

# Cadres, content and costs for community-based care for mothers and newborns from seven countries: implications for universal health coverage

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## Introduction

This series of papers are the first multi-country, economic and systems analyses of community based maternal-newborn care (CBMNC). Important implications arise for universal health coverage (UHC), community care generally and specifically for the design and implementation of CBMNC with some practical dos (and some don'ts). The findings are relevant for other community-based programmes, for example community case management of childhood infections. HIV treatment, mental health care, and early child development.

The eight papers cover six African countries including five cRCTs in Ethiopia (Mathewos *et al.* 2017), South Africa (Daviaud *et al.* 2017a), Tanzania (Manzi *et al.* 2017), Uganda (Ekirapa-Kiracho *et al.* 2017), Ghana (Pitt *et al.* 2016), one programmatic assessment of national scale-up in Malawi (Greco *et al.* 2016), plus a rural pro-poor programme in Bolivia (Barger *et al.* 2017b) designed to reach an underserved ethnic minority (Figure 1).

Birth is the time of greatest risk for the newborn and their mother, and since minutes count, this moment is the greatest test of health systems function and UHC. Yet the world's 140 million births each year occur in very different health systems contexts. Analysis based on the latest data for live births (UNICEF 2015) and place of birth (UNICEF 2016) show rapid transitions over the last decade with more births in middle-income countries and increases in facility births:

*12.3 million births* in high-income contexts, where most women have access to quality of care, and protection against catastrophic charges if they or their baby require comprehensive care, following by health and social support for the crucial days and weeks after birth—exemplifying UHC.

*38.6 million births* in middle-income contexts, where also most births are in hospital, but access to high quality care may be less predictable or more complex care may be affected by financial barriers.

*44.7 million births* now take place in hospital in low-income contexts. This represents a remarkable shift into facility, from 60% of all births worldwide in 2000 to 80% in 2016 (UNICEF 2016). Yet there are major gaps in quality of care, sometimes for basic aspects such as running water, plus challenges for all the health system building blocks of human resources, equipment, drugs, and data and leadership to drive improved quality. Most women and their babies are discharged home within hours of birth.

44.1 million women give birth at home, with the poorest women most excluded. In South Asia two thirds of home births are with traditional birth attendants, but in Africa, the majority of home births are home alone.

Focusing on Africa, where most of the studies in this supplement took place, the continent has reached a tipping point with half of the 36 million births now in facilities (Figure 2). Yet for most countries there is still a huge equity gap with facility births being 59% more likely for the highest income quintile compared with the lowest (Lawn *et al.* 2014). There is an even greater gap in quality of care for facility births.

Yet irrespective of where birth occurs, the woman and her newborn spend most of their time at home, and need to be empowered for healthy home behaviours, and these can be enabled through effective pregnancy and postnatal care contacts. Antenatal care has had decades of focus, with structured visit schedule and content. In contrast, systematic postnatal care contacts only gained global

### Key Messages

- Costing inputs: First multi-country, standardised economic analyses of community based maternal newborn care (CBMNC), involving evaluations of large scale implementation in six African countries including five cRCTs (Ethiopia, South Africa, Tanzania, Uganda, Ghana), national scale-up in Malawi plus a rural programme in Bolivia.
- Cost effectiveness: CBMNC is highly cost effective by WHO definition of cost per DALY averted being lower than the national GDP per capita), since although impact is modest, the running cost is relatively low at under USD1 per capita for six of the seven evaluations.
- Cost drivers: The largest and most variable cost driver was training and incentives for community health workers (CHW) influenced by whether the worker is a 'volunteer' CHW or a paid extension worker. Supervisory systems and costs for commodities also varied substantially. Cost per home visit ranged from USD1.8 in Tanzania to USD7 in Bolivia, particularly affected by the number of home visits per CHW, and choices regarding commodities.
- Implications for scale up: Efficiency would be improved by increasing the number of visits undertaken. Higher impact requires higher quality of care in facilities which are where most births now occur and is especially crucial for care of pre-term and ill newborns.

### Editorial Overall findings and implications

#### First paper:

Overview, methods and results of multi-country economic analyses  
Introduction to the supplement, objectives, contexts of studies, COIN care tool, methods, results and challenges to address

Country	Evaluation design and learning
Ethiopia	<i>Design:</i> cRCT (COMBINE) <i>Learning:</i> CEA, additional cost of neonatal infection case management to preventive CBMNC
Tanzania	<i>Design:</i> cRCT (INSIST) <i>Learning:</i> CEA, efficiency, time load and running costs
Uganda	<i>Design:</i> cRCT (UNEST) <i>Learning:</i> CEA, efficiency, time load and running costs
South Africa	<i>Design:</i> cRCT (GOODSTART) <i>Learning:</i> cost and time-load for CBMNC to inform package design for national multi-purpose CHW
Malawi	<i>Design:</i> Government scale-up of CBMNC with evaluation in 3/27 districts <i>Learning:</i> Feasibility, efficiency of scale-up using multi-purpose extension workers
Bolivia	<i>Design:</i> Government package to reach under-served ethnic minority with CBMNC, pragmatic evaluation <i>Learning:</i> Cost drivers, implications for scale up

#### Final paper:

Multi-country analysis of kits and commodities used by CHWs and extension workers

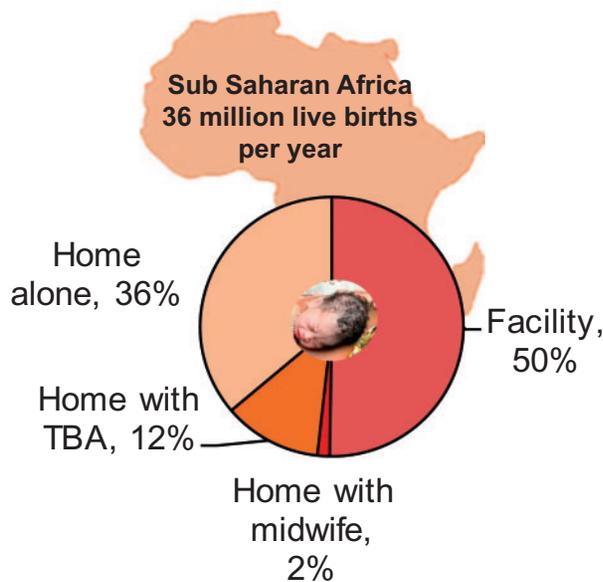
**Figure 1.** Community based maternal newborn care economic analysis: summary of eight papers in this supplement.

Abbreviations: cRCT, cluster randomised controlled trial; CEA, cost effectiveness analysis. Study acronyms spelt out in full in the respective papers

health attention after The Lancet Neonatal Series (Lawn *et al.* 2005), especially driven by data regarding the risky first day after birth, when one million newborns die and approximately one-fifth of maternal deaths occur. Postnatal care is important for promotion of maternal, newborn survival, particularly early identification of danger signs, and also for healthy behaviours such as breastfeeding and maternal mental health support. Most European countries have high national coverage of home postnatal visits, for example around 1900 health visitors in the UK were nationally scaled up with early home postnatal care visits and also being responsible for birth certificates (Davies, 1988). Cuba provides multiple home visits by

doctors in the year after birth, also promoting optimal nutrition and early child development (Bragg *et al.* 2012).

Even with marked increases in facility births, community contacts during pregnancy and postnatally are required and are in policy for most countries (WHO 2015). Antenatal care contacts are similar in many countries, with clear WHO guidelines on numbers of visits and the content of care. In contrast, CBMNC packages are highly varied. WHO guidelines recommend at least two home contacts during pregnancy and two to four postnatally (WHO 2013). Between 2000 and 2016 several influential South Asian studies were published (Bang *et al.* 1999; Baqui *et al.* 2008; Kumar *et al.* 2008);



**Figure 2.** Place of birth in Sub Saharan Africa.

Data source: Analysis based on data from UNICEF (2016). State of the World's Children 2016. Geneva: UNICEF

however, apart from one study in Pakistan using the existing national Lady Health Worker cadre (Bhutta *et al.* 2011; Soofi *et al.* 2017), most of the early studies were testing efficacy, the cadre was a specially recruited CHW, and the content often curative care at home, notably injection antibiotics. Initial studies also focused mostly on the baby. Very few of these studies included systematic economic analyses, and the limited economic data could not be pooled.

The studies in this series of papers were part of a new wave of large cRCTs and national evaluations in Africa to examine impact of CBMNC, including both mother and newborn, attempting to link to health facilities and aiming to inform national scale up. These studies were designed between 2006 and 2008 in the context of a 'second primary health care revolution', e.g. with the set-up of Ethiopia's national Health Extension Worker programme. Given the MDG focus on maternal and child survival, with increasing attention to neonatal deaths, the focus of many of these community programmes was on maternal, newborn and child health. Between 2005 and 2010, 10/12 countries in South Asia and 21/45 countries in Sub Saharan Africa developed policies for CBMNC, but with varied content of care and implementation approaches in terms of cadres and visit intensity (WHO 2012). Whilst the Asian studies showed high neonatal mortality impact (30 to 70%), the African ones have reported lower, variable impact, being affected by lower coverage, and by poor quality of care in facilities (Lassi and Bhutta, 2015). Context, notably baseline neonatal mortality rate (NMR) is correlated with the level of mortality reduction—these African studies had NMRs of 23–33, apart from South Africa which was lower. Many of the first wave of Asian studies were in settings with higher neonatal mortality, which may also explain some of the large NMR reduction with community care.

To inform implementation of CBMNC, priority was given to addressing the gap for economic and systems data including worker time, supervisory load, commodities used, recognising that harmonised inputs were crucial to allow data pooling. Led by the South African Medical Research Council working with Saving Newborn Lives/Save the Children and a large group of African researchers and economists,

a standardised approach was developed including the 'Cost of Integrated Newborn Care (COIN Care) Tool' (details in paper 1).

## Programmatic design

Although the details varied, all these examples of CBMNC included the same programme strategy, notably:

1. *Pregnancy and postnatal contacts at home* (with strategies to increase birth in facilities), with an aim of between 5 and 9 visits in total across the countries. High coverage of the home pregnancy visit was achieved in almost all settings, but lower for postnatal and especially the critical early postnatal visit. Within these home visit packages, there was variation in:

*Content*, with all including preventive care, particularly promotion of facility birth, and also health behaviours such as breastfeeding. The only study in this collection which included curative care was COMBINE in Ethiopia, with community based antibiotic therapy including injection gentamicin (Mathewos *et al.* 2017). None of these studies attempted to provide care at birth at home or community level, and recent data from Pakistan suggests that this is particularly challenging (Soofi *et al.* 2017).

*Cadres*, broadly fell into extension workers funded by the government (Ethiopia and Malawi) or CHWs in most cases recruited by the study team (Ghana, South Africa, Tanzania, Uganda), or by non-governmental organisations (Bolivia) and acting as volunteers but with various incentives including training or travel allowances.

*Commodities* range in price with the estimated annual cost per CHW being highest in South Africa (USD116), driven especially by a m-Health component, and lowest in Tanzania where the only item over USD5 was an umbrella (Barger *et al.* 2017a). In Ethiopia drug-related supplies (antibiotics) accounted for over three-quarters of the kits annual running costs. Only in Ethiopia and Malawi were the procurement pathways through government systems. If high coverage (95%) was achieved for a standardised population, then the Tanzania programme was the lowest running cost driven by higher visits per worker and much lower training costs and especially commodity costs, with few consumables.

*Coverage* was varied. In Bolivia with a dispersed population, fewer visits per CHW and higher costs per woman, the estimated annualised cost per CHW was USD595, which was 75% higher than Tanzania. However, the purpose in Bolivia was to reach an underserved ethnic group, and ensure no one was left behind, which may be expected to cost more.

2. *Community mobilization* was undertaken in all cases and varied from active regular women's groups, through to more 'light touch' approaches such as community meetings a few times during the lifespan of the study. Several of the packages involved active engagement of home decision-makers such as men and mothers or mother-in-law.
3. *Quality of care in facilities* was part of most of these programmes, with a variable level of quality improvement, ranging from multi-facility quality collaboratives to limited training for essential newborn care (e.g. NEWHINTS) (Pitt *et al.* 2016).

## Programmatic costs and cost-effectiveness

One unequivocal finding is that CBMNC is highly cost-effective (by WHO definition of cost per DALY averted being lower than the national GDP per capita), compared to the control group of standard care without home visits. These results are driven by low running costs, rather than by high impact, with a very achievable reduction of 1 neonatal death per 1000 live births (<5% of neonatal mortality) in

Ethiopia, Ghana, Malawi, South Africa, Tanzania and Bolivia. The annualised financial costs standardised per 100 000 population was lower than USD1 per capita per year for six of the seven countries, even in study settings and in rural, hard to reach populations.

The main cost drivers included training and incentives for community health workers (CHWs) obviously influenced by whether the worker is a 'volunteer' CHW or a paid extension worker. Supervisory systems and costs for commodities varied substantially. Cost per home visit ranged from USD1.8 in Tanzania to USD7 in Bolivia particularly affected by the number of home visits per CHW.

Time spent per CHW was relatively consistent for a given home visit (median of 23–45 min, except for Ghana where it was 80 min) and even for travel time (30–45 min). However, the total time spent on this CBMNC ranged from 3 to 13 h a week depending on whether the CHW was volunteer or employed, a single or a multi-purpose worker (Daviaud *et al.* 2017b).

Reaching higher coverage would lead to greater efficiency, and lower cost per visit. These analyses show that the incremental cost and sustainability may be lower with a multi-purpose paid extension worker (such as Malawi and Ethiopia), but that these workers may struggle to reach higher coverage of care due to multiple competing responsibilities, e.g. family planning, immunisation, iCCM, HIV, TB and many other programmes. Targeting hard to reach populations is likely to result in higher running costs as was found to be the case in Bolivia (Barger *et al.* 2017b).

Increased complexity of content, especially providing curative care at home such as injection antibiotics, is likely to have higher impact (Baqui *et al.* 2015). However this more complex content is harder to scale up, needing more workers more training, more supervision and sustainable supply systems, as seen in the COMBINE study in Ethiopia (Mathewos *et al.* 2017). This increased complexity and unit cost is particularly justifiable for humanitarian settings where routine services are least likely to be able to deliver.

## What next?

The SDGs have one health goal, still with women and children at the start, now with new focus on UHC (United Nations). To achieve UHC requires full coverage of:

- Antenatal care where the number of visits recommended by WHO has recently jumped from four to eight (WHO 2016). More visits highlight an imperative to provide some of these contacts at home through community systems;
- Postnatal visits and in many areas of the world this will require home contacts; and
- Quality of care at birth for every woman and every newborn, which for high impact will require emergency obstetric care services that is neither 'too little too late, or too much too soon' (Miller *et al.* 2016) and also emergency care of small and sick newborns (Bhutta *et al.* 2014).

To achieve this crucial part of UHC will require more context specific planning and programming and particularly that health systems leave behind the dichotomy of community vs facility care (Mason *et al.* 2014), and of maternal vs newborn care (Kinney *et al.* 2016). These new analyses are helpful in both regards. Whilst CBMNC is highly cost-effective, without facility care mortality impact will be limited for newborns and especially for women and stillbirths. CBMNC programmes with preventive care at home, even at higher coverage, had negligible mortality impact if the facility care was low quality. Linking communities to facilities with effective, high-quality care will also be crucial. Achieving this linkage will

require more innovation within the health system, such as major investments in quality of care (WHO/UNICEF 2014), and respectful care, but also more robust technology, and patient-held records. However inter-sectoral changes will also be crucial such as improved WASH at facilities, better transport linkages between facilities and with families at home. To drive higher coverage, quality and equity of care—wherever it is received—will require improved measurement of coverage, content and cost of care.

Community care is a crucial contribution for universal coverage, and is affordable, with running costs of less than USD1 per capita per year (Daviaud *et al.* 2017b), but impact and sustainability require context-specific, data-based choices regarding cadre, content of care, commodities, incentivization for CHWs and supervisors, and critically a health systems approach to linking with high quality facility-based care for every woman and every newborn.

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