

Economic prosperity with social good: the case for digital maternal health in India

India accounts for 25% of global maternal deaths [1]. While maternal death is a costly event incurring mortality for the infants of deceased mothers, and unfavourable consequences for older children (e.g. lack of schooling, poverty), the situation in India also includes large out-of-pocket (OOP) financing leading to catastrophic health spending (CHS) or more than 10% of total household expenditure [2-4]. Therefore, interventions aiming to improve maternal and neonatal health outcomes should not only assess their impact but also the cost of achieving it. The National Health Mission (NHM) in India has reduced catastrophic expenses: OOP expenses on delivery care in private facilities had increased by 5.6 times compared to public health centres before NHM; and CHS in public health centres declined by 27%, but by only 9% in private facilities before and after NHM. Research indicates that rural women, those delivering in private facilities, and living in poor households, notably urban slums, tend to face CHS.

The case of urban slums illustrates this scenario [4-5]. Mumbai has a maternal mortality ratio of 144 [6], which sharply contrasts the health choices of its 16 million residents (largely in slums) i.e. six Government hospitals, 26 maternity homes, 159 dispensaries and 176 health posts. The widespread private facilities range from large, technologically-sufficient hospitals to small nursing homes and stand-alone general practitioners. Clues to the maternity problem lie in the quality of care, affected by the large patient numbers and their uneven distribution. Antenatal visits at health posts - the most community-centric institutions – are minimal, while unnecessary expensive care at higher facilities is prevalent. Therefore, 41% of low-income mothers spent ‘catastrophically’ on care.

CareNX Innovations, a mobile pregnancy care start up, has collaborated with *Apnalaya*, a non-profit organization to deliver antenatal care in the public health posts in Mumbai. Community health volunteers (CHV) under *Apnalaya* motivate women, through home visits and community activities, to visit health posts for antenatal care and counsel them on birth preparedness, diet and other aspects. CareNX Innovations has developed a platform called ‘CareMother’ having a smartphone application used by the CHV to record antenatal data based on tests conducted by the physician at the health post. CareMother identifies high-risk pregnancies, generates real-time results for doctors, tracks health post visits and lists pending tasks of the CHV (e.g. home visits, TT vaccine reminders, high-risk follow-up). The physician uses the app to monitor patients and provide timely care or referral; and uses CareMother’s portable diagnostic kit for the tests. Thus, the program transforms the urban health post, which only registered pregnancies earlier, into a quality ANC clinic that monitors mothers through a common cloud-based platform. Only the high-risk pregnancies are referred to maternity homes - or more expensive tertiary care, as per the case.

Recommendations for policy:

1. It is important to rationalize referrals across health facilities to make them aware of their roles, particularly in urban facilities.
2. Deliveries in cities should be targeted in tertiary hospitals while antenatal care in facilities close to the clients.

3. It is important to strengthen community-based engagement where antenatal counselling focuses on birth preparedness, saving costs for the family and rationalizing referrals.
4. Digital interventions can streamline operations, especially to identify and monitor high-risk cases and enable their follow-up.
5. Digital patient management will involve remote tracking or monitoring by the physician through a cadre of community-based health workers.
6. Digital solutions should be inseparable from a cadre of frontline health workers that deliver these solutions and link with the higher-level physician.
7. Digital solutions can improve acceptability of services by linking with existing clinics to upgrade their quality.

References:

1. RamaRao S, Caleb L, Khan ME, Townsend JW: Safer maternal health in rural Uttar Pradesh: do primary health services contribute? *Health Policy Plan*. 2001, 16 (3): 256-263. 10.1093/heapol/16.3.256.
2. Miller S, Belizán JM. The true cost of maternal death: individual tragedy impacts family, community and nations. *Reproductive health*. 2015 Dec;12(1):56.
3. Mohanty SK, Kastor A. Out-of-pocket expenditure and catastrophic health spending on maternal care in public and private health centres in India: a comparative study of pre and post national health mission period. *Health economics review*. 2017 Dec;7(1):31.
4. Skordis-Worrall J, Pace N, Bapat U, Das S, More NS, Joshi W, Pulkki-Brannstrom AM, Osrin D. Maternal and neonatal health expenditure in Mumbai slums (India): a cross sectional study. *BMC public health*. 2011 Dec;11(1):150.
5. More N, Bapat U, Das S, Patil S, Porel M, Vaidya L, Koriya B, Barnett S, Costello A, Fernandez A, et al: Cluster-randomised controlled trial of community mobilisation in Mumbai slums to improve care during pregnancy, delivery, postpartum and for the newborn. *Trials*. 2008, 9 (7)
6. Maternal deaths in Mumbai fall 30% in five years. Published May 18, 2019. Available: <https://timesofindia.indiatimes.com/city/mumbai/maternal-deaths-in-mumbai-fall-30-in-five-years/articleshow/69381613.cms>