Assessing and Applying Evidence-Based Interventions at the Community Level in India as a Model Policy to Reduce Neonatal Mortality Rates in Nigeria

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Abstract

The percentage of deaths in Nigeria that occur in the first month of life make up 28% of all deaths under five years, yet most of these deaths can be prevented by simple interventions, such as exclusive breastfeeding. This paper aims to address the challenges of reducing neonatal mortality in Nigeria by examining the efficacy of home-based, newborn care interventions and policies that have been implemented successfully in India. A comparison of similarities and differences between India and Nigeria was done using qualitative and quantitative data of various health indicators. The analysis included identifying policy-related factors contributing to India’s newborn survival rates. A literature search of randomized controlled trials of community health worker interventions shown to reduce neonatal mortality was also conducted. While it appears that Nigeria spends more money than India on health per capita and as percent GDP, it still lags behind India in its neonatal, infant, and under five mortality rates. Both countries have comparably low numbers of healthcare providers. In contrast to Nigeria, India’s community health workers receive training on how to deliver postnatal care in the home setting. Three randomized controlled trials of home-based, newborn care strategies revealed that community health workers trained to provide a preventive package of interventions during multiple postnatal visits in rural India, Bangladesh, and Pakistan reduced neonatal mortality percentages by 54%, 34%, and 15-20%, respectively. To address the urgency of neonatal mortality, countries with weak health systems need to invest in evidence-based, newborn care interventions that utilize available human resources. The current available evidence of models of postnatal care provision demonstrates that home-based care and health education provided by community health workers can effectively reduce neonatal mortality rates.
Introduction
Currently, 4 million babies die in the first month of life worldwide. Based on gross national income per capita, 99% of these deaths occur in low and middle-income countries, yet the majority of funding and research is directed towards the 1% of deaths in high per capita income, or industrialized, countries [1]. While there are child survival programs that focus on pneumonia, diarrhea, malaria, maternal-fetal HIV transmission, and vaccine-preventable conditions, these interventions mostly prevent death after the first month of life. On the other hand, the three major causes of neonatal mortality in the first 28 days are infections, prematurity, and birth asphyxia related to childbirth complications [2].

More than half of all neonatal deaths occur in five countries of the world: India, Nigeria, Pakistan, China, and the Democratic Republic of Congo. Between 1990-2009, the global neonatal mortality rate declined, but Africa continues to make the least progress with a reduction of 1% per year. At the current rate, it would take around 150 years for Africa to catch up to the United States’ current newborn mortality rate [3]. Given increasing disparities in health, education, and resources between and within countries, can the global burden of neonatal mortality be reduced with simple, home-based interventions?

Specific Aims
This paper will address the challenges of reducing the neonatal mortality rate in Nigeria by examining the literature regarding efficacy of newborn care interventions that have been successful in other resource-limited settings, particularly India. By addressing gaps in implementation that are hindering progress, this paper will seek to inform global policy and establish an evidence-based foundation for practical action. Specific aims include to 1) compare qualitative and quantitative health indicators between Nigeria and India; 2) evaluate factors that have contributed to the success of the community health worker model and subsequent reduction in India’s neonatal mortality rate; 3) analyze which feasible, high-impact, evidence-based interventions in low-resource settings should be prioritized; 4) make policy recommendations for Nigeria’s Integrated Maternal, Newborn and Child Health Strategy that will facilitate the provision of equitable, high quality services in communities with poor access to health care facilities and trained providers.

Nigeria: Halted Progress
As shown in Table 1, Nigeria’s causes of neonatal death are reflective of Africa as a whole [4]. In 2005, the Integrated Maternal, Newborn and Child Health (IMNCH) Strategy was launched at the United Nations’ World Summit in an effort to coordinate and integrate health policies, programs, and interventions along a continuum of care to reduce child mortality and improve maternal health [5]. By adopting this strategy, Nigeria became one of the first African countries with an integrated plan to look after mothers, newborns and children up to their fifth birthday [6].
Table 1: Estimated Proportions of Death by Cause for Neonates in Nigeria vs. African Region, 2000

<table>
<thead>
<tr>
<th></th>
<th>Nigeria</th>
<th>Regional average*</th>
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<tbody>
<tr>
<td>Neonatal tetanus</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Severe infection (pneumonia, meningitis, sepsis)</td>
<td>23%</td>
<td>27%</td>
</tr>
<tr>
<td>Birth asphyxia</td>
<td>26%</td>
<td>24%</td>
</tr>
<tr>
<td>Diarrheal disease</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>23%</td>
<td>23%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>7%</td>
</tr>
</tbody>
</table>

*Includes entire African continent except Morocco, Libya, Egypt, Sudan, and Somalia.

While the IMNCH Strategy was successfully developed by Nigeria in 2007, implementation within the framework of the National Strategic Health Development Plan, which seeks to improve delivery of services in the health sector, has been stalled. Currently, 23 states have executed their own specific IMNCH plan, but coverage remains less than 50% for the majority of key packages along the continuum of care [7].

Moreover, health care is inequitably distributed between and within states, especially in the North East and North West regions of Nigeria. According to Saving Newborn Lives, a program funded by the Bill and Melinda Gates Foundation, the percentage of deaths in Nigeria that occur in the first month of life make up 28% of all deaths under five years, a statistic that has generally remained unchanged over the past two decades [6]. Approximately 241,000 babies die in the first month of life, bestowing Nigeria with the highest neonatal mortality rate on the African continent—an astonishing 40 per 1000 live births [3,8].

The Federal Ministry of Health has identified key gaps in strategy implementation, lack of accountability at state and local levels, and low coverage and quality of care. The current structure of the health system is divided into three tiers of federal, state, and local government responsibilities with each level having autonomy. Lack of supervision, regulation, and monitoring has resulted in duplication of services and gaps in communication. State and local governments are not required to provide budget and expenditure reports to the federal government as oil revenues are distributed amongst the three tiers by an allocation formula. Hence, health expenditures cannot be monitored, which further limits integration of the health care system [6].

An overwhelming majority of births in Nigeria take place at home and without a skilled birth attendant [7]. Traditional birth attendants (TBAs) are present at 22% of births but have no formal
or modern training on how to manage complications of pregnancy let alone neonatal resuscitation [9]. Additionally, like other developing countries, there are scarce data on the number of missionary, faith-based, private, non-governmental, and traditional maternity facilities, which compounds the issue of maintaining accurate birth records and registers [6].

Case studies that will be discussed in further detail indicate that change begins at the local level. Empowering communities by utilizing women’s groups to create demand for skilled care can also improve care seeking, which is usually delayed due to lack of knowledge and accessibility barriers [10]. For instance, a survey conducted in northern Nigeria found that mothers have insufficient knowledge of early warning signs of neonatal illness, a finding that is more pronounced among illiterate mothers and in rural areas [11]. Moreover, even though breastfeeding can reduce infant mortality rates by providing nutrition and protection from infections, Nigeria has one of the lowest breastfeeding rates (13%) in Africa [7].

Re-defining the Problem
While it is known that newborn deaths can be reduced even in areas with limited resources, preventing such deaths has not been a focus of child survival programs [1]. Newborn health strategies within countries need to be developed, implemented, and monitored through collaborative efforts between communities, governments, and non-profit organizations [12]. It is the responsibility of rich and poor countries to address neonatal mortality disparities, but encouraging national ownership is the most likely way to generate political will.

Nigeria’s IMNCH strategy is based on the widely held belief that packaging interventions and incorporating them into existing maternal health and child survival programs at multiple tiers of the health care system is the most effective way to reduce neonatal mortality rates [13]. In the years since this strategy was implemented, however, Nigeria has demonstrated that better outcomes are not guaranteed if referral linkages between communities and facilities remain weak.

India: A Paradigm for Community-Based Care
Even in countries with weak health systems and low gross national products per capita, it is possible to reduce neonatal mortality using a phased approach at the community level while investing in long-term strengthening of clinical care services. India has been the most active in contributing evidence on providing newborn health care in resource-limited settings. Models of postnatal care provision at the community level in India have demonstrated that simple interventions, such as thermal care and exclusive breastfeeding, can significantly impact neonatal survival. As a result, the Indian government has increased their political commitment and resource allocation towards newborn health [14].

For instance, the World Health Organization’s strategy of Integrated Management of Childhood Illness (IMCI) was recommended as a guideline in 1999 for developing countries but did not include the first week of life. Rather, it targeted sick children age 2 months to 5 years and assumed that transport could easily be provided to a nearby health care facility [15]. The government of India took these guidelines a step further in 2003 by requiring community health workers to visit all neonates at home three times within the first ten days of life as seen in Table 2 [12]. By adding home visits and increasing resources dedicated to neonatal health, India has
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been able to reduce its neonatal mortality rate mostly by providing community-based care and health education [14]. The cost of adding the newborn component to India’s existing program is estimated to be less than 10 cents per child [12].

Table 2: Comparison between Generic Integrated Management of Childhood Illness (IMCI) and India’s Integrated Management of Neonatal and Childhood Illness (IMNCI)

<table>
<thead>
<tr>
<th></th>
<th>IMCI</th>
<th>India’s IMNCI</th>
</tr>
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<tbody>
<tr>
<td>Includes 0-6 days of life</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Facility-based providers</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Community health workers</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Training for home visits for postnatal care</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3 home visits within first 10 days</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>


Current State of Postnatal Care in Nigeria

A survey conducted by Nigeria’s National Population Commission from 2003-2008 revealed that postnatal care visits within 2 days of birth for infants born at home was not only highly variable between regions of Nigeria but abysmally low (38%) overall [7]. It is not clear from the data provided what the content of the visits involved or if any subsequent follow-up visits were made. Of all the women surveyed, 56% did not receive any postnatal care, 38% received a checkup within 2 days of delivery, and 3% obtained care within 3-41 days after delivery. As to be expected, wealthier and better-educated mothers living in urban areas were the most likely to receive postnatal care. The same survey also found that the provider of the first postnatal checkup varied widely, but community health workers made up the smallest percentage regardless of location. Moreover, compared to their rural counterparts, urban women were more likely to receive postnatal care from a doctor, nurse, or midwife instead of a traditional birth attendant or community health worker [7].

Public Health Significance

The United Nations’ Millennium Development Goal (MDG) 4 aims for a two-thirds reduction in death rates for children under the age of five by 2015 [16]. Interestingly, 40% of these deaths occur in the first four weeks—the neonatal period. More specifically, the greatest risk of death is in the first week of life, accounting for three-fourths of all neonatal deaths [1].

Globally, there has been a slower decline in neonatal mortality compared to children younger than five years old [17]. In order to meet MDG 4 by 2015, national governments are now realizing that it will be imperative to target neonatal mortality rates. At the current rate of progress, it does not seem likely that Nigeria will be able to meet MDG 4 in time [18].
It should come as no surprise that countries with the highest neonatal mortality rates have the lowest rates of skilled attendance at birth. High-income countries have neonatal mortality rates of 4 per 1000 live births whereas middle and low-income countries have an average of 33 per 1000 live births [12]. Most of these deaths can be prevented by such simple interventions as improved hygiene, exclusive breastfeeding, and thermal care. Skilled birth attendants, unfortunately, tend to be recruited and trained in only emergency obstetric care while essential newborn care is neglected [10].

Access to advanced technology is not necessary to reduce neonatal mortality rates as the greatest reductions in industrialized countries preceded the onset of expensive neonatal intensive care. For instance, from 1940-1979, England was able to reduce its neonatal mortality rate from 30 per 1000 live births to 10 per 1000 live births after initiating free antenatal care, improved perinatal practices, and antibiotics [19]. Simple, cost-effective interventions are available but underutilized due to lack of knowledge and misdirected resources [12].

Methods
I conducted a retrospective analysis of Nigeria’s Federal Ministry of Health policies that are geared towards achieving Millennium Development Goal 4. I began with an assessment of the scope and severity of neonatal mortality rates in resource-limited countries, the present trajectory of Nigeria’s struggle in saving newborn lives, and how it presents a public health challenge. The difficulty of implementing the Integrated Maternal, Newborn and Child Health Strategy in its current form in Nigeria is then discussed.

Additionally, I compared similarities and differences between India and Nigeria using qualitative descriptions and available quantitative data (see Table 3). An analysis included identifying policy-related factors and community approaches contributing to India’s success in reducing their neonatal mortality rate. For purposes of this paper, a community health worker was defined as a person who is paid or volunteers to promote health, manage illness, or provide support to peers residing within the same community but has no formal or professional certificate or degree. Databases and reference lists of articles were searched for randomized controlled trials of community health worker interventions shown to reduce neonatal mortality rates. Moreover, a qualitative evaluation of the advantages and limitations of replicating India’s community health worker model was considered while taking into account the discrepancy in resource allocation and political feasibility. I concluded by providing justification for policy recommendations in Nigeria, including a plan for future monitoring and evaluation.

My research and data were obtained from PubMed and other publicly available sources, such as public health journals, international development agencies (World Health Organization, United Nations), national health ministries of India and Nigeria, and non-governmental agency reports (Saving Newborn Lives initiative by the Bill and Melinda Gates Foundation).

Results
As demonstrated by Table 3, India’s population is nearly eight times the size of Nigeria’s (1,224,614,000 vs. 158,423,000, respectively). The neonatal mortality rates in Nigeria are somewhat higher than India for the first 28 days of life (40 vs. 32 deaths/1000 live births,
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respectively). There is a larger discrepancy in the infant mortality rate for the first year of life (88 vs. 48 deaths/1000 live births, respectively). The under-5 mortality rate for Nigeria is more than twice that of India’s (143 vs. 63 deaths/1000 live births, respectively) [20,21]. Children born in India have a higher life expectancy at birth (65 years) than Nigerian children (54 years). Both countries have comparably low numbers of health care providers with only 6 physicians per 10,000 in India and 4 physicians per 10,000 in Nigeria. Likewise, there is a lack of nurses and midwives in India and Nigeria (13 vs. 16 per 10,000, respectively) [22,23].

There are insufficient data on the number of community health workers in each country. In 2011, India’s National Rural Health Mission made a decision to start paying 800,000 rural community health workers, known as Accredited Social Health Activists (ASHAs), for providing home-based newborn care [24]. ASHAs are required to visit newborns 6 times within the first 42 days of life to promote essential newborn care and early detection of sick neonates who need to be referred. Additional visits are required for preterm, low birth weight, or sick infants. For each home visit, ASHAs earn 250 rupees ($5.08), which is paid in total at the end of the 42 days. Remuneration is also dependent on documented evidence of birth registration and birth weight records. Moreover, ASHAs are responsible for administering the BCG (Bacillus Calmette-Guérin), oral polio, and DPT (diphtheria, pertussis, tetanus) vaccines [25].

Although Nigeria has “community health extension workers,” who must attend formal schooling and are paid to work at rural facilities, they are not part of the communities that they serve. Using the defined criteria of this paper, only volunteer health workers who are recruited from within their villages would qualify as community health workers [26]. Unlike their counterparts in Nigeria, ASHAs receive training on how to deliver postnatal care in the home setting [25]. In addition, India’s government has set specific targets, which varies by state, for reducing its neonatal mortality rate whereas Nigeria has not [14,18].

India has a slightly higher percentage (37%) of skilled health personnel present at rural births than Nigeria (28%) [22,23]. Rural birth registration is also higher in India than Nigeria (35% vs. 22%, respectively). There is a noticeable disparity in the percentage of children six months old and younger who are exclusively breastfed as India’s rate (46%) is more than three times that of Nigeria’s (13%). Adult literacy rates in India and Nigeria are similar (63% vs. 61%, respectively) [20,21]. It must be noted, however, that these measurements are national averages and do not take into account the regional disparities found between and within states of both countries.

According to the most recent data available in 2009, although Nigeria’s gross national income per capita is less than India’s ($2070 vs. $3280, respectively), the former spends somewhat more on health per capita ($136) than the latter ($132). Furthermore, Nigeria’s total expenditure on health as percent gross domestic product is slightly higher than India’s (5.8% vs. 4.2%, respectively) [22,23].

Cultural barriers that continue to plague many low-income, developing countries are also prevalent in India and Nigeria. Gender-related power differences still play a role in the societal structure such that 14% of Nigerian women must get permission before seeking treatment. Likewise, 21% of women stated that a hindrance to obtaining care was the concern that a female provider would not be available [7]. In India, on the other hand, there is a bias against female
neonates when it comes to care seeking as male newborns are favored by parents. One study of ill newborns found that for every two male neonates admitted to health care facilities, only one female newborn is admitted [27]. Furthermore, there is a prevalent belief that illness is due to supernatural powers, which results in families first seeking help from traditional healers rather than a trained provider. Another cultural barrier in India is the common custom of confining mother and baby at home for 1-2 months after delivery in hopes of protecting both against infection and to facilitate recovery from childbirth [14].

Table 3: Comparison of Health Indicators between India and Nigeria

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>Nigeria</th>
</tr>
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<tbody>
<tr>
<td><strong>Total population</strong></td>
<td>1,224,614,000</td>
<td>158,423,000</td>
</tr>
<tr>
<td><strong>Neonatal mortality rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per 1000 live births (≤age 28 days)</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td><strong>Infant mortality rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per 1000 live births (≤age 1 year)</td>
<td>48</td>
<td>88</td>
</tr>
<tr>
<td><strong>Under-5 mortality rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per 1000 live births</td>
<td>63</td>
<td>143</td>
</tr>
<tr>
<td><strong>Life expectancy at birth</strong></td>
<td>65</td>
<td>54</td>
</tr>
<tr>
<td><strong>Physicians per 10,000</strong></td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><strong>Nurses &amp; midwives per 10,000</strong></td>
<td>13</td>
<td>16.1</td>
</tr>
<tr>
<td><strong>Community health workers</strong></td>
<td>≥ 800,000c</td>
<td>unknown</td>
</tr>
<tr>
<td><strong>CHW incentives</strong></td>
<td>Monetaryc</td>
<td>Voluntaryc</td>
</tr>
<tr>
<td><strong>Training for home visits</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>involving postnatal care</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>National targets for</strong></td>
<td>Yesf</td>
<td>No</td>
</tr>
<tr>
<td>neonatal mortality rate reductions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Using PubMed and reference lists of articles, a search on randomized controlled trials of home-based newborn care strategies that reduce neonatal mortality rates yielded three relevant articles. One study in rural India found that by having community health workers provide a preventive package of interventions involving clean cord care, thermal care, breastfeeding promotion, and danger sign recognition during two postnatal household visits, maternal behavior modification reduced neonatal mortality rates by more than 50%. The intervention group recorded little change in care seeking behaviors though [28].

Similarly, a study in Bangladesh found that poorly educated, female community health workers given six weeks of hands-on training were able to identify pregnant women and make two
antenatal home visits and three postnatal home visits on day of life 1, 3, and 7. Sick neonates were either treated in the home or referred to a facility. In a community with a weak health system and low health care utilization, the intervention resulted in a 34% reduction in neonatal mortality rate compared to the control group [29].

Lastly, a cluster-randomized controlled trial in rural Pakistan involved young residents, referred to as lady health workers, with at least eight years of schooling and fifteen months of community care training. The intervention arm of this study involved group sessions promoting antenatal care, early breastfeeding, delayed bathing, recognition of sick newborns, and danger signs for referral. Lady health workers were encouraged to visit mothers within 24 hours of birth and on postnatal days 3, 7, 14, and 28. While there was a 15-20% reduction in perinatal and neonatal mortality, there were no statistically significant differences in the referral or care seeking patterns for newborn babies [30].

Discussion

Maximizing Use of Available Resources

The greatest challenge facing countries with weak health systems remains how to ensure universal coverage of life-saving interventions. Some of the barriers that resource-poor countries share include limited capacity of existing health systems, lack of financial and human resources, external and internal brain drain, and corruption amongst policymakers. Like many African nations, Nigeria faces a significant shortage of doctors, nurses, and other qualified medical personnel in rural areas due to poor compensation and lack of basic amenities. Currently, community health extension workers are being used to staff underserved health facilities instead of providing home-based care [31].

Further compounding the problem, at the end of 2010, Nigeria’s Federal Ministry of Health announced that it was partnering with a California-based non-profit organization as part of its IMNCH strategy. The agreement brings American doctors into the country to provide free maternal and newborn child services but only at designated health facilities [32]. While foreign aid is important, the sustainability of such efforts remains questionable. The fact that these physicians are only available at health care facilities will do little to address the accessibility barriers in rural areas.

While it appears that Nigeria spends more money on health per capita and as percent GDP, it still lags behind India in its neonatal, infant, and under five mortality rates [20,21]. Therefore, it raises the question of whether Nigeria is making the best use of its allocated resources. Possible barriers to proper oversight include government corruption, ethnic tension, and religious violence, which all further contribute to the political instability of this oil-rich country. Moreover, although the Nigerian health system has abundant human resources compared to the rest of Africa, there is still inequitable distribution of health care personnel across the country [22]. Rather than trying to find ways to retain physicians in rural areas, it may be more effective to start at the community level and invest in cost-effective, evidence-based, newborn care interventions that utilize available human resources.
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Integrating Community Health Workers

Community health workers contribute to the health care infrastructure by strengthening community-oriented primary care and serving as linkages between the patient, community, and health care system. Ideally, community health workers should have extensive social networks and share a social or cultural identity with the community. By building trust and listening to the community, they are better suited to translate the health care needs of their peers. Recruiting residents ensures that they will have an understanding of the community’s perceptions and cultural beliefs [33]. Additionally, they may even share the conditions and diseases of the local area.

Community health workers can increase adherence to medical regimens while simultaneously promoting continuity and coordination of care. It is important not to overlook the fact that they require competency training and supportive supervision as well as opportunities for advancing their skills. Reporting systems and reliable referral linkages need to be established for such a model to work [33].

Although altruism plays a role in deciding to become a community health worker, payment is necessary to ensure sustainability and continuity. Further research is needed to determine the effectiveness of outreach workers due to variability in recruiting and training [33]. Strategies may have to be tailored to the needs of each community. It remains clear, nevertheless, that community health workers should be integrated in the health care delivery system to improve health outcomes in vulnerable populations.

Focusing on Home-Based Care

The studies conducted in India and Bangladesh reaffirm the effectiveness of newborn care delivered in a community setting. In particular, India’s government has prioritized newborn health since the early 1990s. It continues to allocate large budget provisions for home-based newborn care, community-based midwives training, and neonatal equipment as part of its 11th Five-Year Plan. Similar to Nigeria, there are inconsistencies in neonatal mortality rates between and within states. Using a generic framework, Indian states have been allowed to develop and individualize plans based on local priorities and capabilities. Despite its enormous population, home-based newborn care is now the focus of India’s policy for reducing its infant mortality rate [14].

The Pakistan trial had findings that were not as significant as the other studies, but it should be noted that lady health workers were only able to visit 24% of the neonates in the intervention clusters due to a cultural practice of women delivering in their parents’ house and having to reside with them for forty days thereafter. Furthermore, the difficulty in tracking these women prohibited any of the workers from completing all four of the suggested postnatal home visits. The lack of improvement in seeking care in the India and Pakistan studies could be due to reluctance amongst families to travel long distances to referral centers and the presumed poor quality of care associated with public facilities [30].

Studies in Pakistan with trained community health workers also show other beneficial outcomes associated with postnatal home visits, such as reduced rates of postpartum depression and improved household practices for both maternal and newborn care [34]. Furthermore, cluster-
randomized controlled trials on empowering women’s groups to educate the community on maternal and neonatal health problems have found success at a low cost. One study in Bangladesh found that participatory women’s groups, facilitated by peers trained in not only health issues but also modes of communication, could have an impact on neonatal mortality rates. After three years of monthly meetings, intervention clusters were more likely to use a safe delivery kit, exclusively breastfeed for the first six weeks, and delay bathing of the newborn [35]. A similar study in Nepal, involving monthly women’s group meetings for two years, empowered women to identify local perinatal problems and devise strategies to address them. The intervention clusters experienced a 30% reduction in neonatal mortality rates, lower maternal mortality, and were more likely to have antenatal care, trained birth attendance, and hygienic practices [36].

Cluster-randomized controlled trials are susceptible to bias. Although intervention and control clusters had similar baseline neonatal mortality rates, differences in poverty and literacy could have affected outcomes. Clearly, there is a need to scale up randomized controlled trials in resource-limited settings to support the efficacy of community health worker interventions and participatory women’s groups in reducing neonatal deaths.

In 2009, the World Health Organization and the United Nations Children’s Fund endorsed a strategy for postnatal home visits in the first week of life to promote exclusive breastfeeding, skin-to-skin care, hygienic umbilical cord care, early recognition and care seeking for sick newborns, and home-based treatment for local infections and feeding problems. Recognizing the role of home visits in improving newborn survival, it is recommended that countries with limited access to facilities adopt a similar policy [37]. Nigeria’s IMNCH strategy, however, fails to clearly define any community-based newborn care strategies. It has been estimated that 90,000 newborns could be saved in Nigeria each year just with community-based care and healthy home practices [6].

The World Health Organization recently praised India’s Home-based Newborn Scheme at a conference in Geneva and recommended that other countries with high neonatal mortality rates embrace similar interventions [38]. Despite the fact that India has the world’s highest number of newborn deaths, it is worth noting that the country reduced its neonatal mortality by 33% between 1990-2009 [3]. Innovative solutions, supported by government policies, have cemented India’s position as a model for other countries to follow.

As an example, a non-randomized controlled study, conducted by the Society for Education, Action, and Research in Community Health (SEARCH) in rural India, introduced home-based management of sepsis in neonates. Village health workers with 5-10 years of school education were taught how to diagnose and treat septicemia, meningitis, and pneumonia using simplified clinical criteria. In addition, they were trained to take histories of pregnant women, examine neonates at birth and 8 more times in the first 28 days of life, and maintain records. They also provided health education to mothers and grandmothers. Since there were no laboratory facilities available, all neonates who met the sepsis criteria were treated with oral co-trimoxazole and intramuscular gentamicin. Although there is a possibility that false-positive cases of sepsis were identified, neonatal mortality rates decreased by more than 50% from baseline. The estimated
cost of care per neonate treated was $5.30, a significant difference from the hospital-based cost of $17 per neonate [39].

**Policy Recommendations for Addressing Neonatal Mortality**

In order for an IMNCH strategy to work, there needs to be a functional health system with consistent availability of staff and supplies as well as supervisory monitoring and evaluation systems. Nigeria, unfortunately, does not currently have the available health infrastructure or government accountability to successfully implement such a strategy. Key gaps in streamlining the IMNCH strategy at state and local levels should signal the government to consider policy options promoting innovative approaches that can achieve high coverage and quality of care.

India has been able to reduce its neonatal mortality rate by accelerating implementation of the highest-impact and most feasible interventions within the home, which depend heavily on postnatal visits to educate mothers about topics like thermal care, breastfeeding, and clean hygiene [14]. There are few incentives for health care workers to practice in poor rural settings despite the fact that these areas remain the most vulnerable. Thus, recruiting those who reside within the community can engage local populations in a socio-culturally appropriate manner while also creating lasting sustainability. The Nigerian government needs to enlist and train adequate numbers of rural health workers and ensure that they are well compensated. Moreover, it will be necessary to test evidence-based practices to find a home-based newborn care package that is culturally accepted and practical to implement at the community level in Nigeria.

The Federal Health Ministry of Nigeria should have oversight of any proposed policy that specifically addresses neonatal mortality with particular focus on regions with lack of access to health care personnel and facilities. Most importantly, a target neonatal mortality rate should be set and achieved within the next three years. Accordingly, the federal government needs to allocate more budgetary resources to health care. Mobilizing resources and increasing investment in health, especially for the underserved, should include maximizing human resources by recruiting, training, and rewarding outreach workers. Any focused strategy addressing newborn mortality can only be accomplished with commitment from government, international development agencies, non-governmental organizations, and local communities, who have the most at stake.

The Nigerian government should start expanding the community health worker force in areas with the least access to health care facilities while also demanding financial and administrative accountability between all three tiers of government. A consensus regarding content, delivery strategy, and timing of postnatal care visits should be established by testing models of postnatal care provision in rural areas. Priorities and phasing of implementation are likely to differ by state, geographic location, and socioeconomic class, which means coordination and data tracking will be crucial. Nigeria’s Federal Ministry of Health has only recently started data collection initiatives with the help of such programs as Saving Newborn Lives, United States Agency for International Development, Organization for Economic Cooperation and Development, World Health Organization, and the United Nations Children’s Fund [40]. Measuring progress and linking data to decision-making will require an assessment of the quality and timing of data collection.
While India’s preferred IMNCH policy may be a potential solution to Nigeria’s high neonatal mortality rate, any observed policy outcome has its limitations. It can be difficult to determine whether a given outcome is the direct result of an implemented policy or other external factors. Therefore, it will be necessary to strengthen monitoring and evaluating systems in order to assess unintended consequences, compliance, obstacles, and administrative accountability. Moreover, evaluating observed policy outcomes will facilitate policy revisions and highlight gaps in policy performance, or rather, the degree that a policy outcome contributes to the solution of a problem [41]. Proposed indicators for measuring continued progress include ensuring record keeping, antenatal care, skilled care at birth, exclusive breastfeeding, and postnatal care visits within two days of birth [12].

Innovative Solutions for the Future
New innovations may help mitigate the challenges of saving premature or low birth weight infants in rural communities. For instance, a group of students at Stanford University recently created a low-tech, inexpensive incubator that uses a removable wax warmer, which can be heated with electricity or hot water. The warmer resembles a sleeping bag and can maintain a temperature of 98 degrees for 4-6 hours. While incubators in the United States can cost up to $20,000, an Embrace infant warmer costs $100 and does not have to rely on electricity. Clinical trials are currently being conducted in India with plans to eventually make it commercially available [42].

Kangaroo Mother Care (KMC) is an even simpler intervention for preterm newborns (less than 37 weeks gestation). It involves tying the baby to the mother, thereby facilitating thermal care through skin-to-skin contact, promotion of exclusive breastfeeding, and early recognition of illness. KMC can be initiated after birth once the neonate is clinically stable and can even be continued at home. A meta-analysis showed that KMC reduces neonatal mortality and morbidity in preterm babies who weigh less than 2000 grams at birth. Although these studies were all conducted in hospitals, more research is underway for community-based KMC. With few neonatal care units available in developing countries, larger trials of KMC at lower levels of the health system need to be explored. It is estimated that up to 500,000 neonatal deaths related to preterm birth complications could be prevented annually with this intervention [43].

The American Academy of Pediatrics has implemented an evidence-based, neonatal resuscitation curriculum for resource-limited settings with particular emphasis on “the golden minute” after birth in which stimulation to breathe or assisted ventilation may be needed. In collaboration with the World Health Organization, United States Agency for International Development, and Saving Newborn Lives, the goal is to address birth asphyxia by having at least one person skilled in neonatal resuscitation at every delivery. Bulb suction and bag-mask ventilators are made available at cost to all Millennium Development Goal countries [44].

Another simple approach is using the positive deviance model, which is based on the assumption that in every community, there are individuals, known as positive deviants, whose behaviors yield better solutions to a common problem shared by residents. For instance, families who have higher neonatal survival rates than the rest of the community would first be identified. By determining which beneficial strategies are contributing to better health outcomes, positive deviants are then encouraged to share and promote similar behaviors, such as exclusive
breastfeeding, amongst their peers. The model, which has been used successfully by maternal and child programs to address malnutrition, relies on members of the community to promulgate solutions that are equally accessible to everyone. Studies have shown that this model of behavior change is empowering, more likely to be maintained by community members, and can overcome cultural barriers associated with modifying behaviors that have been passed on for generations [45].

Conclusion

It is therefore recommended that India’s IMNCH policy, which relies on community health workers to provide postnatal care, should be adopted and implemented as it is likely to be more cost-effective and strategically feasible under present conditions in Nigeria. Evaluation of the mortality impact of community-based interventions will be crucial, especially in Africa, since most of the available studies are from Southeast Asia. A wider choice of interventions to reduce neonatal mortality is needed. Even the simple use of participatory peer groups is a potentially sustainable and low cost intervention for promoting demand for care, but larger trials are needed. It is also essential to recognize that neonatal health is inherently dependent on maternal health. Concurrent efforts to improve education and gender equality should not be neglected.

Community health workers should, at the very least, be trained to identify pregnant women, make antenatal visits, help with delivery in home births, conduct postnatal visits, detect and refer for danger signs, maintain records and registers, and organize group talks to promote health education. Community-based treatment of neonatal sepsis should also be strongly considered. In return, workers should be rewarded either monetarily or with access to income opportunities, such as business training and microcredit. Financial incentives, like compensation for each sick newborn identified, may be another option.

Delivering these services through community outreach services can facilitate health education and preventive medicine, thereby improving home-care practices. Further research is needed to identify reasons for low compliance with referrals. Factors, such as lack of faith in public institutions or transportation barriers, may play a role and need to be addressed. At the same time, there should be investment in building the necessary infrastructure so that health systems can eventually be developed.

Setting and achieving specific targets for neonatal survival can only be accomplished with reliable information, which is scantily available in countries with the highest neonatal mortality rates. Thus, governments are unaware of the urgency of the problem and continue to inadequately allocate resources [12]. One of many challenges will be how to systematically collect the necessary data to inform leaders and guide progress.

Given that we only have three more years to achieve the Millennium Development Goals, the global health agenda needs to prioritize training more frontline community health workers to provide home-based postnatal care. It will be critical to integrate them into the developing health care system as their services will continue to be essential in the future. Though the obstacles are many, it is our moral imperative to ensure that the countless lives of newborns lost each day due to preventable measures are no longer ignored.
References


Assessing and Applying Evidence-Based Interventions at the Community Level in India as a Model Policy to Reduce Neonatal Mortality Rates in Nigeria


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