Newborn survival in Uganda: a decade of change and future implications

Anthony K Mbonye,[1] Miriam Sentongo,[2] Gelasius K Mukasa,[3] Romano Byaruhanga,[4] Olive Sentumbwe-Mugisa,[5] Peter Waiswa,[6,7,8] Hanifah Naamala Sengendo,[9] Patrick Aliganyira,[9] Margaret Nakakeeto,[10] Joy E Lawn[11] and Kate Kerber[11,12]* for the Uganda Decade of Change and Future Implications Analysis Group†

[1]Community Health Services, Ministry of Health, Kampala, Uganda, [2]Reproductive Health Division, Ministry of Health, Kampala, Uganda, [3]International Baby Food Action Network, Kampala, Uganda, [4]Nsambya Hospital, Kampala, Uganda, [5]WHO, Kampala, Uganda, [6]Makerere University School of Public Health, Kampala, Uganda, [7]Karolinska Institutet, Stockholm, Sweden, [8]Iganga-Mayugye Health & Demographic Surveillance Site, Iganga, Uganda, [9]Save the Children, Kampala, Uganda, [10]Child Health Advocacy International, Kampala, Uganda, [11]Save the Children, Cape Town, South Africa and [12]University of the Western Cape, Belleville, South Africa

*Corresponding author. Saving Newborn Lives, Save the Children, South Africa. E-mail: kjkerber@gmail.com

†Group members are listed at the end of the article.

Accepted 3 April 2012

Each year in Uganda 141 000 children die before reaching their fifth birthday; 26% of these children die in their first month of life. In a setting of persistently high fertility rates, a crisis in human resources for health and a recent history of civil unrest, Uganda has prioritized Millennium Development Goals 4 and 5 for child and maternal survival. As part of a multi-country analysis we examined change for newborn survival over the past decade through mortality and health system coverage indicators as well as national and donor funding for health, and policy and programme change. Between 2000 and 2010 Uganda's neonatal mortality rate reduced by 2.2% per year, which is greater than the regional average rate of decline but slower than national reductions in maternal mortality and under-five mortality after the neonatal period. While existing population-based data are insufficient to measure national changes in coverage and quality of services, national attention for maternal and child health has been clear and authorized from the highest levels. Attention and policy change for newborn health is comparatively recent. This recognized gap has led to a specific focus on newborn health through a national Newborn Steering Committee, which has been given a mandate from the Ministry of Health to advise on newborn survival issues since 2006. This multi-disciplinary and inter-agency network of stakeholders has been able to preside over a number of important policy changes at the level of facility care, education and training, community-based service delivery through Village Health Teams and changes to essential drugs and commodities. The committee's comprehensive reach has enabled rapid policy change and increased attention to newborn survival in a relatively short space of time. Translating this favourable policy environment into district-level implementation and high quality services is now the priority.

Keywords Uganda, newborn, neonatal mortality, maternal, newborn and child health, Millennium Development Goals, epidemiology, implementation, health systems research

KEY MESSAGES

- Between 2000 and 2010 neonatal mortality in Uganda reduced by 20%. This is more than the average reduction for sub-Saharan Africa but less than the national reductions in maternal mortality and under-five mortality after the neonatal period.

- There has been a recent increase in attention to newborn survival, as well as comprehensive policy change and the start of programme change for newborn health over a relatively short period of time.

- The multi-disciplinary, inter-agency national Newborn Steering Committee, appointed by the Maternal and Child Health Cluster of the Ministry of Health, has been instrumental in changing the evidence and policy landscape, and has strengthened dialogue across the continuum for maternal, newborn and child health.

- Recognition of opportunities for improved service delivery for newborn care at both health facility and community level shows promise, but improved local data, dedicated funding and a commitment to achieving high coverage of quality services are needed in order to save lives.

Box 1 Uganda at glance

Total population (2011)	34 500 000
Mothers, babies and children	
Annual births (2010)	1 514 000
Maternal mortality ratio per 100 000 live births (2010)	310
Annual number of maternal deaths	5000
Stillbirth rate per 1000 total births (2009)	25
Annual number of stillbirths	38 000
Neonatal mortality rate per 1000 live births (2010)	26
Annual number of newborn deaths	39 000
1–59 month mortality rate per 1000 live births (2010)	68
Annual number of 1–59 month child deaths	103 000
Health system	
Health worker density per 10 000 population (2005)	14.3
Percentage of births that take place in a facility (2011)	57%
Context	
History of regional civil unrest; high total fertility rate; growing gap between rich and poor	

Data sources: Population estimates (UNFPA 2011); maternal mortality estimates (WHO *et al.* 2012); annual births, neonatal, and under-five mortality (UNICEF *et al.* 2011) with new analysis of mortality trends by age of death; stillbirth estimates (Cousens *et al.* 2011); health worker density (WHO 2011a); facility births (UBOS and Macro International Inc. 2012). Note that mortality rates and numbers are for most recent year in which data are available.

Introduction

Progress to reduce the world's 3.1 million newborn deaths each year is being made in all regions; however sub-Saharan Africa is being left behind in this global shift. At the current average rate of decline, the risk of dying within the first 4 weeks of life in Africa will only match the current risk in high-income countries after the year 2160 (Oestergaard *et al.* 2011). However, there are encouraging signs that the rate of progress has increased for both under-five and neonatal survival since 2000. Meeting the Millennium Development Goal (MDG) 4 for child survival by 2015 will be increasingly determined by national success in reducing newborn deaths, since an increasing proportion of under-five deaths globally occur in the first month of life (Liu *et al.* 2012).

In 2000, the government of Uganda committed to meeting the global MDGs by 2015. Ugandan policy makers have placed particular attention on achieving MDG 5 for maternal health and MDG 4 for child survival, though the country is not yet on track for either goal. Each year, around 141 000 children die before their fifth birthday and 5000 women die due to complications of pregnancy and childbirth (Box 1) (WHO *et al.* 2012; UNICEF *et al.* 2011). Challenges such as persistent high fertility rates, few health workers, the urban–rural gap and civil unrest in recent years affect all families but newborns are especially vulnerable.

Newborn health as a global public health issue has gone from being seen as an invisible and intractable problem, to one for which effective interventions exist and are affordable in low resource settings (Shiffman 2010). What factors have facilitated this increase in attention for newborn health in Uganda and what have been the barriers? What are the key issues now in ensuring that policy change leads to effective implementation in countries?

This paper is the final in a seven-paper supplement to evaluate change for newborn survival, focusing on the decade 2000–10. In this paper, we explored changes that have occurred for newborn survival, applying a common results framework and standardized analyses and tools in order to better

understand what has or has not progressed and why. By examining these quantitative and qualitative data, we also identify readiness for scale up, facilitating factors and constraints, as well as health system gaps in order to inform the future agenda for newborn survival.

Methods

This evaluation is structured according to a standard results framework with reduction in neonatal mortality as the goal, changes in coverage of healthy behaviours and use of health services as the strategic objective, and policy and programme change as the intermediate results. Changes in context and certain social determinants of health are also considered. More details on this framework and methodology are found in the first paper in this supplement (Lawn *et al.* 2012).

Data collection methods

We conducted a review of peer review literature, programme reports and assessments, and national guidelines and policy documents. We used standard methods and tools developed for the multi-country analysis on change for newborn survival (Lawn *et al.* 2012). The data were entered into a shared database and cross-checked for quality. Definitions and sources are detailed in the first paper of this supplement (Lawn *et al.* 2012).

A national multi-disciplinary team of 28 experts was convened to complete the tools, analyse data and review the findings. Members included representatives from the Ministry of Health (MoH), health professional associations, United Nations (UN) agencies, non-governmental organizations, academics and researchers. This team held meetings convened by the MoH during 2010 and 2011, and communicated by teleconference and email between meetings.

Data analysis methods

We assessed changes in national neonatal mortality, cause of death and coverage of newborn-related health behaviours and services between 2000 and 2010 using data from four Demographic and Health Surveys (DHS): 1995, 2000/1, 2006 and preliminary results for 2011 [Uganda Bureau of Statistics (UBOS) and ORC Macro 1995; UBOS and ORC Macro 2001; UBOS and Macro International Inc. 2007; UBOS and Macro International 2012], the United Nations (UN) (UNICEF *et al.* 2011), the Institute for Health Metrics and Evaluation (IHME) (Lozano *et al.* 2011), and Child Health Epidemiology Reference Group (Liu *et al.* 2012). To assess change over time, the average annual rate of reduction for Neonatal Mortality Rate (NMR) is compared with regional and global rates as well as under-five and maternal mortality (WHO *et al.* 2012; UNICEF *et al.* 2011; Hill *et al.* 2012). Definitions and sources of coverage indicators are detailed in the first paper in this supplement (Lawn *et al.* 2012). More detail on the sources and quality of the neonatal mortality data are detailed in Supplementary Data Web Annex A. The Lives Saved Tool (LiST) (Johns Hopkins Bloomberg School of Public Health 2010) was used to evaluate associations between changes in coverage of health services and neonatal mortality. A description of the indicators and analysis is in Supplementary Data Web Annex B. Changes in factors not

related to the health system such as national economic growth, female literacy, governance and conflict, and poverty reduction were considered using data from the World Bank (World Bank 2011).

Two standard tools were applied to assess changes in national newborn policy and programmes (Lawn *et al.* 2012). First, the Policy and Programme Timeline was used to identify critical events and changes for policies, programmes, advocacy and research that may have contributed to scale up of newborn health programmes (Supplementary Data Web Annex C) (Lawn *et al.* 2012). Secondly, 27 selected Scale-up Readiness Benchmarks were considered to determine whether each marker was in place (achieved), partially achieved or in progress (partially achieved), or not in place (not achieved) for three time points of 2000, 2005 and 2010 (Supplementary Data Web Annex D) (Moran *et al.* 2012). Both tools were completed by the national expert team and background documentation was verified by out-of-country reviewers.

Availability and access to newborn care services was assessed using the density of physicians, nurses and midwives, and measured against World Health Organization (WHO) standards (Lawn *et al.* 2012). Additionally, staffing levels from a four-district health facility assessment were compared with national norms and standards for service delivery (MoH 2010e; MoH 2011b). *Quality of newborn care services* was assessed primarily using Uganda's 2007 Service Provision Assessment (MoH and Macro International Inc. 2008) as well as a nine-district health facility assessment (MoH 2010e; MoH 2011b). We examined *demand for care* through published literature on barriers and facilitators to care-seeking (Waiswa *et al.* 2008; Waiswa *et al.* 2010b; Waiswa *et al.* 2010c) and through newborn messages and scope of the national behaviour change communication strategy (Newborn Steering Committee 2010). National financing and official development assistance (ODA) for health overall as well as maternal, newborn and child health (MNCH) were analysed to assess changes in *financial resources for health* (WHO 2005; Pitt *et al.* 2010; WHO 2011b). All government and donor funding values are in constant 2008 United States Dollars (USD).

Results

Neonatal mortality reduction (goal level)

The scarcity of national data from civil registration and health sector sources necessitates the use of estimates of mortality rates and causes. The country's birth registration is currently eighth lowest in the world with just 21% of births captured (UNICEF 2011a). The routine health information system does not report specifically on deaths during the first month of life; most newborn causes of death are combined in one 'perinatal conditions' category and are not reported by programmatically useful causes of deaths.

According to household survey data and modelled estimates, neonatal mortality has declined since 1990, with an increasing pace since 2000 (Figures 1a and 1b). While modelled estimates are limited by a lack of population-based household survey data in the second half of the decade, between 2000 and 2010 neonatal mortality declined from 32 to 26 deaths per 1000 live births, an annualized reduction of 2.2% per year, according to UN estimates (UNICEF *et al.* 2011). This is similar to the rate of
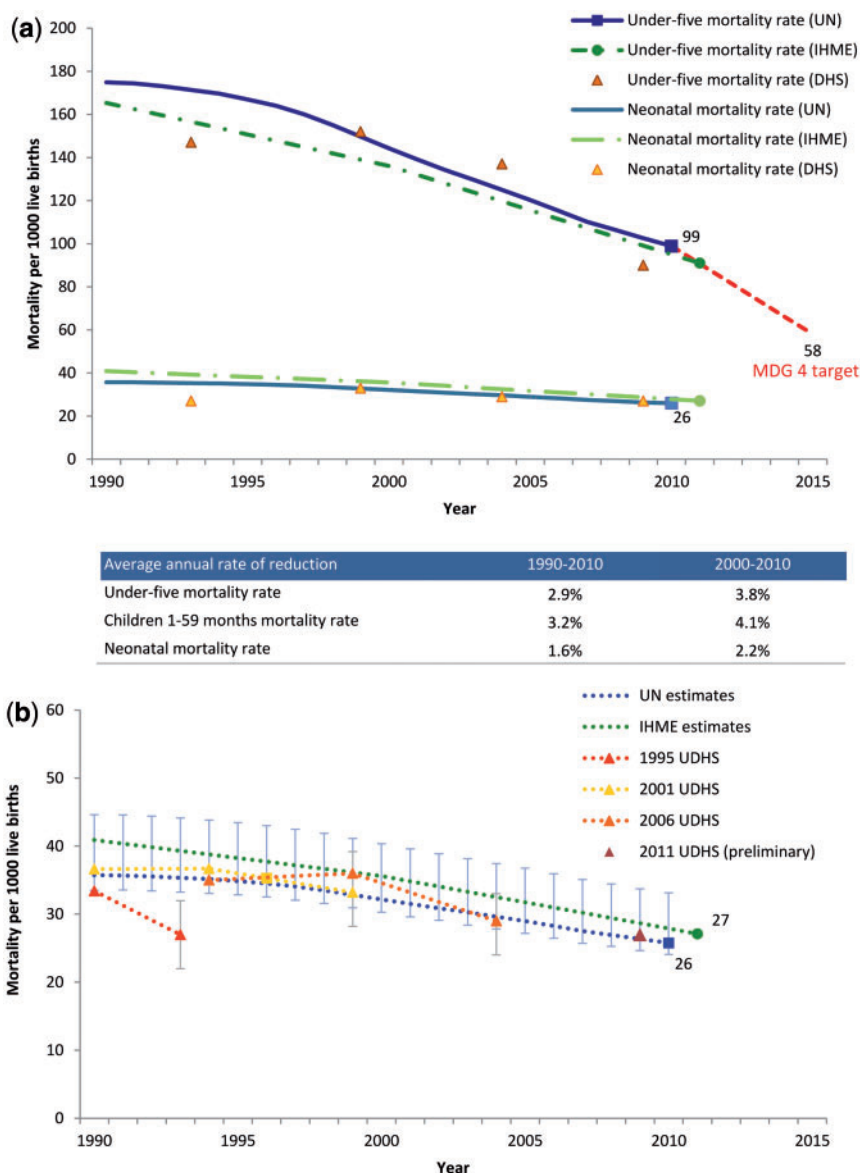
Figure 1 (**a**) National progress to MDG 4 for newborn and child survival from 1990 *Data sources*: Demographic and Health Surveys (UBOS and ORC Macro 1995; UBOS and ORC Macro 2001; UBOS and Macro International Inc 2007; UBOS and Macro International 2012); UN estimates and MDG target (UNICEF *et al.* 2011); IHME estimates (Lozano *et al.* 2011). *Note*: Point estimates from household surveys are centred 2 years prior to survey date. (**b**) Neonatal mortality trends from 1990 *Data sources*: Demographic and Health Surveys (UBOS and ORC Macro 1995; UBOS and ORC Macro 2001; UBOS and Macro International Inc. 2007; UBOS and Macro International 2012); UN estimates and MDG target (UNICEF *et al.* 2011); IHME estimates (Lozano *et al.* 2011). *Note*: Point estimates from household surveys are centred 2 years prior to survey date. Uncertainty bounds are provided for UN estimates and 95% confidence intervals for national household surveys where available.

reduction shown between the 2000/1 DHS and preliminary data from the 2011 DHS (UBOS and ORC Macro 2001; UBOS and Macro International Inc. 2012). Both UN and IHME (Lozano *et al.* 2011) neonatal estimates show a higher rate of decline for Uganda than the regional average for sub-Saharan Africa of 1.4% per year. Within Uganda, neonatal mortality is decreasing at a slower pace than mortality amongst children 1–59 months and maternal mortality, at 4.1% per year and 5.2% per year, respectively (UNICEF *et al.* 2011; WHO *et al.* 2012).

The three main causes of neonatal mortality (severe infections, intrapartum-related deaths and complications of preterm birth) account for approximately 90% of all newborn deaths

(Liu *et al.* 2012) (Figure 2). Official elimination status for maternal and neonatal tetanus was achieved in June 2011, with deaths due to neonatal tetanus dropping from 5% in 2000 to less than 1% in 2008 (UNICEF 2011b). In addition to these direct causes of death, delays in seeking and receiving care at household and facility level indirectly contribute to newborn mortality (Waiswa *et al.* 2010a).

Changes in the wider context for health

Although primarily we analysed direct impact changes on newborn health, we also examined broader contextual changes
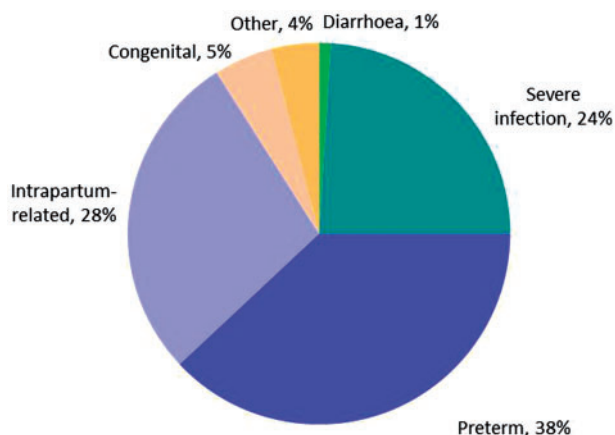
Figure 2 Estimated causes of mortality around the year 2010 for 39 000 neonatal deaths   *Data sources*: Uganda-specific mortality estimates (Liu *et al*. 2012). *Note*: Severe infection includes sepsis, meningitis, pneumonia and tetanus.

over the past decade. During this period, gross national income per capita nearly doubled to US$500 in 2010 and adult female literacy increased from 59% to 65% (World Bank 2011). Multi-sectoral policies on nutrition, safe water, agriculture and poverty eradication were developed and implemented, but distribution of wealth remains inequitable; the share of household income amongst the poorest 40% of the population dropped slightly from 18% to 16% (UNICEF 2011a). Adult HIV/ AIDS prevalence has reduced slightly over the decade but remains high at 6.5% (UNICEF 2011a). Uganda faced challenges such as unrest in the northern and eastern regions and

conflict in neighbouring countries. Despite struggles with political instability throughout the decade, measures of government effectiveness remained constant (World Bank 2010).

Healthy behaviours and equitable use of effective health services (strategic objective level)

Coverage of key newborn health interventions did not measurably increase between 2001 and 2006, though the preliminary DHS 2011 data show some improvement (Uganda Bureau of Statistics and Macro International Inc. 2007; Uganda Bureau of Statistics and ORC Macro 2001) (Figure 3). Use of modern contraceptive methods and skilled attendance—two important high-impact interventions—increased by 8 and 17 percentage points respectively. Despite high antenatal care coverage, only an estimated 53% of HIV-positive pregnant women received antiretroviral drugs (UNAIDS *et al*. 2010). Only 11% of women who gave birth at home received postnatal care within 2 days of delivery. Exclusive breastfeeding in the first month of life remained above 80% throughout the decade, but less than half (42%) of mothers initiated breastfeeding within the first hour after birth (UBOS and Macro International Inc. 2007; UBOS and Macro International Inc. 2012).

Large disparities in access to health care exist between the wealthiest and poorest families, especially for clinical care which requires access to 24/7 services. Skilled care at birth was nearly three times higher amongst families in the richest quintile compared with families in the poorest quintile (Uganda Bureau of Statistics and Macro International Inc. 2007). Despite a MoH policy statement restricting training and use of traditional birth attendants, they assisted in nearly one-third of births amongst families in the poorest wealth quintile (Uganda Bureau of Statistics and Macro International Inc.
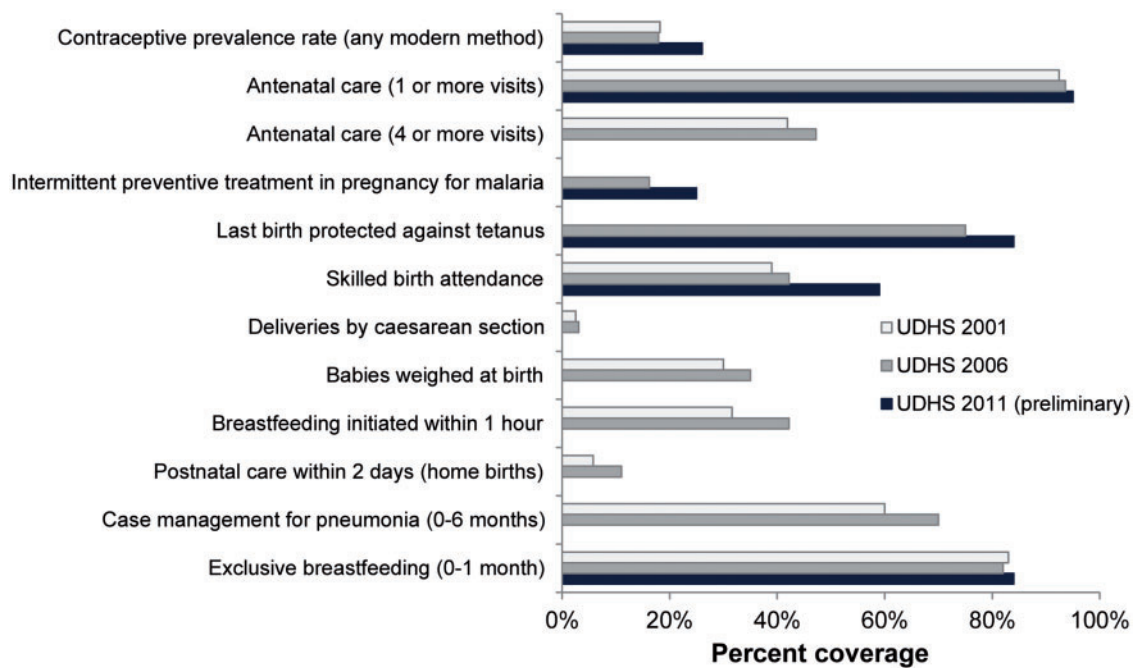

Figure 3 Trends in national coverage for newborn-related interventions and packages   *Data sources*: Demographic and Health Surveys (UBOS and ORC Macro 1995; UBOS and ORC Macro 2001; UBOS and Macro International Inc. 2007; UBOS and Macro International 2012).

2007). Even for women who gave birth in health facilities there were missed opportunities to provide interventions critical for maternal and newborn survival. Emergency obstetric care and skills for neonatal resuscitation were critically low (Waiswa *et al*. 2010a), and only 5% of facilities nationwide were equipped to offer caesarean sections (MoH and Macro International Inc. 2008).

Programme change at scale in health systems (intermediate results level)

Policy and programme change at scale in health systems

The analysis of the Policy and Programme Timeline revealed considerable change from 2000 to 2010. Attention to newborn survival was minimal prior to 2000 and in the early part of the decade but increased rapidly from 2005 (Supplementary Data Web Annex C). Uganda's progress towards achieving the Scale-up Readiness Benchmarks confirms this pattern (Moran *et al*. 2012). In 2000, none of the 27 benchmarks were completed, but by 2010, 15 benchmarks were completed and 9 others were in progress or partially fulfilled, with one missing set of data (Figure 4). Initially newborn health was introduced through maternal health programmes with less but still significant incorporation of newborn care into child health activities. Policy change in the second part of the past decade appears to be linked to newborn-specific advocacy and action across facility and community levels in the context of broader MNCH policy and programmes.

Following the 10-year celebration of the regional safe motherhood initiative in 1997, WHO in Uganda launched a mother–baby package together with the MoH's Safe Motherhood Strategic Plan (MoH and WHO 1997). The package was focused on facility-based care during pregnancy and childbirth but omitted high impact interventions such as bag-and-mask resuscitation, Kangaroo Mother Care and community-level interventions. Similarly, Uganda's first Health Sector Strategic Plan in 1999 included maternal health components but neglected newborn-specific interventions (MoH 1999). The Minimum Health Care Package detailed in the second five-year Health Sector Strategic Plan

(MoH 2005) included priority newborn survival interventions such as resuscitation, safe and clean delivery, thermal care and care-seeking for sick babies, but it lacked an implementation framework or mechanism to train health workers in newborn care and deliver these services.

In 2006, a multi-disciplinary national Newborn Steering Committee (NSC) was established as an advisory body to the MoH Maternal and Child health cluster (Box 2). The committee's first major task was to undertake a national situation analysis for newborn health (MoH 2008). The NSC provided technical support on newborn health issues to the national Roadmap to Accelerating the Reduction of Maternal and Neonatal Mortality (referred to here as Roadmap) (MoH 2007b) and the 2009 Child Survival Strategy (MoH 2009a). The NSC led the development of an implementation framework for newborn care and service delivery standards (MoH 2010d; MoH 2010e).

Availability and access to newborn care services

Health sector reform in the late 1990s led to a major restructuring and decentralization of health services. At the district level, one general hospital serves approximately 500 000 people, while health sub-districts administer lower level health facilities including Health Centre (HC) level IV, III and II. HCs IV function as small hospitals which should be equipped for emergency obstetric care; HC III conduct births, manage newborn illness and provide laboratory services; and HC II are small, outpatient-only units which can provide a first dose of antibiotics to a sick newborn and referrals. Private and faith-based organizations own 41% of hospitals and 22% of lower level HCs. Private not-for-profit facilities receive government subsidies to expand care to rural areas (Lundberg 2008).

The average distance of families from health facilities improved from 49% of the population living within 5 km of a health facility in 2000 to 73% in 2008 (Lundberg 2008). This is short of the 85% target set in the third and current five-year Health Sector Strategic and Investment Plan but demonstrates the increase in public and private facilities (MoH 2010a).
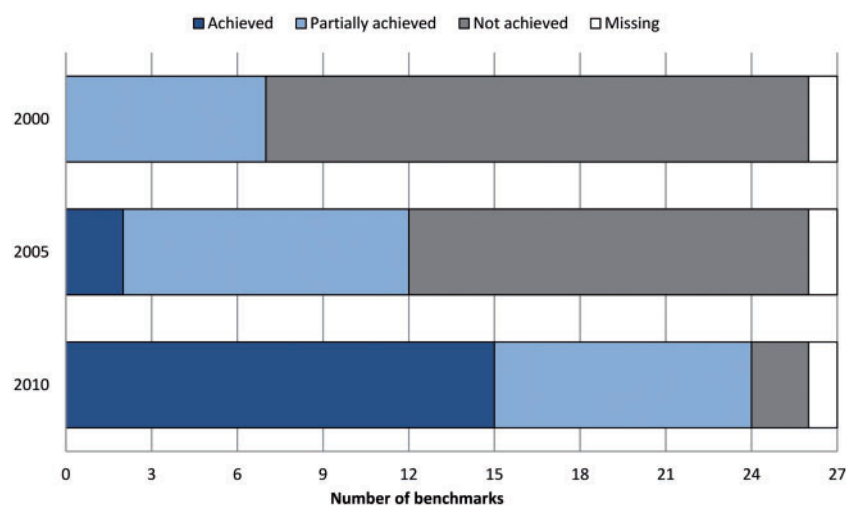

Figure 4 Progress towards Scale-up Readiness Benchmarks for newborn care. *Note*: More detail on this analysis can be found in the second paper of this supplement (Moran *et al*. 2012). Full results and documents reviewed can be found in Supplementary Data Web Annex D.

Box 2 Uganda's national Newborn Steering Committee (NSC)

Rationale

The 2005 *Lancet* neonatal series was a milestone that called attention to evidence-based newborn survival interventions that could be delivered within existing health systems (Darmstadt *et al*. 2005; Knippenberg *et al*. 2005). Following the publication of the series, Ministry of Health (MoH) representatives requested technical support for Uganda and held a high-level stakeholder meeting on newborn health in 2006.

Process

Newborn health was identified as a gap requiring specific technical expertise in order to transform policy and scale up interventions. Consequently, the NSC was established in 2006 as an advisory arm within the MoH Maternal and Child Health cluster, with clear terms of reference in relation to the MoH. The multi-disciplinary NSC comprises approximately 20 members from different backgrounds, portfolios, institutions and organizations. Since the committee's inception, Save the Children has provided organizational and nominal financial support for monthly NSC meetings. Technical working groups are convened in interim periods depending on need and emerging issues.

Results

The NSC provides a forum for champions, implementers, researchers, academics and policy makers to regularly meet and share best practices as well as co-ordinate efforts and outputs for newborn survival. The NSC oversaw the conducting and launch of the first ever National Situation Analysis of Newborn Health in 2008 (MoH 2008). The NSC was requested by the Social Services Parliamentary Committee to spearhead a component of the National Child Survival Strategy pertaining to a framework for newborn health implementation (MoH 2010d) as well as norms and standards for newborn services (MoH 2010e). The group's meetings and outputs are tracked and reported on annually in the national health sector performance report (MoH 2011a). The NSC has catalysed policy formulation and adaptation, research activities, maternal and newborn health advocacy, and the development of a national behaviour change communication strategy and materials (Newborn Steering Committee 2010). The group has lent technical expertise to the creation of job aids for newborn care at facility level, as well as the integration of newborn care into the national Village Health Team strategy and integrated community case management programme (Nalwadda 2011). The NSC continues to link with training institutions and health professional associations to bring together upcoming champions for newborn health.

Challenges and future plans

Sustainability of the NSC is dependent on the continued support of the MoH and partners. Incorporating regional representation from districts will facilitate dissemination and implementation of the national strategies and policies. With a number of new policies and benchmarks in place or in process, the committee is shifting focus towards ensuring district level planning and financing of newborn health programmes within the current five-year Health Sector Strategic and Investment Plan.

However, adequate human resources to staff these facilities remains an issue, especially with the recent marked increase in health facility deliveries seen in preliminary DHS results (UBOS and Macro International 2012). With just 1.2 doctors and 13.1 nurses and midwives per 10 000 population, Uganda is well below the WHO health worker benchmark of 23 per 10 000 population (WHO 2011a). Active health professional societies, particularly the Association of Obstetricians and Gynaecologists of Uganda, have taken up district-based projects that include newborn health activities and advocacy (Lalonde *et al*. 2008), but specialists remain concentrated in urban areas and tertiary centres.

The lowest level of the health system is run by community volunteers and called the Village Health Team (VHT). Each VHT is responsible for community mobilization, preventive care and, recently, some curative services. In 2008 the MoH revitalized and expanded the dormant VHT programme to include integrated community case management (iCCM) strategies for treating childhood pneumonia, diarrhoea and malaria in children 2–59 months as well as home visits for newborn care (Box 3).

Quality of newborn care services

The quality of health services was identified as a deterrent to service utilization in Uganda (MoH and Macro International Inc. 2008), leading to the development of national norms and standards for newborn care at each level of service delivery (MoH 2010e; MoH 2011b). According to health facility assessments of 167 sites across nine districts to measure progress against these standards, fewer than 1 in 10 had designated kangaroo mother care beds and just 16% of facilities had a nursery for sick or small babies (Newborn Steering Committee 2011). Less than 15% of facilities assessed had job aids for neonatal resuscitation, managing small babies, case management for infections or identifying newborn danger signs. Nearly half of facilities had infant ambubags and masks, but few facilities (16%) had oxygen and just 3% had a pulse oximeter to measure oxygen concentration (Newborn Steering Committee 2011). Encouragingly, injectable gentamycin and baby weighing scales were present in three-quarters of facilities (Newborn Steering Committee 2011).

Initiatives to improve coverage and quality of care such as Life Saving Skills, Helping Babies Breathe, Essential Newborn

---

Box 3 Incorporating newborn care into Uganda's Village Health Team (VHT) Strategy

Rationale

The key challenge to Uganda's health care system is the extension of basic health care services to the entire population, especially in rural areas (MoH 1999). The Ministry of Health (MoH) revitalized the VHT as a way to harmonize the various streams of community work resurfacing with the second primary health care revolution (Lawn *et al*. 2008). The new strategy mandates that all community health-related interventions must be implemented via the VHTs, and their portfolio includes a range of health and sanitation activities including maternal, newborn and child health. Two members of the VHT are designated to take on maternal and newborn health services (MoH 2009c). However, a 2009 assessment of VHT services found that home visits for pregnancy and newborn care were rarely carried out and specific newborn care training and counselling materials were lacking (MoH 2009b).

Process

Regional WHO/UNICEF community newborn care materials were initially adapted into a community-based newborn care manual as a stand-alone training. Newborn care was incorporated into the harmonized VHT strategy (MoH 2009c) and the integrated community case management (iCCM) strategy (MoH 2010b). The VHT/iCCM strategy has incorporated the Uganda Newborn Study (UNEST) model of home visits by VHTs during pregnancy and early in the postnatal period, with visits on day 1, 3 and 7 emphasizing general health prevention and promotion messages as well as identification of newborns with danger signs and assisted referral (Waiswa *et al*. 2010c). The Newborn Steering Committee ensured newborn care content was present in the overarching strategy, handbook, implementation guidelines, training materials, registers, supervision and auditing tools, job aids and reporting forms.

Results

VHT materials with newborn health interventions and messages, including schedule of antenatal and postnatal care visits, were launched in July 2010. A 2011 assessment of the newborn component of iCCM revealed that VHTs and health facility staff are knowledgeable and accepting of the role VHTs play in conducting home visits (Nalwadda 2011). Since 2010, over 12 000 VHTs in 24 districts have been trained in the iCCM package. The VHT and iCCM packages cover 36 full districts nationwide and an additional 29 districts have partial implementation of the VHT, iCCM or UNEST packages.

Challenges and future plans

While roll-out of training has been rapid, implementation is primarily led by a small number of implementing partners. Research is required to determine the best methods for identifying pregnant and newly delivered women in order to facilitate home visits, as well as further evaluation of the impact of VHT preventive care on newborn care outcomes. Final results from UNEST in 2012 are expected to provide more information.

Care, Kangaroo Mother Care, Acute Care of at-Risk Newborns, and Integrated Management of Childhood Illness have been piloted. However, none have been scaled up nationally. Essential information on newborn care has been incorporated into tools such as the partograph, and at least 16 health facilities have commenced Maternal and Perinatal Death Reviews since 2008 (MoH 2011b). Most essential drugs, equipment and treatment procedures for newborn care have been added to the Essential Drugs List and National Treatment Guidelines, but the level at which these services can be delivered (mainly HC IV and above) puts them out of reach of many families (MoH 2007a; MoH 2010c).

Demand for newborn care

In line with policy gains for newborn health, there has been an increasing focus on understanding and improving home and community newborn care practices, and reducing demand-side barriers for newborn health services. Qualitative research found that poor health system capacity for newborn care results in crucial delays in seeking and receiving appropriate care (Waiswa *et al*. 2010a; Waiswa *et al*. 2010b). Money remains a significant barrier to seeking care; two-thirds of women identified getting money for treatment as a problem in

accessing health care (Uganda Bureau of Statistics and Macro International Inc. 2007).

The barriers identified to accessing care informed the development of the national behaviour change communication strategy in 2010 (Byaruhanga *et al*. 2010; Nsungwa-Sabiiti *et al*. 2008). The strategy promotes healthy behaviours such as thermal care, breastfeeding, clean cord care, malaria prevention as well as care-seeking and extra care for sick and small babies through various channels including media, advocacy targeted to decision makers and social mobilization (Newborn Steering Committee 2010).

Financial resources for health

Uganda was among the signatories of the 2001 African Union Abuja declaration to pledge 15% of government spending be allocated to health. Since 2000, government spending on health as a proportion of all government spending has increased from 7% to 12% (Figure 5a) (WHO 2011b); total government health expenditure also doubled during this period. Despite the abolition of user fees for health services in 2001, there was little change in the proportion of health spending from out-of-pocket costs, which contribute around 40% of all health care spending. User fee removal resulted in increased antenatal care and outpatient admissions but informal

payments continued, and there was a perception of decreased quality of care (WHO 2005). While access to health care for poorer families still increased, wealthier families moved over to the private sector (Orem *et al.* 2011).

An evaluation at the end of the first Health Sector Strategic Plan of the equity of the health budget and donor fund allocation between 2001 and 2005 found that the Sector Wide Approach increased resources and allowed the MoH greater flexibility to implement reform. Vertical funding from donors reduced, but only one-third of donor funds was assigned to priorities identified in the strategic plan (Ssengooba *et al.* 2007). Uganda received a similar amount of ODA for health per capita and for child health compared with the average of 68 Countdown to 2015 for MNCH priority countries in 2008, and slightly less than average ODA for maternal and newborn health per live birth (Pitt *et al.* 2010) (Figure 5b). However, gains between 2003 and 2008 were much lower than the average for Countdown countries. Between 2003 and 2008, ODA for MNCH increased from US$67 million to US$125 million with two-thirds of this funding going towards child health (Figure 5b). Funding for projects that specifically mention newborn health remains extremely low at 0.5% of all MNCH projects receiving ODA.

Implications

Uganda has evidence of comprehensive policy change for newborn survival across multiple sectors and MNCH packages, mainly since newborn survival started to become a policy and programme issue around 2006. Programmes rolled out in the first part of the decade lacked specific newborn health components. The addition of high impact newborn survival interventions to each of these packages, followed by specific newborn health policies and guidelines, reflects a rapidly changing agenda for MNCH within the MoH and amongst stakeholders.

Understanding how these rapid and comprehensive changes occurred and how to support implementation is critical to saving lives. Uganda has a complex policy environment with multiple donors and competing agendas. The interactions between government and multiple newborn health stakeholders, mainly through the NSC, and the use of evidence and data to guide health system priorities and implementation realities have influenced these changes. These interactions have implications for Uganda and indeed other countries, and wider than newborn survival.

Convening mechanism, stewardship and role of champions

The vast majority of publications and outputs for newborn survival in Uganda since 2006 linked to the NSC or individual champions on the NSC (Box 2). The evidence and policy gap identified through global public health discourse and the national situation analysis resulted in the NSC being strategically designed to focus specifically on advancing newborn survival. A steering committee responsible for all MNCH outcomes may have struggled to deliver outputs effectively and equally for each of the three components. The NSC was intentionally situated in the maternal and child health cluster of the MoH to have links to both maternal and child health

constituents and a wide range of partners. The diverse composition of the NSC may have resulted in a longer consensus-building process to achieve change, but the outputs were officially endorsed and widely accepted. Although the NSC focus was specifically on newborn survival, the increased dialogue between the maternal and child health constituents likely has had positive effects for MNCH more widely.

This co-ordination mechanism is not without challenges. From 2006 to 2010, the committee was supported financially and logistically by Save the Children. Though the financial support was nominal, the sustainability of the committee and the level of influence at regional and district level will be a critical test of whether national policies and frameworks result in programmatic change. A question remains as to whether the current stand-alone NSC is needed in the long term or whether newborn health can be effectively incorporated back into the maternal and child health cluster of the MoH.

Evidence and data to inform scale up

Global data helped local policy makers and health professionals describe the problem and frame newborn survival priorities at a 2006 stakeholder meeting. UN estimates and household and health facility survey findings improved the availability of mortality and coverage data, which was a recognized gap by decision makers. Since 2009, through the NSC the MoH has begun measuring facility-based and VHT-provided newborn care services against the established national standards. However, major data gaps remain for high quality, locally available data that can be used for planning and decision making and tracking the impact of policies and programmes on improving newborn survival. The current Health Sector Strategic and Investment Plan targets reduction in neonatal mortality as a strategy for reaching MDG 4 and progress is substantiated by clear indicators (MoH 2010a), making newborn health data collection a priority for the routine health information system. Though extremely useful, infrequent household surveys do not provide enough data for programme planning and effective evaluation. Continued efforts to routinely monitor services against the set standards for newborn care will help close this gap.

While other case studies have reported a complex pattern of using research to influence policy (Rubayet *et al.* 2012), the experience in Uganda has been relatively linear in terms of adopting evidence-based newborn care practices. Evidence for community-based newborn care, particularly from Asia (Bang *et al.* 2005; Bhutta *et al.* 2008; Baqui *et al.* 2009), and the UN statement on home visits for newborn care (WHO *et al.* 2009) helped guide local community-based questions and study design. This global evidence coupled with local research, particularly the Uganda Newborn Study (UNEST), and formative research likely resulted in a favourable policy window for integrating newborn care into the national revitalization of the VHT strategy and iCCM roll-out, even before final research results from UNEST were available (Box 3). There is still a need for implementation research with costing data to inform health systems strengthening, in addition to creating avenues for private sector involvement and integration with newborn care.
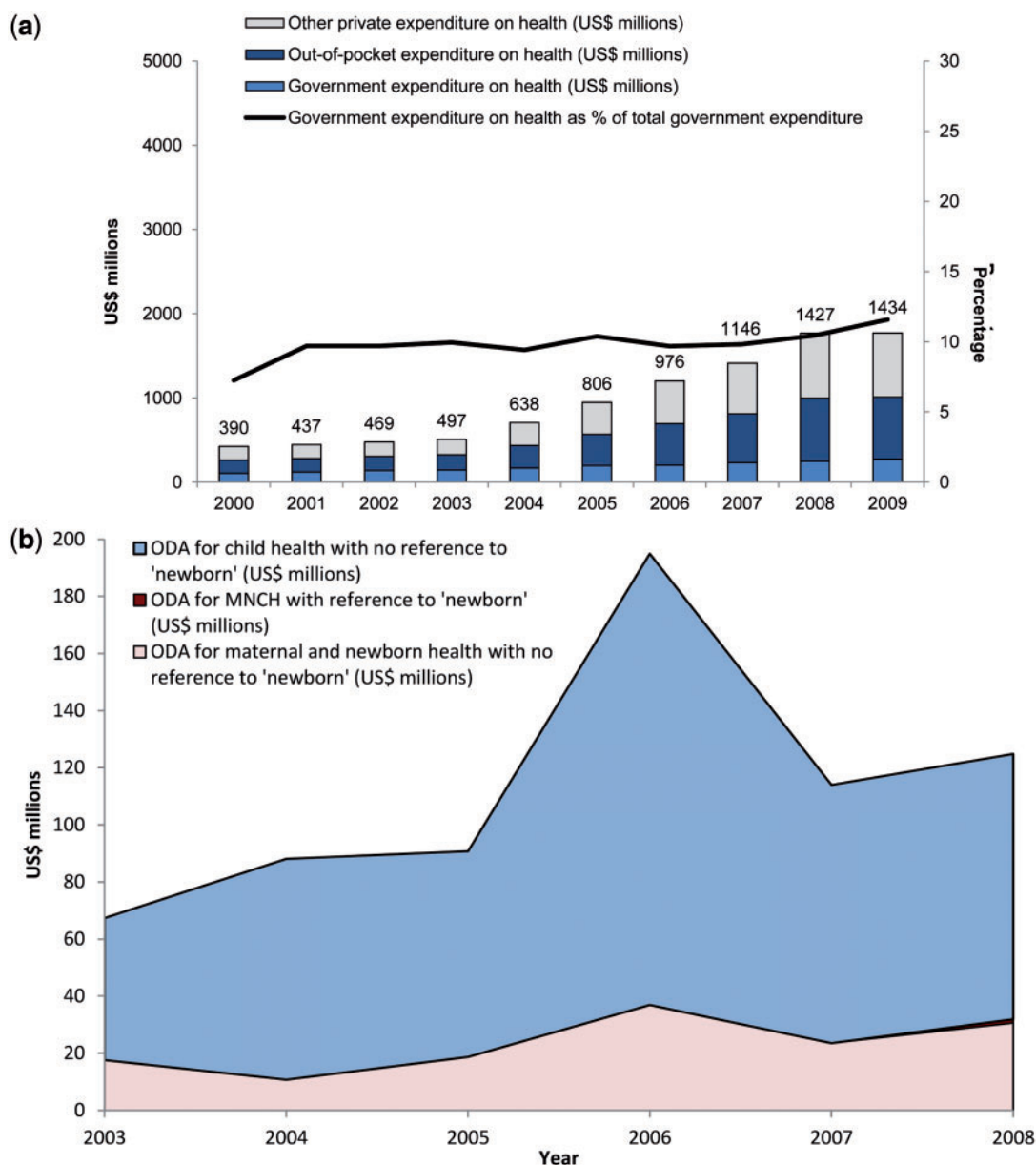
Comparison with Countdown to 2015 (68 countries)	Uganda		Countdown country averages	
Comparison of MNCH donor funding	*2003*	*2008*	*2003*	*2008*
ODA for health per capita	$8.10	$10.88	$4.30	$9.50
ODA for child health per child	$9.38	$15.13	$5.80	$15.90
ODA for maternal and newborn health per live birth	$13.78	$21.47	$14.00	$31.00
Comparison of donor funding for newborn health	*2003*	*2008*	*2003*	*2008*
Value of ODA for MNCH which mentions 'newborn' (US$ millions)	$0.00	$1.29	$0.38	$3.51
Value of ODA for MNCH that specifically benefits newborns (US$ millions)	$0.00	$0.12	$0.00	$0.07

Figure 5 Health funding changes in Uganda (**a**) Total health expenditure from government, out-of-pocket and other private sources, and percentage of government expenditure on health compared with total government expenditure (2000–2009)   *Data source*: Analysis of WHO national health accounts WHO (2011b). *Note*: Dollar values in constant 2008 USD. (**b**) Changes in newborn-related official development assistance for maternal, newborn and child health in Uganda, showing the proportion mentioning newborn health   *Data source*: Pitt *et al*. (2010) with special analysis done by C. Pitt. *Note*: All dollar values in constant 2008 USD. MNCH donor projects with reference to newborn health include MNCH donor disbursements that mention the word 'newborn' or relevant search terms in titles or project descriptions. The OECD database does not systematically capture funding from emerging donor states, foundations, non-governmental organizations or faith-based groups.

Seizing opportunities within the health system

Unlike other case studies in this supplement where there was a priority entry point used to effect change—for example, community-based newborn care in Nepal (Pradhan *et al*. 2012) or Kangaroo Mother Care in Malawi (Zimba *et al*. 2012)—the approach to policy change in Uganda has been to ensure newborn health is incorporated at both facility and community levels without prioritizing one over the other. However, the lack of a single focus might result in slower roll-out of a wider breadth of services. The initial lack of newborn care in prevention of mother-to-child transmission of HIV/AIDS and infant and young child feeding may have been a missed opportunity within well-funded and rapidly expanding programmes. Similarly, despite the integration of newborn care into Integrated Management of Childhood Illness, the limited implementation compared with other countries in the region may have also played a role in the late entry of newborn health components into child survival programmes. The strong commitment to and rapid rollout of iCCM is an important opportunity to ensure that preventive care and referral linkages for newborns are strengthened.

Addressing both facility care and community-based care within a broader MNCH context is resource intensive and also depends on different champions to lead the integration of packages and service delivery. Engaging a range of health professional associations including paediatricians, obstetricians, midwives and private providers has been an important strategy used by the NSC to diffuse newborn care messages and training. The development of integrated job aids for newborn care by the MoH with input from the NSC attempts to harmonise the many stand-alone packages into a single training and implementation package for facility-based newborn care.

Implementation realities

National-level policies and strategies for newborn survival initiated during the latter part of the past decade are only beginning to affect implementation and gaps remain in terms of both coverage and quality of care. With high and constant fertility rates, understanding the barriers to family planning is critical to reducing maternal, newborn and child deaths in the country. Facility birth rates have increased markedly and incentives for increasing demand for skilled attendance at birth are being examined (Ekirapa-Kiracho *et al*. 2011), as well as factors relating to uptake of healthy behaviours and care-seeking (Waiswa *et al*. 2010a; Waiswa *et al*. 2010b).

With the recent increase seen in facility births, there are important missed opportunities for women already accessing health facilities at the time of delivery. The maternal and perinatal audit process and ongoing assessment of service quality has the potential to improve care and reduce deaths, but the vast majority of health facilities have not yet implemented the full audit cycle from capturing deaths to addressing avoidable or modifiable factors (Pattinson *et al*. 2009). The development of national newborn care standards and treatment guidelines, essential drugs list and procurement schedules will improve guidance to facilities on how to improve quality of care. Efforts to adapt the clinical guidelines and essential drugs list to make injectable antibiotics available at HC III and II

facilities are underway, but this has not yet been approved. The finalization of the single integrated training and implementation package for newborn care within pre-service and in-service training provides an opportunity for co-ordinated rollout by development partners led by the MoH.

Institutionalization of newborn survival and the future agenda

Many of the major health system changes within the last decade have been positive, but the true reach and impact of these changes on newborn survival remains unknown. Decentralization of the health system that began in the early part of the decade increased local ownership and accountability for service delivery, but progress is mixed. Instability in certain parts of the country has meant limited access to health services for a large segment of the population. In particular, there are additional complexities of newborn health services in the northern region as provision of newborn care in complex emergencies is a noted gap (Lam *et al*. 2012).

Sustained, co-ordinated funding remains a challenge for newborn care services. The removal of user fees was a positive equitable change but had mixed results for quality and utilization of services. While the Roadmap was costed, there are no earmarked funds for newborn care implementation in either national or district budgets. Similarly, there is no specific budget for newborn care within the Health Sector Strategic and Investment Plan at facility or community level. Though there has been progress in improving co-ordination (Ssengooba 2008), donor funding is inconsistent and still much lower for newborn-specific programmes.

If Uganda reaches the targets set in the current Health Sector Strategic and Investment Plan and achieves universal coverage of care by 2015, up to 89% (42 800) of newborn deaths could be averted as well as 36 600 stillbirths (Supplementary Data Web Annex B). Addressing missed opportunities in health facilities, i.e. by ensuring that all women and babies already accessing health facilities receive high quality care, particularly through Kangaroo Mother Care and case management of infections, would prevent 21% of deaths. A moderate increase of 20 percentage points in the coverage of interventions available to be delivered through outreach services would result in 19% of all newborn deaths being averted (Supplementary Data Web Annex B). Given the favourable policy environment and systems already in place or in process, both of these marginal increases in service quality and coverage should be achievable in the few years before the deadline for the MDGs. Newborn care training and services are now tracked through the annual health sector review and are a key component of performance targets. Improving the frequency and quality of local data, including births, mortality rates and outcomes as well as service coverage, is critical in order to continue measuring progress towards the MDGs and beyond.

Conclusion

Before 2006, almost no policy or programmatic attention in Uganda was given to newborn survival. Rapid and comprehensive policy change now shows Uganda moving towards

implementation of life-saving services. The NSC has provided a platform within the MoH for technical leadership and broad stakeholder consensus, and has catalysed higher level interest for newborn survival. However, policy change and national consensus on technical needs cannot guarantee progress for newborn survival without adequate funding for implementation. Newborn-specific cost data for planning as well as advocating for a specific newborn health allocation will ensure that resources are available for strategic priorities. As more women access facility-based care during pregnancy and childbirth, convincing evidence is needed for innovative solutions that address the lack of health providers, such as task shifting within an integrated continuum of care approach. New research, relating to service delivery modes that link community and health facilities especially in the early postnatal period, are expected to continue to inform implementation in this setting.

While some progress has been made, there is still a need to accelerate progress to reduce newborn deaths and improve care for the 1.5 million babies who are born each year in Uganda. Newborn health is not promoted and protected within a vacuum; the same interventions will also improve care for mothers and older children and strengthen the overall health system. Every effort made to improve the health of women and their newborns is an effort to safeguard Uganda's future.

Supplementary Data

Supplementary data are available at *Health Policy and Planning* Online.

Acknowledgements

Funding

Conflict of interest

None declared.

References

Bang AT, Reddy HM, Deshmukh MD, Baitule SB, Bang RA. 2005. Neonatal and infant mortality in the ten years (1993 to 2003) of the Gadchiroli field trial: effect of home-based neonatal care. *Journal of Perinatology* **25**(Suppl. 1):S92–107.

Baqui AH, Arifeen SE, Williams EK *et al.* 2009. Effectiveness of home-based management of newborn infections by community health workers in rural Bangladesh. *Pediatric Infectious Disease Journal* **28**: 304–10.

Bhutta ZA, Memon ZA, Soofi S *et al.* 2008. Implementing community-based perinatal care: results from a pilot study in rural Pakistan. *Bulletin of the World Health Organization* **86**: 452–9.

Byaruhanga RN, Nsungwa-Sabiiti J, Kiguli J *et al.* 2010. Hurdles and opportunities for newborn care in rural Uganda. *Midwifery* **27**: 775–80.

Cousens S, Blencowe H, Stanton C *et al.* 2011. National, regional, and worldwide estimates of stillbirth rates in 2009 with trends since 1995: a systematic analysis. *The Lancet* **377**: 1319–30.

Darmstadt GL, Bhutta ZA, Cousens S *et al.* 2005. Evidence-based, cost-effective interventions: how many newborn babies can we save? *Lancet* **365**: 977–88.

Davy K, Bergh AM, van Rooyen E, Manu R, Greenfield J. 2010. Progress in the implementation of Kangaroo Mother Care in Ghana. 29th Conference on Priorities in Perinatal Care in South Africa, 9–10 March 2010, Goudini Spa, Western Cape. United States Agency for International Development (MRC) Unit for Maternal and Infant Health Care Strategies and University of Pretoria, UNICEF Ghana, Ghana Health Service.

Ekirapa-Kiracho E, Waiswa P, Rahman MH *et al.* 2011. Increasing access to institutional deliveries using demand and supply side incentives: early results from a quasi-experimental study. *BMC International Health and Human Rights* **11**(Suppl. 1):S11.

Hill K, You D, Inoue M, Oestergaard MZ, on behalf of the United Nations Inter-agency Group for Child Mortality Estimation and its Technical Advisory Group. 2012. Accelerating progress in reducing global child mortality, 1990–2010. Forthcoming.

Johns Hopkins Bloomberg School of Public Health. 2010. LiST: The Lives Saved Tool. An evidence-based tool for estimating intervention impact. Online at: http://www.jhsph.edu/dept/ih/IIP/list/index.html, accessed 10 September 2011.

Knippenberg R, Lawn JE, Darmstadt GL et al. 2005. Systematic scaling up of neonatal care in countries. Lancet **365**: 1087–98.

Lalonde AB, Senikas V, Bateson DS, Perron L. 2008. SOGC Partnership Program 1998–2006: building organization capacity to support improved maternal and neonatal health. Journal of Obstetrics and Gynaecology Canada **30**: 1014–24.

Lam J, Amsalu R, Kerber K et al. 2012. Neonatal health in humanitarian emergencies: a survey of providers. BMC Conflict and Health. forthcoming.

Lawn JE, Rohde J, Rifkin S et al. 2008. Alma-Ata 30 years on: revolutionary, relevant, and time to revitalise. The Lancet **372**: 917–27.

Lawn JE, Kinney MV, Black RE et al. 2012. Newborn survival: a multi-country analysis of a decade of change. Health Policy and Planning **27**(Suppl. 3):iii6–iii28.

Liu L, Johnson HL, Cousens S et al. 2012. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. doi:10.1016/S0140-6736(12)60560.

Lozano R, Wang H, Foreman KJ et al. 2011. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. The Lancet **378**: 1139–65.

Lundberg M. 2008. Client satisfaction and the perceived quality of primary health care in Uganda. In: Amin S, Das J, Goldstein M (eds). Are You Being Served? New Tools for Measuring Service Delivery. Washington, DC: World Bank.

MoH. 1999. Health Sector Strategic Plan 2000/01–2004/05. Kampala, Uganda: Government of Uganda.

MoH. 2005. Health Sector Strategic Plan (HSSP II) 2005/06–2009/10. Kampala, Uganda: Government of Uganda.

MoH. 2007a. Essential Medicines List for Uganda. Kampala, Uganda: Government of Uganda.

MoH. 2007b. Roadmap for Accelerating the Reduction of Maternal and Neonatal Mortality and Morbidity in Uganda 2006–2015. Kampala, Uganda: Government of Uganda.

MoH. 2008. Situation Analysis of Newborn Health in Uganda: Current status and opportunities to improve care and survival. Kampala, Uganda: Government of Uganda, Save the Children, UNICEF, WHO.

MoH. 2009a. National Child Survival Strategy. Kampala, Uganda: Government of Uganda.

MoH. 2009b. Situation analysis, Village Health Teams: current status, activities, actions to improve survival. Kampala, Uganda: Government of Uganda.

MoH. 2009c. Village Health Team: A handbook to improve health in communities. Kampala, Uganda: Government of Uganda.

MoH. 2010a. Health Sector Strategic and Investment Plan: Promoting people's health to enhance socio-economic development, 2010/11–2014/15. Kampala, Uganda: Government of Uganda.

MoH. 2010b. Integrated Community Case Management of Childhood Malaria, Pneumonia and Diarrhoea: Implementation guidelines. Kampala, Uganda: Government of Uganda, UNICEF, WHO.

MoH. 2010c. Uganda Clinical Guidelines: National guidelines on management of common conditions. Kampala, Uganda: Government of Uganda.

MoH. 2010d. Newborn Component of the Child Survival Strategy in Uganda: Implementation framework. Kampala, Uganda: Ministry of Health Uganda and Save the Children.

MoH. 2010e. Newborn Implementation Framework: Standards for newborn health care services. Kampala, Uganda: Ministry of Health Uganda and Save the Children.

MoH. 2011a. Annual Health Sector Performance Report: Financial Year 2009/2010. Kampala, Uganda: Government of Uganda.

MoH. 2011b. Baseline assessment for basic newborn care standards in Uganda. Kampala, Uganda: Ministry of Health.

MoH, Macro International Inc. 2008. 2007 Uganda Service Provision Assessment Survey. Kampala, Uganda: Ministry of Health and Macro International Inc.

MoH, WHO. 1997. Uganda Safe Motherhood Strategic Plan (1997–1999). Kampala, Uganda: Government of Uganda.

Moran AC, Kerber K, Pfitzer A et al. 2012. Benchmarks to measure readiness to integrate and scale up newborn survival interventions. Health Policy and Planning **27**(Suppl. 3):iii29–iii39.

Nalwadda C. 2011. Assessment of the newborn component of Integrated Community Case Management. Kampala, Uganda: Save the Children.

Newborn Steering Committee. 2010. Newborn Healthcare: Behaviour Change Communication Strategy. Kampala, Uganda: UNICEF, National Newborn Steering Committee.

Newborn Steering Committee. 2011. Newborn Health Implementation Framework Standards for Newborn Health Services: Health Facility Assessments. Kampala, Uganda: Save the Children, Healthy Child Uganda, UNICEF, on behalf of the National Newborn Steering Committee.

Nsungwa-Sabiiti J, Balyeku A, Kiguli J et al. 2008. Home and community newborn care practice in Uganda, designing by dialogue. Formative research towards a behaviour change communication strategy. Kampala, Uganda: Save the Children.

Oestergaard MZ, Inoue M, Yoshida S et al. 2011. Neonatal mortality rates for 193 countries in 2009 with trends since 1990: progress, projections and priorities. PLoS Medicine **8**: e1001080.

Orem JN, Mugisha F, Kirunga C, Macq J, Criel B. 2011. Abolition of user fees: the Uganda paradox. Health Policy and Planning **26** (Suppl. 2):ii41–ii51.

Pattinson R, Kerber K, Waiswa P et al. 2009. Perinatal mortality audit: counting, accountability, and overcoming challenges in scaling up in low- and middle-income countries. International Journal of Gynecololgy & Obstetrics **107**(Suppl. 1):S113–21, S121–2.

Pitt C, Greco G, Powell-Jackson T, Mills A. 2010. Countdown to 2015: assessment of official development assistance to maternal, newborn, and child health, 2003–08. The Lancet **376**: 1485–96.

Pradhan YV, Upreti SR, KC NP et al. 2012. Newborn survival in Nepal: a decade of change and future implications. Health Policy and Planning **27**(Suppl. 3):iii57–iii71.

Rubayet S, Shahidullah M, Hossain A et al. 2012. Newborn survival in Bangladesh: a decade of change and future implications. Health Policy and Planning **27**(Suppl. 3):iii40–iii56.

Shiffman J. 2010. Issue attention in global health: the case of newborn survival. The Lancet **375**: 2045–9.

Ssengooba F. 2008. Efficiency and equity through a sector-wide approach in Uganda. Insights. Online at: http://www.eldis.org/go/topics/insights/2008/financing-primary-health-care/swaps-in-uganda, accessed 30 September 2011.

Ssengooba F, Rahman SA, Hongoro C et al. 2007. Health sector reforms and human resources for health in Uganda and Bangladesh: mechanisms of effect. Human Resources for Health **5**: 3.

Uganda Bureau of Statistics, Macro International Inc. 2007. Uganda Demographic and Health Survey 2006. Calverton, MD: UBOS and Macro International Inc.

Uganda Bureau of Statistics, Macro International Inc. 2012. An Overview of the Health Situation in Uganda: The 2011 UDHS Preliminary Results. Kampala, Uganda: UBOS and Macro International Inc.

Uganda Bureau of Statistics, ORC Macro. 1995. *Uganda Demographic and Health Survey 1995*. Calverton, MD: UBOS and ORC Macro.

Uganda Bureau of Statistics, ORC Macro. 2001. *Uganda Demographic and Health Survey 2000/1*. Calverton, MD: UBOS and ORC Macro.

UNAIDS, UNICEF, WHO, UNFPA, UNESCO. 2010. *Children and AIDS: Fifth Stocktaking Report*. New York: UNICEF.

UNFPA. 2011. *State of the World Population 2011: People and Possibilities in a World of 7 Billion*. New York: United Nations Population Fund. Online at: http://www.unfpa.org/swp/, accessed 12 December 2011.

UNICEF, WHO, World Bank, United Nations Population Division. 2011. *Levels and Trends of Child Mortality: 2011 Report. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation*. New York: UNICEF, WHO, World Bank, United Nations Population Division.

UNICEF. 2011a. *State of the World's Children 2011*. New York: UNICEF.

UNICEF. 2011b. Uganda announces elimination of Maternal and Neonatal Tetanus. Online at: http://www.unicef.org/media/media_59210.html, accessed 17 August 2011.

Waiswa P, Kemigisa M, Kiguli J *et al.* 2008. Acceptability of evidence-based neonatal care practices in rural Uganda – implications for programming. *BMC Pregnancy and Childbirth* **8**: 21.

Waiswa P, Kallander K, Peterson S, Tomson G, Pariyo GW. 2010a. Using the three delays model to understand why newborn babies die in eastern Uganda. *Tropical Medicine & International Health* **15**: 964–72.

Waiswa P, Nyanzi S, Namusoko-Kalungi S *et al.* 2010b. 'I never thought that this baby would survive; I thought that it would die any time': perceptions and care for preterm babies in eastern Uganda. *Tropical Medicine & International Health* **15**: 1140–7.

Waiswa P, Peterson S, Tomson G, Pariyo GW. 2010c. Poor newborn care practices – a population based survey in eastern Uganda. *BMC Pregnancy and Childbirth* **10**: 9.

World Bank. 2010. Worldwide Governance Research Indicators. Online at: http://info.worldbank.org/governance/wgi/mc_countries.asp, accessed 30 September 2011.

World Bank. 2011. Health, Nutrition and Population Statistics. Online at: http://go.worldbank.org/9NF74C70J0, accessed 30 September 2011.

WHO, UNICEF, UNFPA, The World Bank. 2012. *Trends in maternal mortality: 1990–2010*. Geneva: World Health Organization.

WHO, UNICEF, USAID, Save the Children. 2009. *WHO–UNICEF Joint Statement on home visits for the newborn child: a strategy to improve survival*. Geneva: World Health Organization.

WHO. 2005. The elimination of user fees in Uganda: impact on utilization and catastrophic health expenditures. Discussion Paper number 4. Geneva: World Health Organization.

WHO. 2011a. Global Health Atlas of the Health Workforce. Online at: http://apps.who.int/globalatlas/default.asp, accessed 30 September 2011.

WHO. 2011b. National Health Accounts. Online at: http://www.who.int/entity/nha/, accessed 30 September 2011.

Zimba E, Kinney MV, Kachale F *et al.* 2012. Newborn survival in Malawi: a decade of change and future implications. *Health Policy and Planning* **27**(Suppl. 3):iii88–iii103.