

Improving Maternal Healthcare Access and Neonatal Survival through a Birthing Home Model in Rural Haiti

Stan Shaffer, MD, Denise Fryzelka, MSN, CNW, Cindy Obenhaus, RN, Elizabeth Wickstrom, MD

Abstract

High neonatal mortality in Haiti is sustained by limited access to essential maternity services, particularly for Haiti's rural population. We investigated the feasibility of a rural birthing home model to provide basic prenatal, delivery, and neonatal services for women with uncomplicated pregnancies while simultaneously providing triage and transport of women with pregnancy related complications. The model included consideration of the local context, including women's perceptions of barriers to healthcare access and available resources to implement change. Evaluation methods included the performance of a baseline community census and collection of pregnancy histories from 791 women living in a defined area of rural Haiti. These retrospective data were compared with pregnancy outcome for 668 women subsequently receiving services at the birthing home. Of 764 reported most recent pregnancies in the baseline survey, 663(87%) occurred at home with no assistance from skilled health staff. Of 668 women followed after opening of the birthing home, 514 (77%) subsequently gave birth at the birthing home, 94 (14%) were referred to a regional hospital for delivery, and only 60 (9%) delivered at home or on the way to the birthing

home. Other measures of clinical volume and patient satisfaction also indicated positive changes in health care seeking. After introduction of the birthing home, fewer neonates died than predicted by historical information or national statistics. The present experience points out the feasibility of a rural birthing home model to increase access to essential maternity services.

Introduction

Haiti's neonatal mortality rate of 34 deaths per 1,000 live births is the highest in the Western Hemisphere and among the highest in the world.¹ Barriers to healthcare access are a major cause of excess perinatal mortality, especially in Haiti's rural areas. An important review of maternal deaths by Barnes-Josiah *et. al.* demonstrated that almost every maternal death can be linked to delays in seeking care, delays in reaching an obstetrical facility, or delays in receiving timely care - a tragic circumstance referred to as the 'Three Delays'.² It is likely that these access problems are also responsible for stillbirths and neonatal deaths by way of untreated or poorly treated maternal complications, inadequate neonatal care, or harmful home care practices.³

Strategies to improve perinatal mortality in Haiti have historically focused on expansion of hospital services. But because most hospitals are located in population centers, this approach fails to benefit women who must travel from distant locations or cannot afford hospital fees. An alternate strategy has been to train traditional birth attendants to attend mothers at their homes.⁴ This approach is helpful

Submitted: June 4, 2007;

Accepted September 22, 2007

From the Program in International Medicine
The University of Missouri – Kansas City, School
of Medicine

Conflict of Interest: none declared

Corresponding author: Stan Shaffer, M.D., 6401 Wornall
Terrace, Kansas City, MO 64113; 816-812-7100; 816-
932-6139

Email: ShafferS@umkc.edu

for providing some basic elements of maternity and newborn care, especially in the context of rural poverty. But practices of home birth attendants are limited in scope and may suggest that a double standard of care is acceptable.

We are assessing the feasibility of an intermediate strategy based on the provision of obstetrical and newborn services at community birthing homes (*Maisons de Naissance*). This strategy would permit women with uncomplicated pregnancies to receive prenatal care and delivery assistance close to home while women with pregnancy risk factors are identified and transported for hospital-based care. In the prototype model described in this report, staffing is by nurse midwives, nurses, and nursing assistants. Triage and patient management are assisted by clinical protocols. Physician collaboration, when necessary, is available by satellite internet communication. The present model uniquely addresses both social and medical factors determining access to maternity care in an undeveloped country. The goals of this community-based model are to recognize and ameliorate local barriers to healthcare access, to work within the social context of the community to encourage positive health practices, to bring high-quality primary care close to where mothers are living, and to evaluate performance. This report describes the efficacy, cost, and community impact of this prototype model located in a rural area of southwest Haiti.

Methods

Preliminary investigations were conducted to define the barriers which were limiting access or delaying health care for women in southwest rural Haiti. Regional demographic data, cultural traditions, local practices surrounding birth, and existing resources for maternal health care were reviewed. Healthcare providers at obstetrical centers were interviewed to better understand healthcare alternatives in the region and to discuss previous experiences of success and failure.

After the need for rural based services was suspected and a birthing home model proposed, a suitable site was selected with the assistance of the

local community. It was determined that services would be available to all women, but a primary zone of service was established in order to target community programs, to define a population for baseline data acquisition, and to evaluate outcomes. The zone of service was defined by a set of roads which demarcated a thirty-square-kilometer area surrounding the future site of the birthing home.

Prior to opening the birthing home, a census of the zone of service was conducted. The census included demographic information for each home and each resident. Women of childbearing age were asked to also participate in a women's health survey which included pregnancy history, health-seeking attitudes and practices, and ideas for needed services. The results of the survey were used to further define the services to be offered.

Home visits continued after the opening of the birthing home, called *Maison de Naissance*. A rotation of visits served as a demographic surveillance system to update census information and confirm patient outcomes. Home visits were simultaneously used to provide health education and community health interventions, such as Vitamin A distribution. Home visits also provided a means to monitor access and usage of other health services in the region. Traditional midwives, or *matrons*, working in the area were identified and encouraged to collaborate in the home visit program for patient education and referral. Home visits were also used for case management or directly observed therapy, as in the case of HIV positive mothers.

This review includes maternal and child services which were provided to all patients as well as more detailed assessment of pregnancy outcome for a target population of women 15-45 years of age living within the *Maison de Naissance* zone of service. Analysis of pregnancy outcome includes those women who were delivered or referred between the opening of the birthing home, September 24, 2004, and January 1, 2007.

The data for this review was obtained from the electronic medical records of *Maison de Naissance*, which includes information from all facility-based clinical services as well as health information collected as a part of the zone of service census,

women's health surveys, and home visits. Patient satisfaction was evaluated by structured interviews held with patient focus groups. These interviews took place in March 2007 and were conducted by an independent consultation group (Fleishman-Hillard International Communications).

Primary outcome measures for this review include utilization of services (specifically prenatal visits and births at the facility), frequency of maternal referrals, maternal mortality ratio, and neonatal mortality rate.

The methods for census, surveys, patient interviews, data management and data evaluation were reviewed by the Institutional Review Committee of St. Luke's Hospital. An exemption was given from signed informed consent.

The Model

The birthing home (*Maison de Naissance*) model focuses on reducing barriers to healthcare access, providing quality health services with regard to local social context, and monitoring performance. Elements of the model include:

1. Resources

Maison de Naissance (MN) is located in a rural area to provide geographic access to women who otherwise would walk 6-8 hours to reach a hospital. Electricity and water are supplied by a generator and a well, respectively. Essential equipment, supplies, laboratory, and ultrasound are available for low-risk maternity and normal newborn care. HIV screening and treatment are included. Staffing includes a nurse midwife (*Infirmière Sage-Femme*) 24/7 and ancillary nursing staff that are receiving training to become midwives (*Sage-Femmes*). A vehicle and driver are available 24/7 for patient transport. A web-based electronic medical record is used to record all health care information. Satellite internet access permits communication, telemedicine, quality assessment, and outcome monitoring.

2. Patient management, triage and transport

Assessment and management protocols are used to guide care in line with evidence-based standards for low-risk maternity care and normal newborn

care. Women suspected of needing an operative delivery or experiencing complications of pregnancy or labor are transported to a regional hospital located approximately 30 minutes away by truck. Sick newborns are also referred.

3. Hospitality

Maison de Naissance is designed to physically resemble a home rather than a medical facility. Likewise, the staff is trained to make special efforts to create an atmosphere which is inviting and encouraging to the women who are served. To reduce potential financial barriers, there are no patient fees. Patients are also not responsible for fees or supplies if they are referred.

4. Evaluation

The staff participates in case reviews and quality improvement processes. The web-based electronic medical record and internet communication facilitates long-distance evaluation activities. The community participates in program evaluations through mother's clubs, individual interviews, and focus groups.

Results

Baseline community evaluations

The baseline census, conducted in early 2004, identified 901 homes and 5,496 residents within the zone of service. Maternal health surveys were completed for 791 women who were pregnant or had previously been pregnant. There were a total of 1,951 prior pregnancies among 764 women. These pregnancies resulted in 1,657 live births, of which 1,460 children were still living. Of 197 childhood deaths, 66 occurred by one month of age, 65 occurred between one month and one year of age, and 55 occurred between one and five years of age. The estimated neonatal mortality from these historical data is, therefore, 40 neonatal deaths per 1,000 live births. During their most recent pregnancy, 321 (42%) women reported that they had at least one prenatal visit. The remaining 443 women reported they had never visited a clinic or hospital for care prior to delivery. There were 101 (13%) hospital births and 663 home deliveries.

Eighty-one women were pregnant at the time that the survey was conducted. Of these, 30 (37%) had visited a prenatal clinic.

The women surveyed volunteered the following health concerns:

- Distrust of the public hospital
- Mistreatment at the public hospital
- Charges for services (all facilities)
- Lack of transportation to the city
- Clinic visits take time away from family, home, farm, or market work
- Men object to time spent at a clinic
- Men object to family planning
- Hospital clinics have long wait times
- There is no food provided by the hospital

Some respondents noted that they were isolated from any health services while others discussed

sometimes seeking health advice from a variety of sources, including traditional healers or leaf doctors, traditional birth attendants, Voodoo priests, church clinics, and public clinics.

Efficacy

Between September 24, 2004, and January 1, 2007, clinical service volumes included 15,663 patient visits. There were 1,647 prenatal patients who had received a total of 10,597 visits for prenatal care (average 6.4 visits per patient). Women living within the zone of service had significantly more prenatal visits than women living outside of the zone of service (7.7 versus 6.0 visits, $p < 0.01$). Other visits were for infant follow-up and vaccinations (2,387 visits), women's health or family planning (1,683 visits), labor checks (740 visits), and postpartum evaluations (256 visits). (Figure 1)

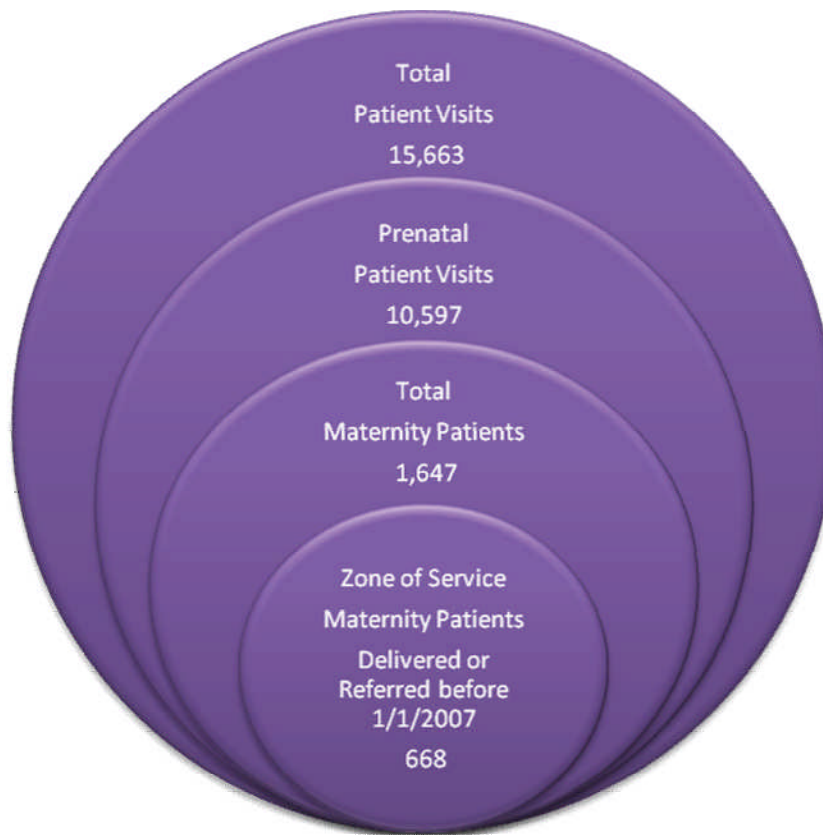


Figure 1: Clinical volume and patients followed to assess pregnancy outcome

During the same time period, the community health team of *Maison de Naissance* provided 5,208 home visits. An additional 487 homes were added to the zone of service census. Only one pregnant woman was identified who was not receiving prenatal care.

There were 668 maternity patients who lived within the zone of service and who were delivered or referred by January 1, 2007. Delivery occurred at *Maison de Naissance* for 514 (77%) patients, 94 (14%) patients were referred and delivered at the referral hospital, and 60 (9%) patients delivered at home or on the way to *Maison de Naissance*.

Among those women who delivered at *Maison de Naissance*, testing for syphilis was documented for 481 (72%) and tetanus vaccination during this pregnancy was documented in 454 (68%). Quality reviews conducted with the staff resulted in modifications of clinical protocols so that mothers arriving late in pregnancy or only for delivery would still receive all recommended prenatal screens. Vitamin K administration and eye prophylaxis was documented for all 515 newborns delivered at *Maison de Naissance* (delivery number includes one set of twins). All infants were breast fed.

The most common reasons for patient referral were vaginal bleeding, suspected postdates, hypertension or pre-eclampsia, and preterm labor (Table 1). The 94 patients who were referred were all successfully transported to the referral hospital. Among those referred, three subsequently died. One maternal death was due to eclampsia. Two maternal deaths were due to placenta previa and vaginal bleeding. One of these patients died in the hospital undelivered. The second patient was refused admission to the hospital because its blood bank was not operational. She died in route to a more distant hospital.

There were 514 live births (including one set of twins) and one still birth at *Maison de Naissance*. Two infants died before 28 days of life. One infant died at 3 days of age and one infant died at 21 days of age. Both infants died at home and the cause of

Table 1: Indications for maternal transfers

Maternal Indications	Number
Vaginal bleeding	21*
Postdates	19
Hypertension/pre-eclampsia	17
Preterm labor	12
Repeat C-Section	9
Prolonged labor	8
Abnormal fetal position	2
Prolonged rupture of membranes	2
Eclampsia	2*
Large uterine size	1
Fetal death	1

*includes subsequent maternal death(s)

death was not apparent in either case. Eleven neonates born at *Maison de Naissance* were transferred soon after birth for hospital evaluation and care. Indications for neonatal transfers included poor feeding (5 infants), low birth weight (3 infants), respiratory distress (2 infants), omphalocele (1 infant). There were three subsequent deaths in this group, all associated with low birth weight.

The calculated neonatal mortality rate for infants delivered at *Maison de Naissance* was 5.0 deaths per 1,000 live births. The calculated neonatal mortality rate for the zone of service (includes births outside of *Maison de Naissance*) was 9.1 deaths per 1,000 live births. (Figure 2, see page 182)

Cost

In-country, expenses for *Maison de Naissance* and its programs during the 28 months covered by this review totaled \$262,877 (average \$9,388 per month). This includes staff salaries, medications and supplies, and operations (generator fuel, vehicle maintenance, etc.) On a case basis, in-country expenses can be expressed as \$16.78 per patient visit. We did not attempt to include estimates for out-of-country expenses such as internet consultations, training programs, or professional support.

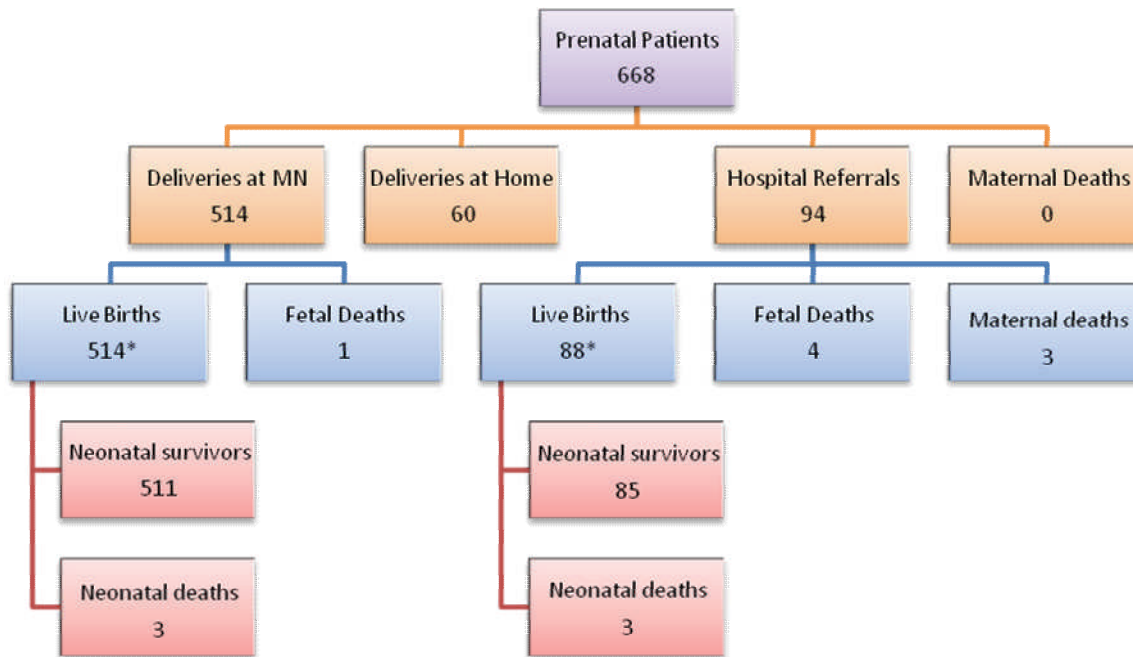


Figure 2: Flow diagram of pregnancy outcomes

During this period, there were 14 fewer neonatal deaths than predicted by national mortality rates. Using this as a measure of success, the cost efficacy of this model (total in-country cost of services divided by the number of successful outcomes) is \$18,777 per neonatal death prevented.

Patient Satisfaction / Community Impact

Interview data from 6 focus groups, including 44 women who had delivered infants at *Maison de Naissance*, revealed that most women learned about the availability of services through home visits by the staff or from a neighbor who had recommended the program. The leading factors for patient satisfaction were: 1. free care, 2. high-quality care, and 3. treatment with respect. Unanticipated findings included comments that some husbands objected to free care because it decreased their authority. At least one patient in each group reported that she had heard in the community that family planning may cause a subsequent child to be weak or sick. Leading recommendations for the program were: 1. provide transportation home post-

partum, 2. increase availability of food and water for clinic patients, and 3. decrease clinic waiting times.

Discussion

Healthcare access is fundamental to improving health outcomes. Haiti struggles with a resource-poor healthcare system plus problems of healthcare access. Geographic barriers are particularly important. Of Haiti's 8.1 million persons, 80% reside in rural areas. Haiti's terrain is difficult and transportation is lacking. Reaching a health facility is a burdensome task. Health statistics confirm that locality is a major element of health disparities within this poorest country of the Western Hemisphere.⁵ Children living in a rural area of Haiti are more than twice as likely to be malnourished than those in urban areas. Their chance of having a measles vaccine is only 80% that of urban children. The under 5 mortality rate is 33% higher for rural compared to urban children. Inequities of health access are especially acute when it comes to birth. Women living in rural areas attain prenatal care less frequently.⁶ Only 52% of deliveries in urban areas

of Haiti benefit from the presence of a skilled birth attendant; in rural areas, this number falls to an appallingly low 11%.

Geographic obstacles are compounded by financial barriers. The community surveys of this investigation revealed how hospital fees, even when modest, deter women from making hospital visits. Women sometimes avoid visiting a medical institution because of previous unfriendly treatment or lack of trust. Some women fear a hospital visit because it is viewed as the desperate last act of a woman dying in childbirth. The result of barriers to maternity care is that care is delayed, the potential for early intervention is lost, and women remain at home for childbirth.

The described birthing home model attempts to overcome several barriers so that access to care is improved. Foremost is an effort to move health care services to a convenient point of access. Since the majority of women in Haiti reside in rural locations and since health statistics demonstrate that rural women are disproportionately disadvantaged, it is logical to create models which preferentially serve rural communities. Furthermore, location of services within local communities can also facilitate understanding of local issues and less obvious barriers that may limit health access. In this experience, surveys of women in the community guided us to the importance of eliminating all patient fees. We were also alerted to the need to be proactive with hospitality to overcome reluctance,

fears, and misperceptions that existed in the community.

We are aware of opinions that women in rural Haiti are skeptical of prenatal care and that it is simply their preference to give birth at home. We are also aware of opinions that services which are free are not valued. The present data, however, challenge these opinions. Robust clinical volumes, positive community attitudes, and patient opinions as evaluated in focus groups all revealed that women embrace the availability of maternity care, especially when it can be balanced with competing family responsibilities. Most women utilized the opportunity for multiple prenatal visits and most elected to deliver at the birthing home.

From a medical perspective, we feel that this model succeeded in providing primary maternity services for women with low-risk pregnancies while also recognizing patients that should be transferred for hospital care. The data from this single birthing home experience is too limited to make definitive conclusions regarding the model's efficacy at reducing mortality. However, the low number of neonatal deaths was remarkable, especially in comparison with countrywide statistics and historical experience from previous pregnancy data in the same community (Table 2). The reduction in maternal mortality was less dramatic. The maternal deaths which occurred reinforce that in addition to adequate prenatal care, triage, and transport, a successful model will need to assure appropriate management of obstetrical emergencies.

Table 2: Summary of perinatal outcome compared with estimates of pre-existing health conditions

	Country wide ^{7,8}	Baseline Community Survey	Present Data
Prenatal Care (percent of total)	79	51	99
Births Attended by Skilled Health Staff (percent of total)	24	13	91
Maternal Mortality Ratio (pregnancy related maternal deaths per 100,000 live births)	680	Not evaluated	498
Neonatal Mortality Rate (deaths in first 28 days per 1,000 live births)	34	40	9

An important feature of this model is the integration of a community-wide home visit program. Door to door coverage was provided by community health workers. Their role included health surveys which enabled population based health statistics; health promotion through education and public health initiatives; confirmation of patient outcomes; and pro-active healthcare delivery in the forms of case management, directly observed therapy, and communication with patients who might otherwise be labeled as “lost to follow-up.” Integration of facility and community health records affords additional opportunities to improve health coverage. Tetanus, for example, remains a significant problem in Haiti. It is possible to reconcile facility and home health records to recognize individuals requiring tetanus vaccination. We hope to integrating facility and community health information to assure that all women in the community are immunized against tetanus, even prior to becoming pregnant.

The present investigation was not designed to provide a definitive assessment of cost effectiveness. The described average cost of \$16 per patient visit is, in fact, high in a country where the total health expenditure per capita is \$23 per year.⁹ However, the present data suggest health benefits which are significant compared to an investment which is modest on the scale of our own economy.

Finally, we note the importance of internet technology as a tool to overcome geographic barriers and increase health access to remote locations. Internet technology was extremely helpful to facilitate communication, case consultations, decision support, health information management, quality assurance, and outcome monitoring.

Scalable strategies to provide maternal and child healthcare are essential as we work toward the Millennium Development Goals.¹⁰ It has been suggested that new strategies include analysis of local context and needs, access to facility-

intrapartum care, adequately resourced centers, training of new types of health workers, context-specific protocols, communication and transport capacity, supervision and accountability for providers’ performance, removal of user fees, and the capacity to monitor effectiveness.^{11,12,13,14,15,16} The current model contains these key components and appears to be well suited to Haiti’s context.

Acknowledgements

We wish to acknowledge the St. Luke’s Hospital Foundation of Kansas City, Missouri, and the White-Flowers Foundation of New York, New York, for their financial support.

References

1. Neonatal Mortality Rate, year 2000 data. UNICEF. State of the World’s Children 2007. Available at: http://www.unicef.org/sowc07/docs/sowc07_table_1.pdf. Accessed April 1, 2007.
2. Barnes-Josiah D, Myntti C, and Augustin A. The “Three Delays” as a Framework for Examining Maternal Mortality in Haiti. *Soc. Sci. Med.* 1998;46(8):981-998.
3. Zupan J. Perinatal Mortality in Developing Countries, *N Engl J Med* 2005; 352:20.
4. Fauveau V, Stewart K, Chakraborty J. Effect on mortality of community-based maternity care programme in rural Bangladesh. *Lancet.* 1991; 338: 1183-6.
5. World Health Organization. World Health Statistics 2006; Inequities in Health., Available at: http://www.who.int/healthinfo/statistics/whostat2006_inequities.pdf Accessed April 1, 2007.
6. Alexandre PK, Crandall L, Saint-Jean G. Prenatal Care Utilization in Rural Areas and Urban Areas of Haiti. *Pan Am J. Public Health* 2005; 18:84-92.
7. Adjusted Maternal Mortality ratio, year 2000 data. UNICEF, State of the World’s Children 2007. http://www.unicef.org/sowc07/docs/sowc07_table_8.pdf. Accessed April 1, 2007.
8. Neonatal Mortality Rate, year 2000 data. UNICEF. State of the World’s Children 2007. Available at http://www.unicef.org/sowc07/docs/sowc07_table_1.pdf. Accessed April 1, 2007.
9. World Health Organization, year 2001 data. http://www.who.int/immunization_financing/countries/hti/summary_data/en/index.html, accessed September 5, 2007.
10. United Nations. The Millennium Development Goals Report. 2006. Available at: <http://unstats.un.org/unsd/mdg/Resources/Static/Products/Progress2006/MDGReport2006.pdf>. Accessed April 1, 2007.

11. Filippi V, Ronsmans C, Osrin D. Maternal Survival 5, Maternal health in poor countries: the broader context and a call for action, *Lancet* 2006;368:1535-41.
12. Rosenfield A, Min CJ, Freeman LP. Making Motherhood Safe in Developing Countries. *N Engl J Med* 2007;356:1395-1397.
13. Murry SF, Pearson SC. Maternity referral systems in developing countries: current knowledge and future research needs, *Social Science & Medicine*. 2006; 62: 2205-2215.
14. Knippenberg R, Lawn J, Darmstadt GL, et al; for the Lancet Neonatal Survival Steering Team. Systematic scaling up of neonatal care in countries. *Lancet* 2005; 365: 1087-98.
15. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L; for the Lancet Neonatal Survival Team. Evidence-based, cost-effective interventions: How many newborn babies can we save? *Lancet* 2005; 356: 977-88.

