



Saving Mothers, Giving Life

SMGL Phase I Monitoring and Evaluation Findings: Executive Summary



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Uganda

Government of Uganda	Health Care Improvement Project (HCI)
Ministry of Health of Uganda	Uganda Health Marketing Group (UHMG)
District Medical/ Health Officers	Uganda Episcopal Conference (UEC)
Uganda Village Health Teams	Health Initiatives for the Private Sector (HIPS)
Centers for Disease Control and Prevention (CDC) Country Office	Capacity Project
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Zambia

Government of Zambia	Center for Infectious Disease Research in Zambia (CIDRZ)
Zambia Ministry of Community Development, Mother and Child Health (MCDMCH)	Zambia Center for Applied Health Research and Development (Boston University) (ZCAHRD)
Zambia Central Statistics Office	Maternal and Child Health Integrated Program (MCHIP)
District and Provincial Medical/ Health Officers	Zambia Integrated Systems Strengthening Program (ZISSP)
Community Health Workers and Safe Motherhood Action Groups (SMAGs)	Communication Support for Health (CSH)
Centers for Disease Control and Prevention (CDC) Country Office	University of Zambia (UNZA)
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Global Partners

American College of Obstetricians and Gynecologists	US Government Agencies:
Every Mother Counts	Centers for Disease Control and Prevention (CDC)
Merck for Mothers	US Agency for International Development (USAID)
Government of Norway	Peace Corps
Project CURE	US Department of Defense (DOD)
	US Global AIDS Coordinator (OGAC)





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Introduction

Saving Mothers, Giving Life (SMGL) is a 5-year initiative designed to rapidly reduce deaths related to pregnancy and childbirth through a coordinated approach that strengthens maternal health services in high-mortality settings. These evidence-based interventions are focused primarily on the critical period of labor, delivery, and 48 hours postpartum, when most maternal deaths and about half of newborn deaths occur. Coordinated and funded by a public-private partnership,¹ SMGL strives to improve access to, demand for, and the quality of Emergency Obstetric and Newborn Care (EmONC).² It also seeks to strengthen links to other essential services for women and children, including HIV prevention, care, and treatment, and family planning.

SMGL began in June 2012 in eight districts, four each in Uganda and Zambia. Phase 1 (the pilot phase) activities took place from June 2012 through May 2013. Participating US Government agencies, along with partner governments and multiple partner organizations, enhanced existing district maternal and child health services to strengthen evidence-based interventions. Altogether, 107 health facilities in Uganda and 113 in Zambia that provided delivery care received support through the SMGL initiative. SMGL activities included routine monitoring during the first year of the project, including baseline and endline assessments before and after Phase 1.

SMGL's essential components and concepts include the following:

- **A comprehensive approach.** Women's lives cannot be saved by any one intervention alone. Reducing maternal mortality requires a solution that addresses multiple health system issues at multiple levels. SMGL uses evidence-based interventions that are designed to address three dangerous delays that pregnant women face in

childbirth: delays in deciding to seek care for an obstetric emergency, delays in reaching a health facility in time, and delays in receiving quality care at health facilities.

- **An adequate number of high-quality delivery facilities, including EmONC, that are accessible within 2 hours** of the onset of labor or obstetric emergencies.
- **An integrated communication-transportation system** that functions 24 hours a day/7-days a week to encourage and enable pregnant women to use delivery care facilities. This system should include community outreach and interventions that increase awareness of these facilities.
- **An adequate number of skilled birth attendants** who can provide quality care for normal delivery and who are able to identify and refer obstetric emergencies.
- **A functional supply chain system** to ensure that facilities have the equipment, supplies, commodities, and drugs they need to deliver high-quality obstetric care.
- **A system that accurately records** every birth and maternal and neonatal death.

Results from monitoring and evaluation indicate that SMGL interventions are effective. For example,

- **Maternal mortality fell sharply** (by 30%) in just 1 year in Uganda's four SMGL districts. It also declined by 35% in health facilities that implemented SMGL interventions in both Uganda and Zambia. (Population-based maternal mortality rates could not be calculated for the SMGL districts in Zambia.) These improvements appear to be due to women's increased access to emergency obstetric care and the effective care they receive once they arrive at health facilities.

1. Current partners are the American College of Obstetricians and Gynecologists, Every Mother Counts, Merck for Mothers, the Government of Norway, Project CURE, and the US Government [Centers for Disease Control and Prevention (CDC), US Agency for International Development (USAID), Corps, US Department of Defense, and US Office of the Global AIDS Coordinator (OGAC)]. The governments of Uganda and Zambia were central to the partnership and all activities.

2. Emergency Obstetric and Newborn Care includes a set of 9 life-saving interventions, known as "signal functions" that the World Health Organization has recommended to reduce maternal and neonatal mortality. Specific interventions are described later in this report.

- **The percentage of all births in SMGL districts that occurred at health facilities increased** during Phase 1 from 46% to 74% in Uganda (a 62% increase) and from 63% to 84% in Zambia (a 35% increase).
- **The percentage of all facilities performing specific life-saving interventions increased.** By the end of Phase 1, each country had an adequate number of facilities (relative to each district's population) to provide basic and comprehensive EmONC. In particular, mid-level health clinics in both countries made substantial gains in their ability to perform more life-saving interventions. The percentage of mid-level facilities that were providing four to five of the recommended seven signal functions increased from 28% at baseline to 44% by the end of Phase 1 in Uganda, and from 24% to 37% in Zambia.
- **SMGL districts showed improvement in treatment for HIV-positive mothers and prophylaxis for their infants** between the baseline and endline assessments. In Uganda, 28% more HIV-positive women received treatment and 27% more infants received prophylaxis. Increases in Zambia were 18% and 29%, respectively.

These successes were likely due to a combination of the following factors:

- Greater **supply** of services, including increased availability and improved access to obstetric services.
- Increased **demand** for obstetric and HIV services, due to voucher programs and intensified activities to increase community awareness, as well as women's growing recognition of the importance of facility delivery and skilled attendance at birth.
- Improved **quality of care** at facilities that hired more staff, trained and mentored more staff in EmONC, and stocked necessary equipment and supplies, and had reliable supplies of medicines.

The first year of SMGL was designed to provide "proof of concept" in the eight pilot districts to determine (1) if the SMGL interventions could improve health outcomes for women and their infants and (2) how these interventions could be scaled up as SMGL expands. The declines in mortality achieved in both countries are impressive given the Phase 1's short timeframe (12 months).

This Executive Summary and the accompanying reports were prepared by staff of the Centers for Disease Control and Prevention (CDC) of the United States at CDC's headquarters in Atlanta, Georgia, and in the Uganda and Zambia CDC country offices. CDC, in collaboration with the USAID and OGAC, led the monitoring and evaluation efforts for the SMGL initiative. These activities were conducted in close collaboration with the governments of Uganda and Zambia and partner organizations.

SMGL Monitoring and Evaluation

Extensive monitoring and evaluation (M&E) of SMGL during Phase 1 was essential to assess potential changes in the key indicators closely related to maternal and neonatal mortality. SMGL M&E efforts drew upon the experience of existing global initiatives designed to standardize data collection methods for monitoring interventions, making decisions, and developing health policies related to maternal and neonatal outcomes and care.

The SMGL M&E Framework included a range of indicators designed to measure program achievements in Phase 1. They can be grouped into four broad categories:

- **Impact**—such as changes in the number of maternal and newborn deaths
- **Outcomes**—such as percentage of deliveries in health facilities and rates of Cesarean sections
- **Outputs**—such as the number of EmONC signal functions performed, HIV tests conducted, and PMTCT (prevention of mother-to-child HIV transmission) services provided
- **Processes**—such as hiring and training personnel, upgrading facilities, and stockpiling life-saving medicines

Several M&E methods were used to assess the various aspects of SMGL during Phase 1. The most important of these processes were

- **Health Facility Assessments (HFAs):** HFAs were conducted before and after Phase 1 at all facilities that provide delivery services in the SMGL districts in both Uganda and Zambia. They gathered baseline and endline data on maternity care infrastructure; EmONC availability and use; human resources; and drugs, equipment, and supplies.
- **Routine Health Information Systems:** Existing Health Management Information Systems (HMIS), which collect monthly statistics from health facilities, were used to monitor access to and quality, efficiency, and use of maternal and child health services. For example, one health information system supported

by the President's Emergency Plan for AIDS Relief (PEPFAR) monitors maternal and child health (MCH) and HIV-related indicators.

- **Facility-Based Pregnancy Outcome Monitoring:** To track key facility indicators, Uganda and Zambia intensified existing efforts to document maternal and neonatal outcomes accurately and completely. These outcomes included maternal complications, the use of life-saving interventions such as Cesarean sections, and more thorough identification and investigation of maternal deaths. In Zambia, reductions in maternal mortality were monitored through routine identification and investigation of deaths that occurred in facilities before and during SMGL Phase 1.
- **Community-Based Maternal Mortality Identification:** In Uganda, SMGL built on the existing data collection infrastructure of Village Health Teams (VHTs) to conduct a baseline and endline Reproductive Age Mortality Study (RAMOS) in SMGL districts. A VHT member visited each household in his or her village to ask if any women had died during a specified period of time, and to find out if any of these women had been pregnant at the time of death or in the preceding 3 months. If so, trained health workers returned to the home to conduct a verbal autopsy. Doctors then reviewed the findings of the verbal autopsies to certify the death and used the International Classification of Diseases, 10th Revision to assign a code for the cause of death.

Findings and conclusions derived from these M&E activities are summarized in this Executive Summary, including data shown in Tables 1 and 2. More in-depth data analysis from the major components of SMGL M&E is provided in four CDC reports that cover the following topics:

- Monitoring and Evaluation Overview
- Maternal Mortality
- Obstetric Care Services: Access and Availability
- Maternal and Perinatal Health Outcomes

Results

Maternal Deaths Declined in SMGL Districts and Facilities

Improved access, emergency referrals, and high-quality, 24-hour emergency obstetric services can increase the number of women that have safe deliveries and quickly reduce the risk of women dying of pregnancy-related complications. SMGL interventions were designed to increase these services in both Uganda and Zambia. As a result, sharp reductions in maternal deaths and improvements in maternal and perinatal health outcomes were reported in the first year of this initiative.

Uganda

To identify all maternal deaths, Uganda

- Conducted a baseline and endline RAMOS to collect mortality data before and after SMGL. Baseline deaths were those that occurred in the 12 months before Phase 1 (June 2011–May 2012). Endline deaths were those that occurred during Phase 1 (June 2012–May 2013).
- Conducted verbal autopsies of each death to learn the cause of death, place of death, and contributing factors.
- Introduced community-based maternal mortality surveillance consisting of monthly identification and reporting of suspected maternal deaths by the VHTs during Phase 1 and continuing into Phase 2.
- Reviewed medical records in SMGL facilities to identify the maternal deaths that occurred in facilities before and during the pilot year.

During Phase 1 in Uganda, the maternal mortality ratio (MMR) for the four SMGL districts (Kibaale, Kabarole, Kyenjojo and Kamwenge) declined from 452 maternal deaths per 100,000 live births at baseline to 316 per 100,000 at endline, a 30% decline in maternal mortality.

- **Maternal deaths from major direct obstetric causes declined by 39%, from an MMR of 382 per 100,000 live births to 234 per 100,000.** The largest reductions were for the direct obstetric causes of obstructed labor or uterine rupture (-54%), sepsis or infection (-50%), and obstetric hemorrhage (-43%). All three of these causes were addressed by components of the SMGL interventions, which focused on reducing maternal deaths in the period around and soon after labor and delivery.
- **The MMR for maternal deaths during the postpartum period (1–42 days after delivery) declined by 39%, from 223 per 100,000 live births to 137 per 100,000.** Both before and during Phase 1, the largest percentage of maternal deaths occurred after the first day during the postpartum period, followed by deaths during pregnancy or delivery. The reduction in postpartum deaths was also larger than declines in deaths during pregnancy or delivery. Maternal deaths during labor, delivery, or less than 24 hours after the end of a pregnancy also declined (-28%). A more modest decline was documented for maternal deaths during pregnancy (-5%). This smaller decline is not surprising given the focus of SMGL on the period of labor and delivery and early postpartum.
- **Maternal deaths in health facilities in the SMGL districts declined by 35%, from 534 deaths per 100,000 live births to 345 per 100,000.** Declines in cause-specific mortality were particularly striking for obstetric labor and postpartum sepsis.
- The decrease in maternal deaths in health facilities is associated with a decrease in case fatality rates. In Uganda, the **case fatality rate for deaths due to direct obstetric complications declined by 25% in all facilities that performed deliveries (from 2.6% to 2.0%) and by 18% in EmONC facilities (from 2.9% to 2.4%).**

These declines were accompanied by a 42% increase in met need for EmONC (the proportion of all expected major direct obstetric complications in a population that were attended in EmONC facilities).

Zambia

To identify maternal deaths,³ Zambia

- Reviewed medical records in health facilities in the SMGL districts to identify and investigate the maternal deaths that occurred in facilities before and during Phase 1. Baseline facility deaths were those that occurred during the 12 months before Phase 1 (June 2011–May 2012). End-line facility deaths were those that occurred during Phase 1 (June 2012–May 2013).
- Zambia's mortality data for the SMGL districts represents only deaths that occurred in health facilities. Facility death rates typically differ from those for the general population because health facilities usually have a higher proportion of women with severe complications.

During SMGL Phase 1 in Zambia, the MMR in health facilities for the four SMGL districts (Mansa, Lundazi, Nyimba, Kalomo) declined from 310 maternal deaths per 100,000 live births at baseline to 203 per 100,000 at endline, a 35% decline in maternal mortality.

- **Maternal deaths in health facilities from direct obstetric causes declined by 36%, from 260 per 100,000 live births to 167 per 100,000.** The largest reductions were for obstructed labor (-78%) and obstetric hemorrhage (-34%). These causes were addressed by components of the SMGL interventions.
- The decrease in maternal deaths in health facilities is associated with a decrease in case fatality rates. **In Zambia, the case fatality rate for deaths due to direct obstetric complications declined by 34% in all facilities (from 3.1% to 2.0%) and by 35% in EmONC facilities (from 3.4% to 2.2%).** These declines were accompanied by a 57% increase in the number of facilities in SMGL districts that provided EmONC.
- Data on maternal deaths that occurred outside of facilities in the SMGL districts during Phase 1 were not available for Zambia. However, **the high facility delivery rate in Zambia SMGL districts (84% at endline), coupled with a high percentage of deaths in facilities at baseline (70%) and sharp reductions in the facility-based MMR with SMGL,** suggest a probable decline in the population-based MMR across the four SMGL districts.

3. Zambia SMGL used two different approaches in gathering maternal mortality data. For the baseline, Zambia SMGL conducted a mortality assessment of the four SMGL districts that identified possible maternal deaths during the 17 months before the SMGL initiative. The assessment included verbal autopsies of each death to learn the cause of death, place of death, and contributing factors. During Phase 1, Zambia switched to tracking deaths at the community level; however, this approach identified only about one-third of the expected number of pregnancies. As a result, it was not possible to produce a reliable population-based estimate of the endline MMR across the four SMGL districts.



Photograph by Ricardo Gamale, 2013

Improvement in Access to and Availability of Obstetric Care

Most maternal deaths can be prevented by increasing access to skilled birth attendance (including delivery in health facilities) and improving the quality of care provided to women at delivery and during the early postpartum period. Improvements to facilities in SMGL districts were meant to ensure access to quality obstetric care within 2 hours for all women, particularly those with severe obstetric complications. They included improvements in the following:

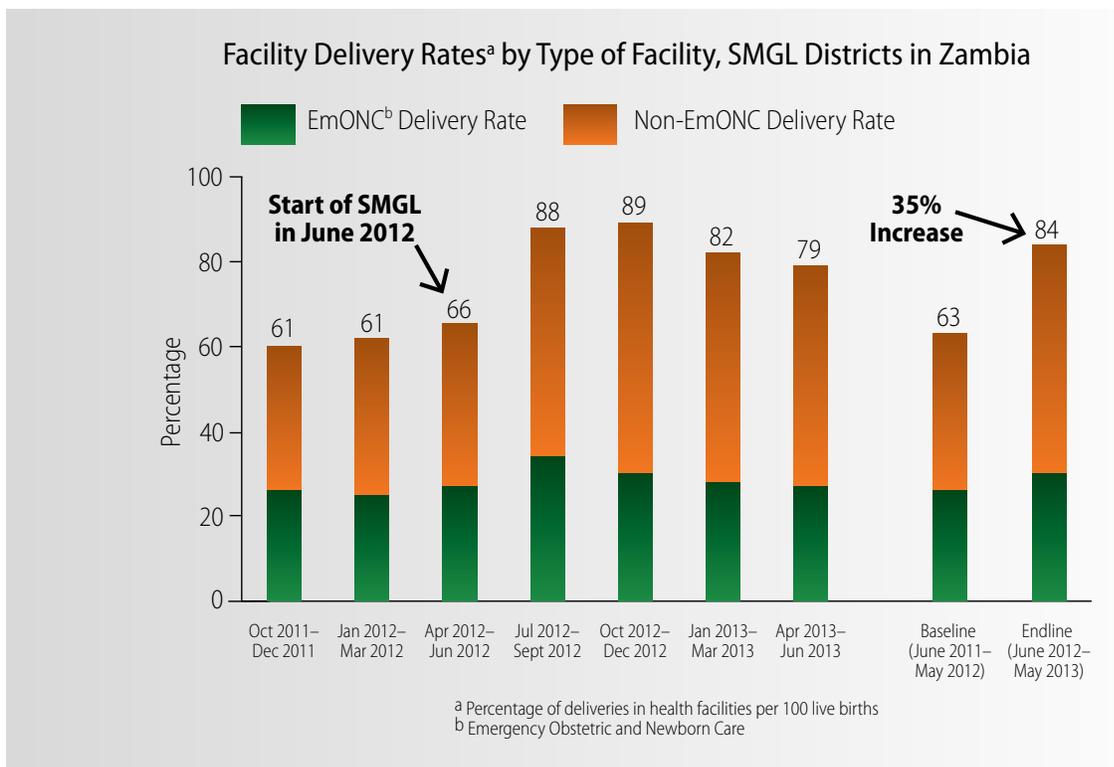
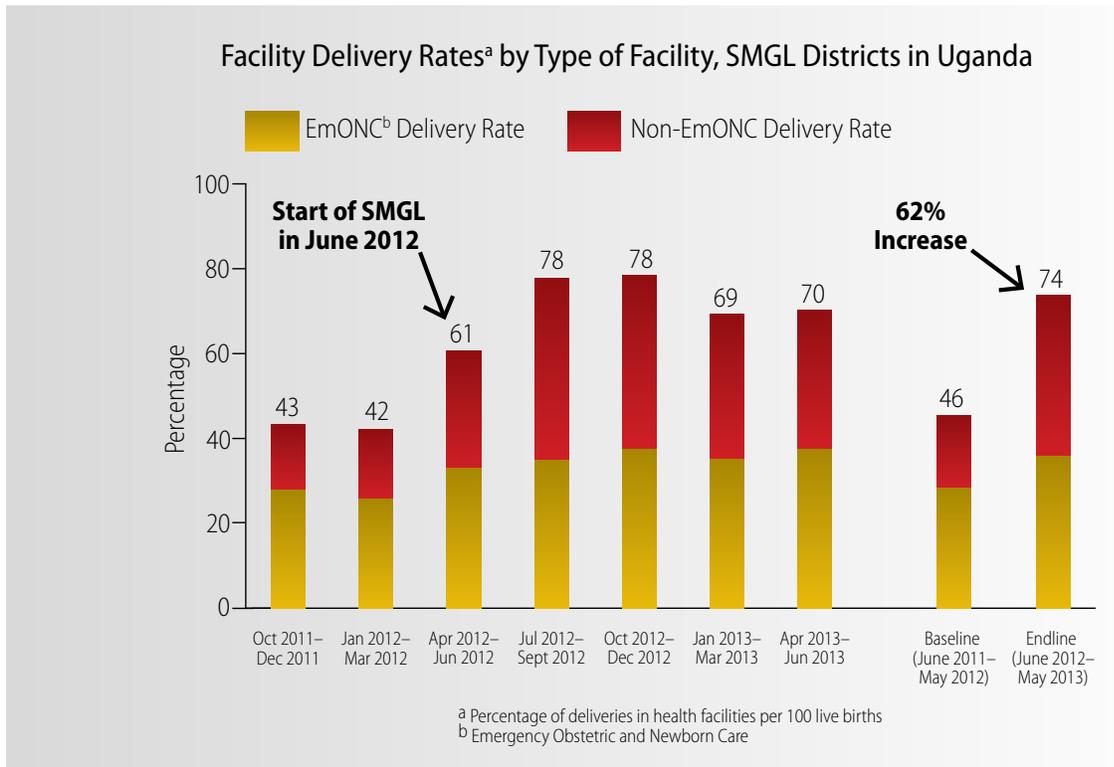
- Human resources
- Facilities and equipment for emergency obstetric care
- Surgical capacity (medical skills and equipment)
- Supply chains and blood banks
- Communication and transportation networks

The SMGL initiative led to a sharp **increase in facility delivery rates** through interventions that addressed both supply and demand factors. The percentage of births that took place in health facilities rose during Phase 1 from 46% to 74% in Uganda (a 62% increase) and from 63% to 84% in Zambia (a 35% increase).

To allow hospitals and higher-level health centers to focus more on complicated cases, three strategies were used to encourage women to seek delivery services at lower-level health centers and health posts:

- A minimum level of high-quality obstetric services in lower-level facilities.
- Community outreach to inform families about facility delivery services.
- Improved access to lower-level facilities.

The overall proportion of deliveries taking place in facilities in both countries increased sharply, by 62% in Uganda and by 35% in Zambia. Moreover, the proportion of births delivered in EmONC facilities increased by 29% and 17%, in Uganda and Zambia, respectively.



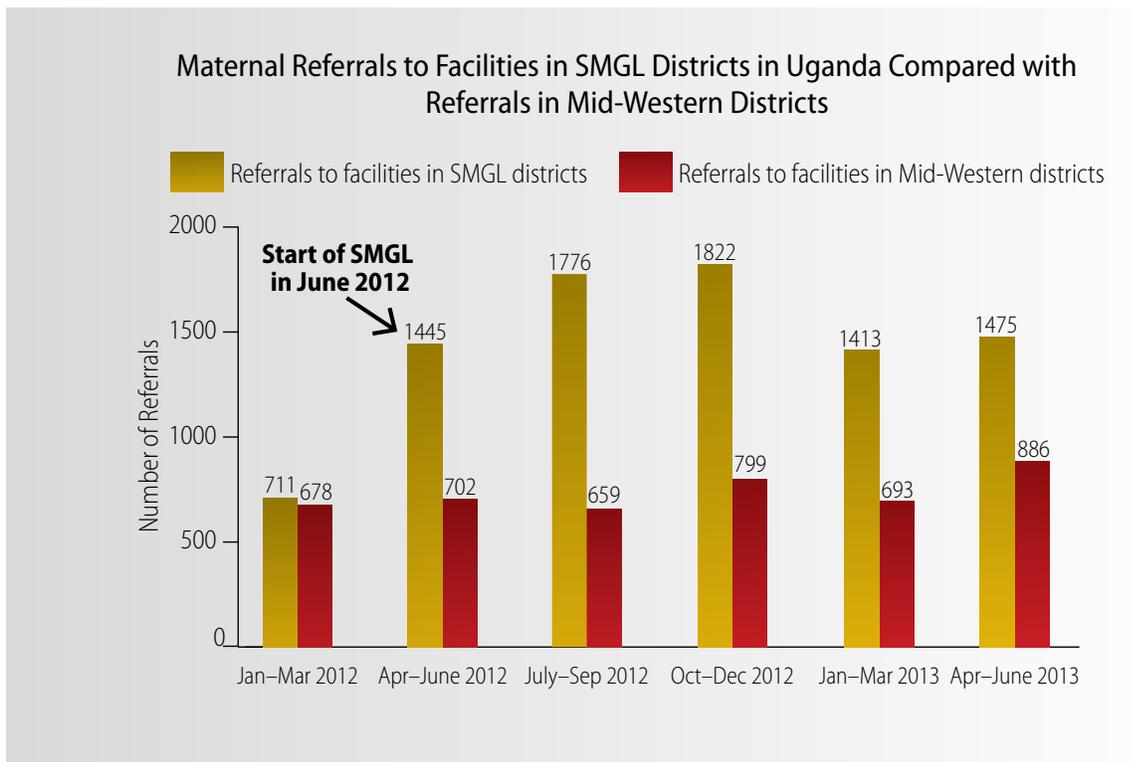
To increase demand for deliveries in health facilities, the SMGL initiative

- Activated more than 4,000 Village Health Team (VHT) workers in 4 districts in Uganda.
- Trained 1,500 Safe Motherhood Action Group (SMAG) members in 4 districts in Zambia to conduct outreach, with an

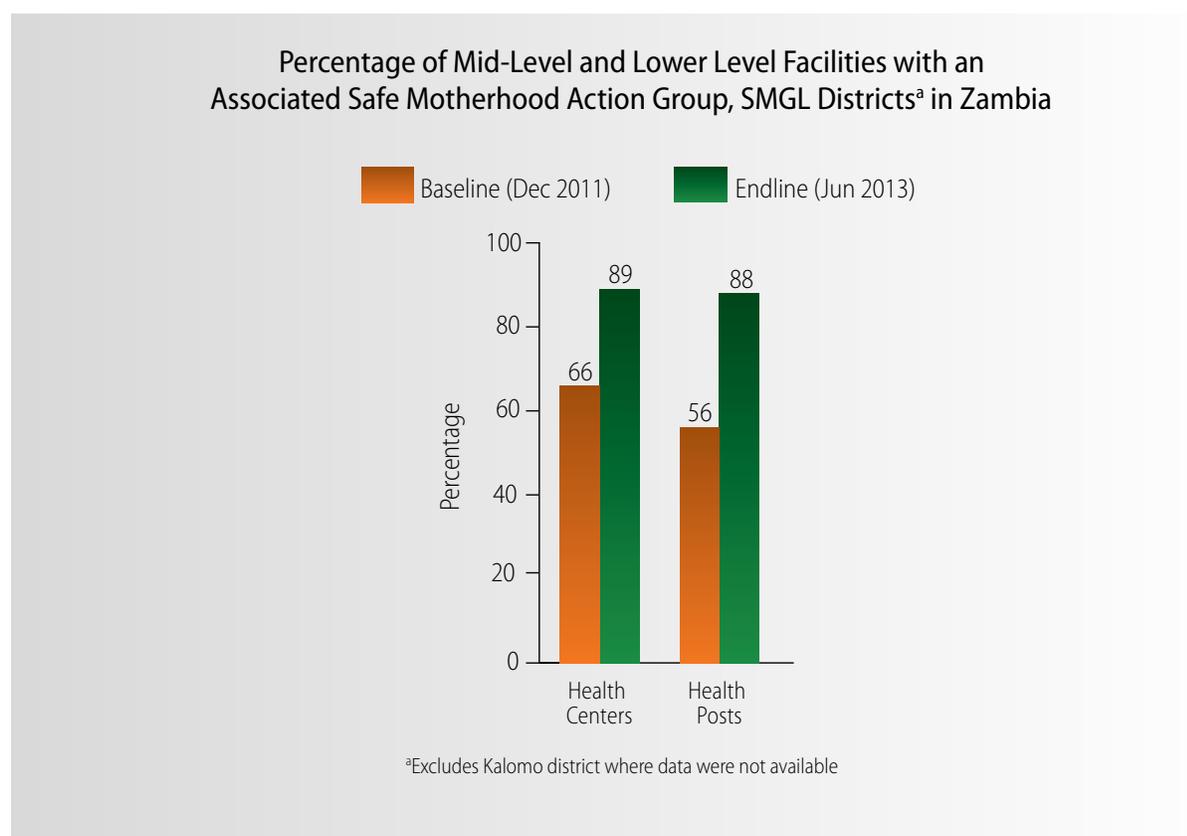
emphasis on increasing deliveries, particularly in mid-level and lower-level health facilities (health centers and health posts).

- Improved communication, transportation, and voucher systems.

In Uganda, the number of referrals to obstetric care facilities in SMGL districts more than doubled compared with the number of referrals in contiguous Mid-Western districts that did not participate in the SMGL initiative.



In Zambia, the percentage of mid-level and lower-level facilities with an active SMAG increased sharply in only 12 months.



Facility infrastructure in Uganda and Zambia improved. The SMGL Initiative

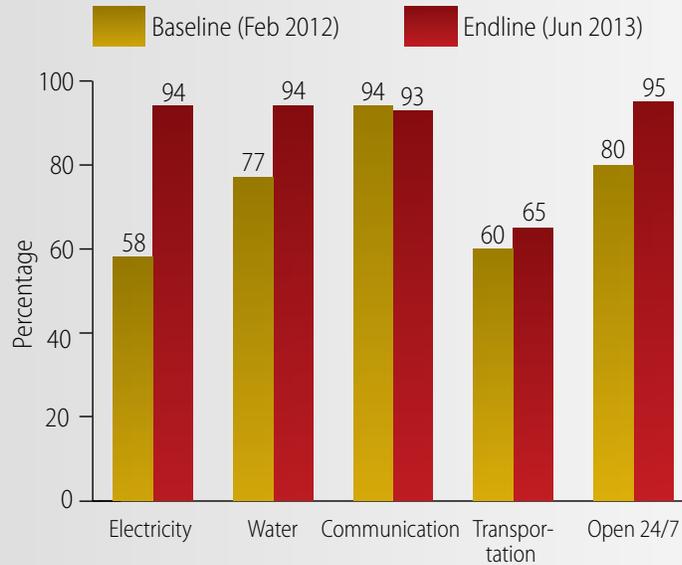
- **Increased the availability of electricity and water.**
- **Improved communication systems** to make emergency referrals easier. By the end of Phase 1, about 90% of health facilities in each country had one or more functioning means of communication in place.
- **Increased access to transportation for women who seek delivery care in facilities,** including using innovations such as transportation vouchers (Uganda).

- **Improved service availability** so that more facilities offered delivery services 24 hours a day, 7 days a week.
- **Provided more beds** for delivery care.
- **Built mothers' shelters** outside hospitals where rural women can wait for delivery (Zambia).

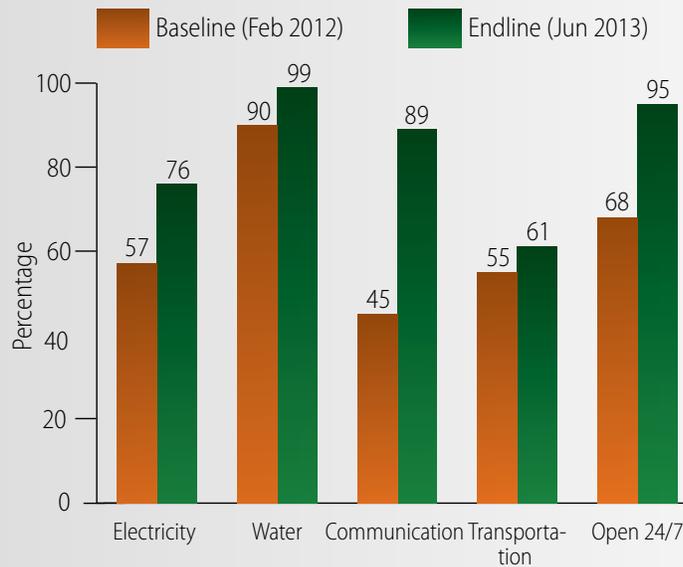
These improvements built on and amplified other health system improvements, including earlier PEPFAR-funded improvements in the 8 SMGL districts.

In Uganda, improvements were made in four of five infrastructure indicators. In Zambia, improvements were made in all five indicators.

Percentage of Health Facilities with Selected Infrastructure, SMGL Districts in Uganda



Percentage of Health Facilities with Selected Infrastructure, SMGL Districts in Zambia



- In Uganda and Zambia, SMGL partners and the Ministries of Health (MOHs) committed to **increase the number of skilled medical staff and their training** in SMGL districts. By the end of Phase 1--
 - ◇ Uganda had achieved its MOH targets for obstetrician-gynecologists, registered nurses, and registered midwives.
 - ◇ Zambia had increased the number of midwives to meet the government's staffing goals.
 - ◇ The SMGL initiative provided training in EmONC to more than 500 health care providers in the eight pilot districts.
- **SMGL increased access to life-saving medications** through improved management and supply chains. In Zambia, the percentage of facilities that reported no recent stock-outs of magnesium sulfate (an anticonvulsant that reduces deaths from eclampsia) at the end of Phase 1 quadrupled (from 22% to 87%). In Uganda, the percentage increased by 32% (from 47% to 62%). Oxytocin, the main component of the Active Management of the Third Stage of Labor, also became more widely available in both countries. Out-of-stock reports for this drug were virtually eliminated in Zambia, and only 18% of health facilities in Uganda reported a recent stock-out of oxytocin at the end of Phase 1.
- **The availability of the equipment necessary to provide life-saving interventions increased.** In Uganda, the percentage of facilities that had newborn ventilation equipment increased from 19% to 63%. The percentage that had functional autoclaves to sterilize delivery instruments increased from 18% to 44%.

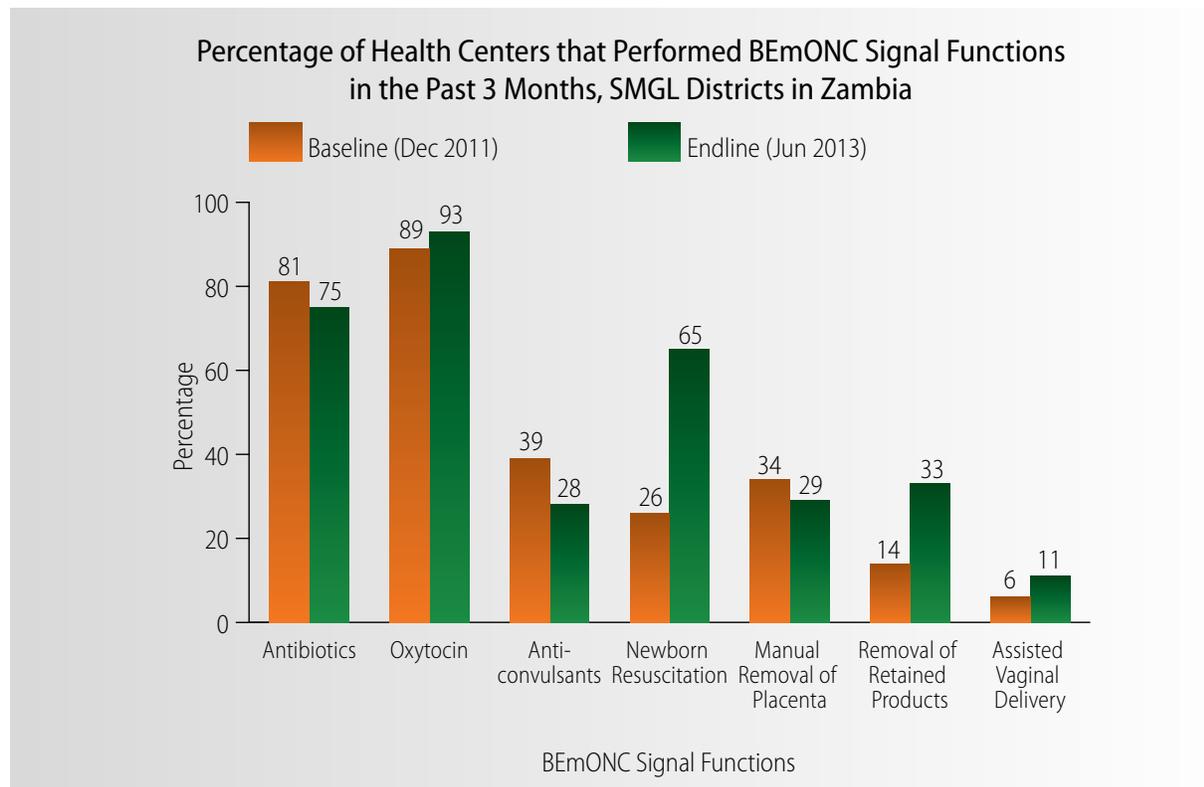
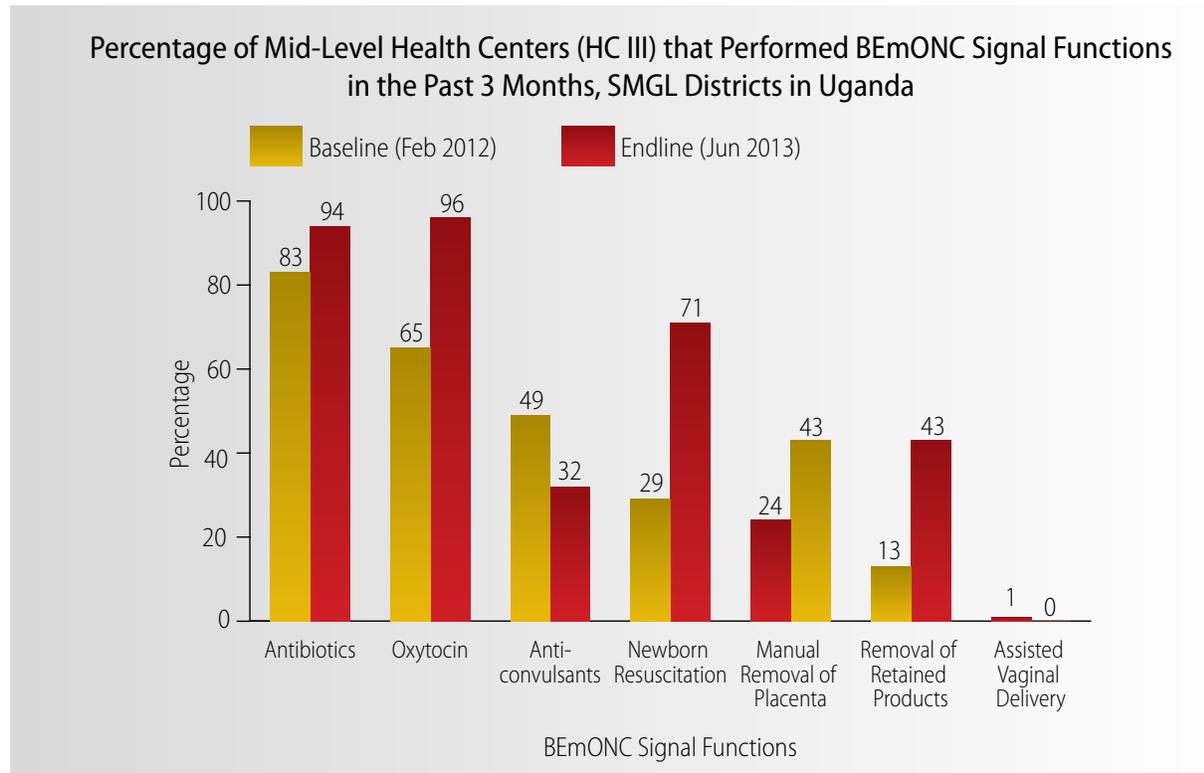
Emergency Obstetric and Newborn Care Coverage Increased

About 15% of women develop complications in childbirth that are potentially life-threatening and require immediate access to emergency obstetric care. A central pillar of the SMGL strategy is to ensure adequate coverage of EmONC, which is a package of life-saving interventions designed to manage the direct obstetric complications that cause the majority of maternal deaths.

- **During Phase 1, SMGL districts increased the met need for basic and comprehensive EmONC by 42% in Uganda and 31% in Zambia.** (Met need for EmONC is the estimated proportion of all women with major obstetric complications who are treated in EmONC facilities.)
- **Availability of basic and comprehensive EmONC facilities improved substantially because of SMGL.** Health facilities in SMGL districts were classified as Basic (BEmONC) or Comprehensive (CEmONC) care facilities⁴ (or neither) on the basis of whether they had recently performed specific medical interventions (aka signal functions) that the World Health Organization (WHO) has determined should be available to save the lives of mothers and newborns. The number of CEmONC facilities (those having the ability to perform Cesarean sections and blood transfusions, in addition to the seven basic life-saving interventions that should be available in BEmONC facilities) increased from 7 to 16 in Uganda, and from 4 to 5 in Zambia. The number of BEmONC facilities also increased from 3 to 9 in Uganda, and from 3 to 6 in Zambia.

4. Emergency Obstetric and Newborn Care includes a set of 9 life-saving interventions, known as "signal functions" that the World Health Organization has recommended to reduce maternal and neonatal mortality. Basic Emergency Obstetric and Newborn Care (BEmONC) facilities are those that performed at least 6 of 7 functions in the 3 preceding months (administer parenteral antibiotics, parenteral oxytocic drugs, parenteral anticonvulsants for pre-eclampsia and eclampsia; perform manual removal of placenta, removal of retained products, and assisted vaginal delivery). Comprehensive Emergency Obstetric and Newborn Care (CEmONC) facilities are those that performed BEmONC signal functions and two additional functions: Cesarean sections and blood transfusions.

In Uganda, the percentage of mid-level health centers performing BEmONC signal functions increased for five of the seven functions. Zambia reported an increase in four of the seven functions in mid-level health centers.

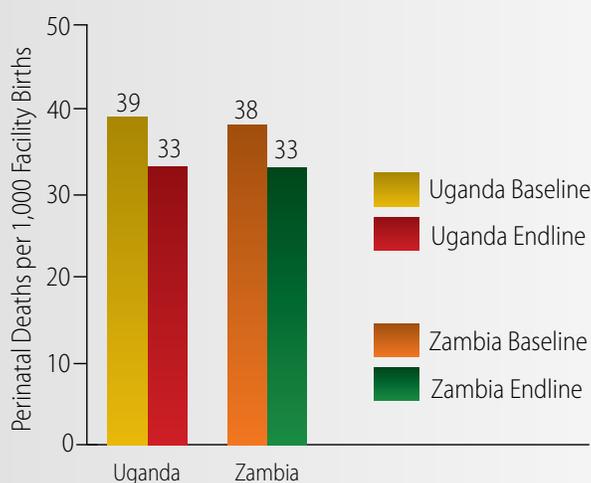


- **In both countries, the largest gains in performance of the EmONC signal functions occurred in mid-level facilities.** In particular, mid-level health clinics in both countries made substantial gains in their ability to perform signal functions. The percentage of mid-level facilities that were performing 4–5 signal functions increased from 28% to 44% in Uganda, and from 24% to 37% in Zambia
- **Cesarean sections as a percentage of all births increased in EmONC facilities in both countries.** This increase was most evident in Uganda, where the percentage increased from 5.3% to 6.5% (a 23% increase), further exceeding the 5% minimum recommended by WHO. In Zambia, the percentage increased from 2.7% to 3.1% (a 15% increase).
- **Institutional perinatal mortality (PMR)⁵ rates declined.** Uganda reported an 17% decrease in PMR, while Zambia reported a 14% decrease between the baseline and endline.
 - ◊ Declines in the PMR were due to declines in the institutional stillbirth rate. Both

countries showed comparable and significant declines in institutional stillbirth rates (20% in Uganda, 19% in Zambia), suggesting important improvements in the quality of delivery care in health facilities.

- ◊ The pre-discharge institutional neonatal mortality rate (NMR), however, did not change significantly between the baseline and endline assessments in either country.⁶ This lack of improvement in the NMR could have been because of a shift in mortality from the intrapartum period (i.e., fewer deaths occurred during labor and delivery because of improved quality and timeliness of care) to the postpartum period (more infants were born alive due to skilled care, but were too sick to survive). Training on neonatal resuscitation may also have led to improvements in the classification of neonatal deaths. Deaths that would have been classified as stillbirths in the baseline may have been classified as neonatal in the endline.

Facility Perinatal Mortality Rate Before and After SMGL, SMGL Districts in Uganda and Zambia



5. The institutional perinatal mortality rate is the number of stillbirths and predischarge neonatal deaths, divided by the number of total births in the same facilities, during the same period, per 1,000.

6. Erratum — An advance copy of this executive summary indicated the pre-discharge institutional neonatal mortality rate (NMR) increased significantly in Uganda during SMGL Phase 1. Further investigation found and corrected erroneously recorded data in one facility, leading to a downward revision of the endline NMR and PMR in Uganda.

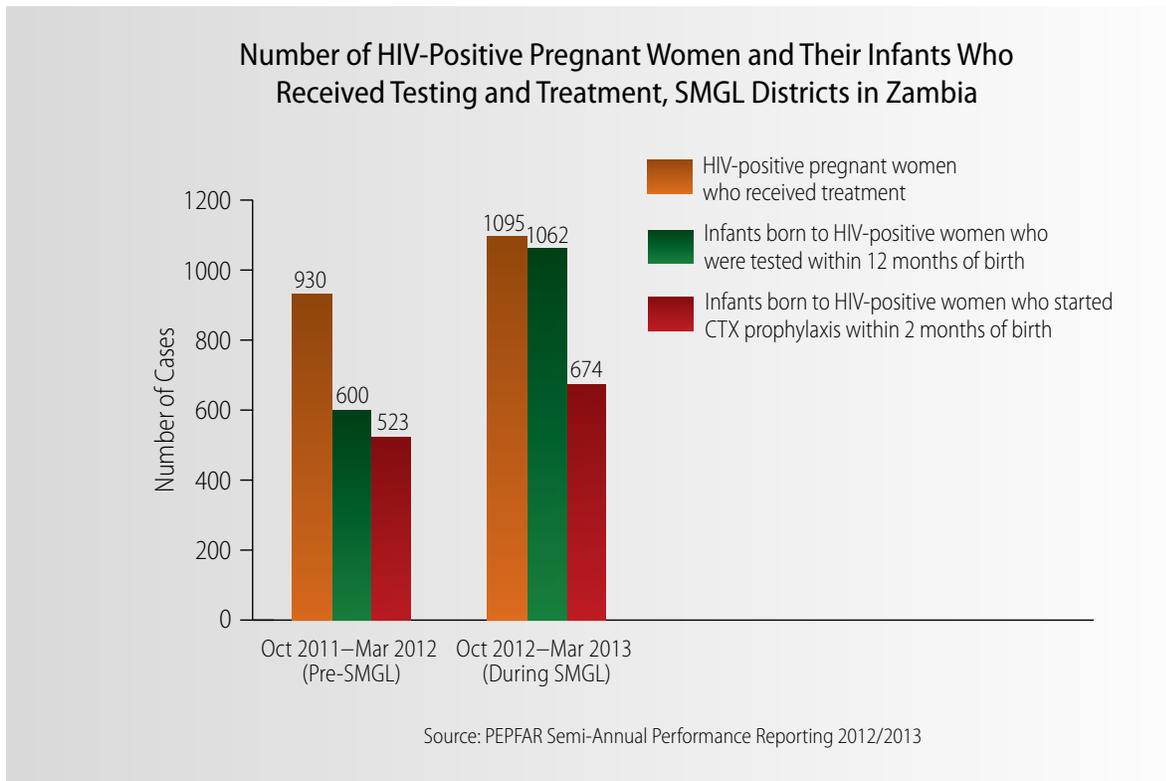
HIV Prevention and Treatment for Women and Infants Improved

Because the SMGL initiative was built on and integrated with existing PEPFAR and MCH efforts and platforms, it was expected that SMGL would contribute to mutually beneficial results in areas where initiatives overlapped, especially for care and treatment of HIV-positive pregnant women and their infants. Evaluation of activities conducted during Phase I found the following:

- **In CEmONC facilities in Uganda, the number of HIV-positive mothers treated and infants who received prophylaxis** had been on the rise before SMGL, due to the Prevention of Maternal to Child Transmission (PMTCT) acceleration supported by PEPFAR. These gains continued and were amplified during Phase 1 of the SMGL initiative. As a result, the number of women delivering in CEmONC facilities whose

HIV status was known at the time of the birth increased from 16,941 at the baseline to 20,564 at the end of Phase 1 (21% increase). The number of HIV-positive mothers delivering in these facilities who received antiretroviral drugs increased from 1,262 to 1,620 (a 28% increase). The number of infants born in these facilities who received prophylaxis increased from 1,117 to 1,415 (a 27% increase).

- **In Zambia, routine data collected by PEPFAR also showed a clear improvement in treatment for HIV-positive mothers and prophylaxis for their infants.** Between the baseline and endline assessments, the number of pregnant women with known HIV status (including women who were tested for HIV and received test results) increased from 23,986 to 33,176 (a 38% increase); the number of HIV-positive women treated increased from 930 to 1,095 (an 18% increase), while the number of infants receiving prophylaxis increased from 523 to 674 (a 29% increase).



Conclusion

There is much to celebrate about recent improvements in access to, utilization of, and quality of maternity care for women and infants in the countries that participated in the first year of the SMGL initiative. Improvements in the availability of and access to EmONC have saved the lives of many women who experienced obstetric hemorrhage, obstructed labor, eclampsia, preeclampsia, sepsis, and other major obstetric complications. The SMGL improvements have also saved the lives of many infants born to women with these complications.

During Phase 1, the intensive and wide-ranging interventions of the SMGL initiative resulted in sharp declines in maternal mortality in SMGL districts in Uganda and in facilities in SMGL districts in Zambia. These declines suggest that the SMGL approach could be expanded and used in other locations to reduce the toll of maternal deaths in resource-limited settings.

In Phase 2, SMGL will seek to further reduce the maternal and neonatal mortality, and apply these life-saving interventions in additional districts and countries. In order to sustain and build on the progress made in Phase 1, SMGL needs to

- Maintain the increased availability, use, and quality of EmONC in the pilot districts.
- Work with lower-level facilities to continue to improve their obstetric services by ensuring routine use of Active Management of the Third Stage of Labor, immediate management of postpartum hemorrhage and other severe maternal complications (including shock), and neonatal resuscitation.



Photograph by Ricardo Gamgale, 2013

- Provide emergency transfer for complications that cannot be managed at lower-level facilities by strengthening and clarifying protocols, procedures, and agreements with higher-level facilities.
- Focus on improvements in neonatal survival through improved newborn care.

Maternal mortality can be further reduced through continued implementation of SMGL. Recommended activities include the following:

- Earlier, more timely access to health facilities because many women who died in health facilities arrived in a critical state.
- Sustained increases in the proportion of women who deliver in health facilities.
- Measurable improvements in the quality of obstetric and newborn care.

Summary of Key Findings from SMGL Phase 1

- In Uganda, the maternal mortality ratio (MMR) for the four SMGL districts declined 30%, from 452 maternal deaths per 100,000 live births at the baseline assessment to 316 per 100,000 at the endline assessment.
- In Zambia, the MMR for health facilities in the four SMGL districts declined by 35%, from 310 maternal deaths per 100,000 live births at baseline to 203 per 100,000 at endline.
- Major direct obstetric causes of maternal death declined in both Uganda and Zambia. In the four SMGL districts in Uganda, the MMR decreased by 43% for obstetric hemorrhage and by 54% for obstructed labor. In health facilities in the SMGL districts in Zambia, the MMR decreased by 78% for obstructed labor and by 34% for obstetric hemorrhage.
- Rates of delivery in health facilities increased sharply in both countries. The percentage of births that took place in facilities rose from 46% to 74% in Uganda (a 62% increase) and from 63% to 84% in Zambia (a 35% increase).
- The numbers of obstetrician-gynecologists and registered midwives increased in the four SMGL districts in Uganda to meet the Ministry of Health's targets. In Zambia, the number of midwives in the SMGL districts increased to meet the government's staffing goals.
- The availability of basic and comprehensive emergency obstetric and neonatal care facilities (EmONC) increased sharply because of the SMGL initiative. The ability of facilities to meet the need for EmONC increased from 46% to 66% in Uganda (a 42% increase) and from 34% to 45% in Zambia (a 31% increase).
- Rates of Cesarean section increased. The percentage of all births delivered by Cesarean section increased by 23% in Uganda and by 11% in Zambia.
- Perinatal mortality rates (PMRs) and still-birth rates declined in both countries. The PMR in Uganda dropped 17%, while the rate in Zambia dropped 14%. Still-born rates dropped 20% in Uganda and 19% in Zambia, suggesting important improvements in the timeliness and quality of delivery care in facilities.

Table 1. SMGL Districts in **Uganda**: Summary of Phase 1 Changes in SMGL Indicators

	Baseline ¹	Endline	% Change ²	Sig. Level ³	
District-wide Maternal Mortality					
Maternal Mortality Ratio ⁴ (per 100,000 live births)	452	316	-30%	***	
Cause-specific Maternal Mortality Ratio ⁵	Obstetric hemorrhage	128	73	-43%	***
	Obstructed labor and uterine rupture	71	33	-54%	***
	Eclampsia / Pre-Eclampsia	58	45	-23%	NS
	Postpartum sepsis	33	17	-50%	**
	Complications of abortion	42	36	-15%	NS
	Other direct causes	49	31	-37%	*
	Indirect causes	70	82	17%	NS
Maternal and Perinatal Outcomes in Facilities					
Maternal Mortality Ratio in Facilities ⁶ (per 100,000 live births in facilities)	534	345	-35%	***	
Cause-specific Maternal Mortality Ratio in Facilities ⁷	Obstetric hemorrhage	131	94	-29%	NS
	Obstructed labor and uterine rupture	72	30	-58%	**
	Eclampsia / Pre-Eclampsia	45	46	3%	NS
	Postpartum sepsis	75	32	-57%	**
	Complications of abortion	63	35	-44%	NS
	Other direct causes	30	32	7%	NS
	Indirect causes	119	76	-36%	*
Institutional Delivery Rate ⁸	All Facilities	46%	74%	62%	***
	EmONC ⁹ Facilities	28%	36%	28%	***
% Institutional deliveries supported by transport vouchers (3 districts) ¹⁰	6%	39%	550%	***	
Active Management of Third Stage of Labor Rate (%) in Comprehensive EmONC Facilities	42%	85%	100%	***	
Cesarean Sections as a Proportion of All Births (%)	5.3%	6.5%	23%	***	
Met Need for EmONC ¹¹ (%)	All Facilities	46%	66%	42%	***
	EmONC Facilities	39%	49%	25%	***
Direct Obstetric Case Fatality Rate ¹² (%)	All Facilities	2.6%	2.0%	-25%	**
	EmONC Facilities	2.9%	2.4%	-18%	NS
Institutional Perinatal Mortality Rate ¹³ (per 1,000 births)	39.3	32.7	-17%	***	
Institutional Stillbirth Rate ¹⁴ (per 1,000 births)	31.2	24.8	-20%	***	
Pre-discharge Neonatal Mortality Rate ¹⁵ (per 1,000 live births)	8.4	8.1	-4%	NS	
HIV Prevention in Facilities					
Number of women who received prophylaxis or treatment	1262	1620	28%		
Number of infants born to HIV-positive pregnant women who received prophylaxis	1117	1415	27%		
Service Delivery					
Number of Basic EmONC facilities	3	9	200%		
Number of Comprehensive EmONC facilities	7	16	129%		
% of Lower-level health facilities with Partial Basic EmONC ¹⁶	28%	44%	57%		
Power availability	58%	94%	62%		
Water availability	77%	94%	22%		
Delivery care available 24 hours / 7 days a week (all facilities)	80%	95%	19%		
Number of Births, June 2012 – May 2013					
District-Wide Births	75675	78261	3%		
Births in Facilities	33492	56571	69%		

References for Table 1

1. Baseline deaths occurred in the 12 months before Phase 1 (June 2011–May 2012); endline deaths occurred during Phase 1 (June 2012–May 2013). Baseline facility outcomes occurred during the 12 months before Phase 1 (June 2011–May 2012); endline facility outcomes occurred during Phase 1 (June 2012–May 2013). Baseline Health Facility Assessments were conducted in December 2011 (Zambia) and February 2012 (Uganda); endline Health Facility Assessments were conducted in June 2013.
2. Percent change calculations based on unrounded numbers.
3. Asterisks indicate significance level using the z-statistic as follows: *** $p < .01$, ** $p < .05$, * $p < .1$, NS=Not significant. The data presented here are not subject to sampling error, since they are the result of complete counts and not samples, but may be affected by random variation. That is, the number of events that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances. Therefore, when a change is labeled as significant it means that the difference is extremely unlikely to be due to random variability.
4. Ratio of maternal deaths to live births in the 4 districts. Includes direct and indirect obstetric deaths that occurred in communities and facilities, investigated in households with verbal autopsies, and with cause of death independently certified by physicians.
5. Ratio of maternal deaths to live births in the 4 districts due to specific direct and indirect obstetric causes that occurred in communities and facilities.
6. Ratio of maternal deaths in facilities among live births delivered at facilities.
7. Ratio of maternal deaths to live births in the 4 districts due to specific direct and indirect obstetric causes that occurred in communities and facilities.
8. Proportion of all births in population occurring in health care facilities.
9. Emergency Obstetric and Newborn Care includes a set of 9 life-saving interventions, known as “signal functions” that the World Health Organization has recommended to reduce maternal and neonatal mortality. Basic Emergency Obstetric and Newborn Care (BEmONC) facilities are those that performed at least 6 of 7 functions in the 3 preceding months (administer parenteral antibiotics, parenteral oxytocic drugs, parenteral anticonvulsants for pre-eclampsia and eclampsia; perform manual removal of placenta, removal of retained products, and assisted vaginal delivery). Comprehensive Emergency Obstetric and Newborn Care (CEmONC) facilities are those that performed BEmONC signal functions and two additional functions: Cesarean sections and blood transfusions.
10. Proportion of pregnant women who used transportation vouchers to access delivery care in facilities that participated in SMGL among all women who delivered in facilities in 3 of 4 SMGL districts.
11. Proportion of women with major direct obstetric complications treated at all facilities/EmONC facilities among expected number of women who would have major obstetric complications (15% of expected births in the population).
12. Proportion of women with major direct obstetric complications who die in all facilities/EmONC. Maternal deaths in facilities were crosschecked with maternal deaths identified in communities (RAMOS baseline and endline in Uganda).
13. Proportion of institutional births that result in stillbirths or pre-discharge neonatal deaths (usually within the first 24 hours).
14. Proportion of institutional births that are stillbirths among all facility-based births.
15. Proportion of institutional births that result in pre-discharge neonatal deaths (usually within the first 24 hours after delivery)
16. Percent of health centers (HC) that performed 4-5 basic emergency obstetric care interventions in the past 3 months.

Erratum — An advance copy of this executive summary indicated the pre-discharge institutional neonatal mortality rate (NMR) increased significantly in Uganda during SMGL Phase 1. Further investigation found and corrected erroneously recorded data in one facility, leading to a downward revision of the endline NMR and PMR in Uganda.



Photograph by Ricardo Gangale, 2013

Table 2. SMGL Districts in **Zambia**: Summary of Phase 1 Changes in SMGL Indicators

	Baseline ¹	Endline	% Change ²	Sig. Level ³	
District-wide Maternal Mortality					
Maternal Mortality Ratio ⁴ (per 100,000 live births)	310	202	-35%	**	
Cause-specific Maternal Mortality Ratio ⁵	Obstetric hemorrhage	110	72	-34%	NS
	Obstructed labor and uterine rupture	59	13	-78%	**
	Other direct causes	91	82	-11%	NS
	Indirect causes	50	36	-28%	NS
Institutional Delivery Rate ⁶ (%)	All Facilities	63%	84%	35%	***
	EmONC ⁷ Facilities	26%	30%	17%	***
Cesarean Sections as a Proportion of All Births (%)	2.7%	3.1%	15%	***	
Met Need for EmONC ⁸ (%)	All Facilities	34%	45%	31%	***
	EmONC Facilities	26%	32%	23%	***
Direct Obstetric Case Fatality Rate ⁹ (%)	All Facilities	3.1%	2.0%	-34%	**
	EmONC Facilities	3.4%	2.2%	-35%	**
Institutional Perinatal Mortality Rate ¹⁰ (per 1,000 births)	37.9	32.8	-14%	***	
Institutional Stillbirth Rate ¹¹ (per 1,000 births)	30.5	24.8	-19%	***	
Pre-discharge Neonatal Mortality Rate ¹² (per 1,000 live births)	7.7	8.2	7%	NS	
HIV Prevention in Facilities					
Number of women who received prophylaxis or treatment	930	1095	18%		
Number of infants born to HIV-positive pregnant women who received prophylaxis during the first 2 months	523	674	29%		
Service Delivery					
Number of Basic EmONC facilities	3	6	100%		
Number of Comprehensive EmONC facilities	4	5	25%		
% of Lower-level health facilities with Partial Basic EmONC ¹³	28%	44%	57%		
Power availability	57%	76%	33%		
Water availability	90%	99%	10%		
Delivery care available 24 hours/7 days a week (all facilities)	68%	95%	40%		
Mothers' shelter availability (% of health centers)	30%	36%	20%		
Number of Births, June 2012 – May 2013					
District-Wide Births	35879	37379	4%		
Births in Facilities	21914	30619	40%		

- Baseline facility deaths occurred in the 12 months before Phase 1 (June 2011–May 2012); endline deaths occurred during Phase 1 (June 2012–May 2013). Baseline facility outcomes occurred during the 12 months before Phase 1 (June 2011–May 2012); endline facility outcomes occurred during Phase 1 (June 2012–May 2013). Baseline Health Facility Assessments were conducted in December 2011 (Zambia) and February 2012 (Uganda); endline Health Facility Assessments were conducted in June 2013.
- Percent change calculations based on unrounded numbers.
- Asterisks indicate significance level using the z-statistic as follows: ***p<.01, **p<.05, *p<.1, NS=Not significant. The data presented here are not subject to sampling error, since they are the result of complete counts and not samples, but may be affected by random variation. That is, the number of events that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances. Therefore, when a change is labeled as significant it means that the difference is extremely unlikely to be due to random variability.
- Ratio of maternal deaths in facilities among live births delivered at facilities.
- Ratio of maternal deaths to live births in the 4 districts due to specific direct and indirect obstetric causes that occurred in communities and facilities.
- Proportion of all births in population occurring in health care facilities.
- Emergency Obstetric and Newborn Care includes a set of 9 life-saving interventions, known as "signal functions" that the World Health Organization has recommended to reduce maternal and neonatal mortality. Basic Emergency Obstetric and Newborn Care (BEmONC) facilities are those that performed at least 6 of 7 functions in the 3 preceding months (administer parenteral antibiotics, parenteral oxytocic drugs, parenteral anticonvulsants for pre-eclampsia and eclampsia; perform manual removal of placenta, removal of retained products, and assisted vaginal delivery). Comprehensive Emergency Obstetric and Newborn Care (CEmONC) facilities are those that performed BEmONC signal functions and two additional functions: Cesarean sections and blood transfusions.
- Proportion of women with major direct obstetric complications treated at all facilities/EmONC facilities among expected number of women who would have major obstetric complications (15% of expected births in the population).
- Proportion of women with major direct obstetric complications who die in all facilities/EmONC. Maternal deaths in facilities were crosschecked with maternal deaths identified in communities (baseline Census and endline subset of deaths in Zambia).
- Proportion of institutional births that result in stillbirths or pre-discharge neonatal deaths (usually within the first 24 hours).
- Proportion of institutional births that are stillbirths among all facility-based births.
- Proportion of institutional births that result in pre-discharge neonatal deaths (usually within the first 24 hours after delivery)
- Percent of health centers (HC) that performed 4-5 basic emergency obstetric care interventions in the past 3 months.





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