Mumbai. *Int J Equity Health* 2009; 8(1): 21.
21. Barua N. How to develop a pro-poor private health sector in urban India, Mumbai: Global Forum for Health Research: Forum 9; 2005.
22. MoHFW. Janani Suraksha Yojna, Guidelines for implementation. New Delhi: MoHFW, Government of India.

23. NRHM. State wise executive summary: status as on 31<sup>st</sup> March 2013. National Rural Health Mission.
24. Lim SS, Dandona L, Hoisington JA *et al.* India's Janani Suraksha Yojana, conditional cash transfer programme to increase births in health facilities: an impact evaluation. *Lancet* 2010; 375(9730): 2009-2023.
25. MOHFW. Guidelines for Janani Shishu Suraksha Karyakram. National Rural Health Mission, MoHFW. Government of India; 2011.
26. EMRI/Patient Transport Service. National Ambulance service (NAS).
27. <http://www.mohfw.nic.in/WriteReadData/1892s/Chapter515.pdf>. Accessed on 28th March 2015.
28. Accessed from:<http://nrhm.gov.in/nrhm-components/health-systems-strengthening/emripatient-transport-service.html>
29. Deorari AK, Paul VK. Neonatal equipment: everything you would like to know. 4<sup>th</sup> edition. 2012.
30. mHealth Projects: Examples from low- and middle income countries. [cited 2013 May 10]. Available from: [http://www.mhealthinfo.org/projects\\_table](http://www.mhealthinfo.org/projects_table)
31. A low-cost, colour-coded, hand-held spring scale accurately categorizes birth weight in low-resource settings. [cited 2013 Apr 9] Available from: <http://www.countdown2015mnch.org/2005conference/alldocs/Mullany%203.pdf>.
32. Technology solutions for global health. NIFTY TM Infant Feeding Cup. PATH. May, 2012. Available from [http://www.path.org/publications/files/TS\\_update\\_nifty.pdf](http://www.path.org/publications/files/TS_update_nifty.pdf)
33. EMBRACE Infant warmer. [cited 2013 Sep 9]. Available from: <http://embraceglobal.org/embrace-warmer/>
34. Swasthya Slate. [cited 2013 Apr 20]. Available from: <http://www.swasthyaslate.org/>
35. Narang A, Murki S. Research in neonatology: need for introspection. *Indian Pediatr* 2004; 41:170-174.
36. Ramji S, Modi M, Gupta N. 50 years of neonatology in India: Progress and future. *Indian Pediatr* 2013; 50(1): 104-106.
37. Ghosh S, Bhargava SK, Madhavan S, Taskar AD, Bhargava V, Nigam SK. Intrauterine growth of North Indian babies. *Pediatrics* 1971; 47:826-830.
38. Bhargava SK, Sachdev HS, Fall CH, Osmond C, Lakshmy R, Barker DJ, *et al.* Relation of serial changes in childhood body-mass index to impaired glucose tolerance in young adulthood. *N Engl J Med* 2004; 350:865-867.
39. Ramji S, Rasaily R, Mishra PK, Narang A, Jayam S, Kapoor AN *et al.* Resuscitation of asphyxiated newborns with room air or 100% oxygen at birth: a multicentric clinical trial. *Indian Pediatrics* 2003; 40:510-17.
40. Kumar V, Mohanty S, Kumar A, Misra R, Santosham M *et al.* Effect of community based behavior change management on neonatal mortality in Shivgarh, Uttar Pradesh, India: cluster randomized controlled trial. *The Lancet* 2008; 372:1151-62.
41. Tripathy P, Nair N, Barnett S, Mahapatra R, Borghi J, Rath S *et al.* Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in Jharkand and Orissa, India: a cluster randomized trial. *Lancet* 2010; 375:1182-1192.
42. Houweling TAJ, Tripathy P, Nair N, Rath S, Rath S, Gope R *et al.* The equity impact of participatory women's groups to reduce neonatal mortality in India: secondary analysis of a cluster randomized trial. *International Journal of Epidemiology* 2013; 1-13.
43. Goudar SS, Carlo WA, McClure EM, Pasha O, Patel A *et al.* The Maternal and newborn health registry study of the Global Network for women's and children's health research. *International Journal of Gynaecology and Obstetrics* 2012; 118:190-93.
44. Pasha O, Goldenberg RL, McClure EM, Saleem S, Goudar SS, Althabe F *et al.* Communities, birth attendants and health facilities: a continuum of emergency maternal and newborn care (the global network's EmONC trial). *BMC Pregnancy and Childbirth* 2010;10:82

45. Althabe F, Belizan JM, Mazzoni A, Berrueta M, Foday JH, Thomas MK *et al.* Antenatal corticosteroids trial in preterm births to increase neonatal survival in developing countries: study protocol. *Reproductive Health* 2012; 9:22.
46. Carlo WA, Goudar SS, Jehan I, Chomba E, Tshetu A, Garces A *et al.* Newborn care training and perinatal mortality in developing countries. *N Engl J Med* 2010; 362:614-623.
47. Birth Defect Registry of India Newsletter. Jan 2012. Available at: [www.fcrf.org.in/bdri\\_news.asp](http://www.fcrf.org.in/bdri_news.asp) (Accessed on June 6, 2013)
48. Agarwal R, Virmani D, Jaipal ML, Gupta S, Gupta N, Shankar MJ *et al.* Vitamin D status of low birth weight infants in Delhi: a comparative study. *J Trop Pediatr* 2012; 58:446-50.
49. Kalra P, Das V, Agarwal A, Kumar M, Ramaesh V Bhatia E *et al.* Effect of vitamin D supplementation during pregnancy on neonatal mineral homeostasis and anthropometry of the newborn and infant. *Br J Nutr* 2012; 108:1052-1058.
50. Trilok Kumar G, Sachdev HS, Chellani H, Rehman AM, Singh V, Arora H *et al.* Effect of weekly vitamin D supplements on mortality, morbidity, and growth of low birth weight term infants in India up to age 6 months: randomized controlled trial. *BMJ* 2011; 342:d2975.
51. Taneja S, Bhandari N, Chandola TR, Mahalanabis D, Fontaine O, Bhan MK. Effect of zinc supplementation on morbidity and growth in hospital-born, low birth weight infants. *Am J Clin Nutr* 2009; 90:385-391.
52. Bhatnagar S, Wadhwa N, Aneja S, Lodha R, Kabra SK, Natchu UCM *et al.* Zinc as adjunct treatment in infants aged between 7 and 120 days with probable serious bacterial infection: a randomized, double blind, placebo-controlled trial. *Lancet* 2012; 379.

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