



www.figo.org

Contents lists available at SciVerse ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo



IMPROVING MATERNAL HEALTH

Models of care that have reduced maternal mortality and morbidity in Sri Lanka

Rohana Haththotuwa ^{a,*}, Lakshmen Senanayake ^b, Upul Senarath ^c, Deepika Attygalle ^d

^a Ninewells CARE Mother and Baby Hospital, Colombo, Sri Lanka

^b Sri Lanka College of Obstetricians and Gynecologists, Colombo, Sri Lanka

^c Department of Community Medicine, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka

^d Ministry of Health, Colombo, Sri Lanka

ARTICLE INFO

Keywords:

Maternal morbidity

Maternal mortality

Reproductive mortality

Sri Lanka

ABSTRACT

Sri Lanka, a non-industrialized country with limited resources, has been able to achieve a maternal mortality ratio that is markedly lower than the ratios of similar countries. Many factors have contributed to Sri Lanka's success story. A political commitment to the cause and implementation of clear policies through well-structured and organized community-based and institutional healthcare services—expanded to cover the whole country and provided free of charge—have been the foundation of maternal and child health (MCH) services in the country. The healthcare programs have been well accepted and utilized by the people as the literacy rate is more than 90% for both men and women. Public health midwives form the backbone of MCH services and provide frontline reproductive health care. More than 98% of deliveries occur in hospitals and are attended by midwives. Furthermore, 85% of women in Sri Lanka deliver in facilities served by specialist obstetricians/gynecologists. The Sri Lanka College of Obstetricians and Gynecologists plays a leading role by assisting the Family Health Bureau in making policies and guidelines, training staff, and acting as team leaders for maternity care services. This was evident after the tsunami in December 2004. National maternal mortality reviews, monitoring and evaluation of MCH activities, and relatively high contraceptive prevalence rates have also contributed to the success in Sri Lanka, which could serve as a model for other countries.

© 2012 Published by Elsevier Ireland Ltd. on behalf of International Federation of Gynecology and Obstetrics.

1. Introduction

The risk of a woman dying as a result of pregnancy or childbirth is about 1 in 6 in the poorest parts of the world [1]. The average lifetime risk of dying during pregnancy in South Asia is 1 in 43; in Sri Lanka the risk is 1 in 430—10 times less than the regional figure [2]. The maternal mortality ratio (MMR) has declined from 405 per 100 000 live births in 1955 to 39.3 per 100 000 live births in 2006 [3]. This certainly is a remarkable achievement for a country with a low income and relatively low national spending on health. How this has been achieved could be a model for many more countries with similar backgrounds.

Sri Lanka is an island covering 62 000 km² with a population of 20.4 million inhabitants made up of multiple sociocultural sub-populations; 72.2% of the population live in rural areas. Gross Domestic Product (GDP) per capita was US \$2053 for 2009, with only 1.48% of GDP spent on health. The country has a Human Development Index of 0.658 and a rank of 91, which is well above the regional average [4].

Sri Lanka is successfully on track to achieve Millennium Development Goals (MDGs) 1, 2, 4, 5, and 6, and is making some progress on the rest. With near-universal access to health care and 98% institutional deliveries, the country is on track to meet MDG 5 targeted at improving maternal health [5].

2. Trends in maternal mortality ratio in Sri Lanka

Registration of births and deaths commenced in 1881 and the system improved over the years. Maternal mortality data are available from the 1900s onward. Maternal death has been a notifiable event since 1986. An analysis of the estimates and causes of maternal deaths conducted in 1996 showed a considerable discrepancy in the rates given by different sources [6]. However, with the establishment of Maternal Mortality Review meetings in 1989 the validity of data improved tremendously.

The decline in the MMR has been rapid and sustained, and well documented for over 100 years. The MMR was 2100 per 100 000 in 1881 and by 1930, nearly 50 years later, it was still 2080 per 100 000. The decline possibly started with the establishment of preventive health services and health promotion in the 1920s. The time taken to halve the MMR was 8 years and 3 years in the 1930s and 1940s, respectively. The decline in MMR tailed off over the 1960s, 1970s, and 1980s and has shown only a slow decline during the last decade (Fig. 1) [7].

* Corresponding author at: Ninewells Care Mother and Baby Hospital, 55/1 Kirimandala Mawatha, Narahenpita, Colombo 05, Sri Lanka. Tel.: +94 77 3315001; fax: +94 11 507652.

E-mail address: rohana@ninemewscare.com (R. Haththotuwa).

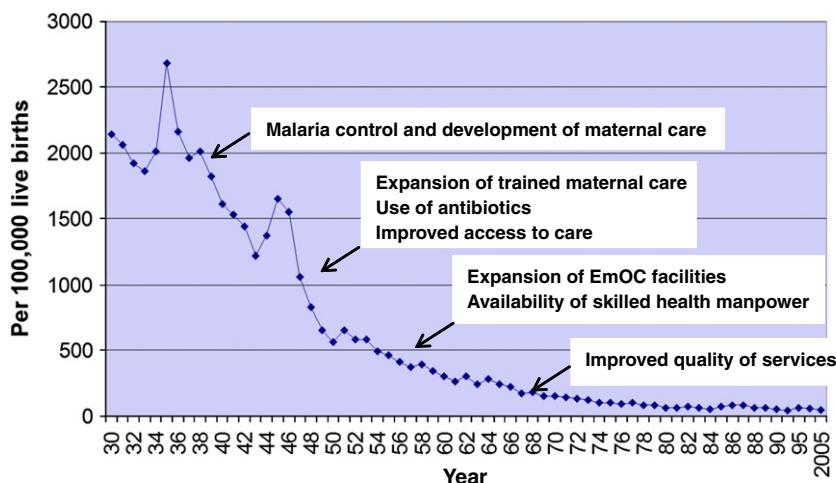


Fig. 1. Maternal mortality ratio in Sri Lanka, 1930–2005.

The peak MMR in 1934 shown in Fig. 1 was due to the major malaria epidemic that affected every third person in the country and killed 80 000 people [8]. The control of malaria and the correction of coexisting anemia possibly resulted in a sweeping reduction in the MMR [9]. Deaths due to hypertensive disease and sepsis—two causes that are associated throughout the world with lack of access to skilled birth attendance—declined dramatically during the 1940s [10]. Thereafter the reduction was due to greater access to maternity care and its utilization, and later the contribution due to the introduction of Comprehensive Emergency Obstetric Care (CEmOC).

3. Factors contributing to successful reduction of the maternal mortality ratio

Long-term state commitment to the provision of public services and the implementation of well-directed policies and strategies have had an impact at differing phases of the decline in maternal mortality [9,11]. Many health- and nonhealth-related factors, along with development of a healthcare system to reach the most remote and rural areas, have contributed to the successful reduction in maternal mortality.

3.1. Health system and delivery of maternity care

One of the earliest landmarks in maternity care services was the establishment of a dedicated maternity “lying-in” hospital—the De Soysa Maternity Hospital in Colombo—in 1897. Health prevention and promotion activities began in an organized way in the form of health units in 1926, and were expanded to cover the entire country by 1952. By 1983 a health unit served a smaller population of about 60 000. Each unit came under the responsibility of a medical officer of health, with assistance from public health nursing sisters, public health inspectors, and public health midwives, and served as a link to the institutional health services [12].

This expansion of field-based services through the health unit system was accompanied by improvement of institutional health facilities [13]. Establishment of a network of institutions—ranging from Teaching Hospitals at the highest level to Rural Hospitals and Maternity Homes at the lowest—contributed remarkably to the decline in the MMR. The number of hospitals with delivery facilities throughout the island has increased from 112 in 1931 to 521 at present, 65 of which provide CEmOC facilities; the rest provide basic delivery facilities with skilled birth attendance [12,14].

Facilities available at institutions were improved with access to specialized services in the higher-level hospitals, which served as referral centers [11]. According to the Demographic and Health Survey 2006–2007, 98% of the births during the preceding 5 years

took place in institutions (84% of which were in hospitals with specialist obstetricians), while 2% of the births were home deliveries [15]. Overall, the rate of skilled birth attendance at delivery was reported as 98%, with a ratio of richest to poorest of 1 for the period 2000–2009 [16]. Fig. 2 illustrates that skilled assistance at delivery had a dramatic impact on reducing the MMR. The partogram was introduced by the Sri Lanka College of Obstetricians and Gynecologists (SLCOG) in 1998, along with training of labor room staff; it is now used countrywide and has improved the quality of intrapartum care and reduced its complications.

Sri Lanka has achieved a rate of availability of Emergency Obstetric Care (EmOC) facilities of 1.7 per 500 000 population, which is above the recommended standard of 1 per 500 000 [17]. The government's policy of providing free health services to the public has enabled everyone to have access to maternity services and institutional care. Although not a constitutional guarantee, a free health service has been one of the strongest factors contributing to the improved reproductive health of women, particularly maternal health [18].

3.2. Prenatal care

The first prenatal clinic was established in Sri Lanka in 1926. Since then the service has been provided by health units and field healthcare providers, led by the medical officer of health, with referrals made to a specialist hospital clinic when indicated. There is also opportunity for mothers to access specialist hospital prenatal clinics directly or access the services of a specialist as a private patient. This ease of accessibility has resulted in most mothers being seen by a specialist before

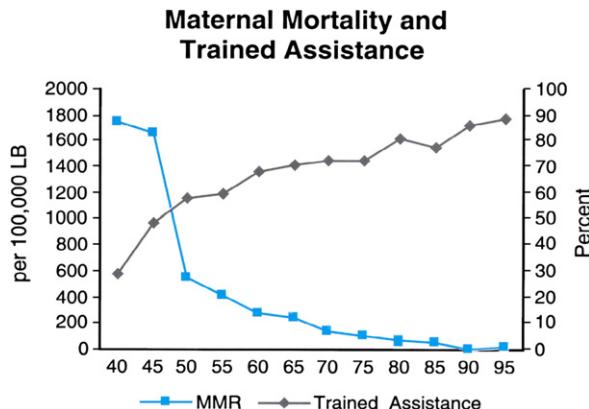


Fig. 2. Maternal mortality ratio and trained assistance at delivery 1945–1995.

delivery. It has also resulted in overutilization of the higher-level hospitals [7]. In 2007, 89% of mothers were registered by midwives before the 12th week of pregnancy and were directed to prenatal clinics [3]. Approximately 51% of mothers had 9–15 prenatal visits. Improved prenatal care has resulted in early detection of pregnancy complications and has helped encourage and direct mothers to deliver in institutions.

3.3. Public health midwives

Public health midwives have been the frontline workers in bringing about the reduction in maternal mortality. A strong and continued effort was made to replace traditional birth attendants with trained public health midwives [11,12]. These midwives are from the community, are trained over a period of 18 months, and look after a population of 3000–5000. Every household is covered by a public health midwife. These midwives are responsible for delivering maternity care directly to women by registering eligible couples, and providing prenatal care, domiciliary maternal care, and postnatal care with family planning. In the early years, utilizing professional assistance in the form of trained midwives for home deliveries was a crucial element that initiated the decline in maternal mortality. This was supported by the development of an institutional structure for maternity care and a referral network of specialist obstetric services. The field health services and institutional health services provided by the state have been integrated and delivered with equal emphasis and free of charge. In 1968 the Family Health Bureau was established in the Ministry of Health to coordinate and implement MCH and family planning activities [3].

3.4. Family planning services

Family planning activities in Sri Lanka were started in 1953 by a nongovernmental organization—the Family Planning Association—but became integrated into the MCH program of the Ministry of Health as a national program. Although there was stiff opposition to family planning services initially, this gradually subsided. The Demographic and Health Surveys recorded a steady increase in contraceptive prevalence rate, from 55% in 1987 to 70% in 2006–2007 [15,19], which correlate with the declining trend in MMR [7,9,11].

3.5. Training of different categories of healthcare providers

Training in maternity care for midwives and nurses is provided by the training institutions under the Ministry of Health. The Postgraduate Institute of Medicine [20] was established in 1976, and local postgraduate degrees, including obstetrics and gynecology, were granted full recognition by the government in 1980. With the implementation of these training programs, skilled attendance and specialist care have improved over the years, resulting in better patient care (Table 1) [21].

3.6. Maternal death review

The annual maternal death reviews have served as a surveillance system of maternal deaths occurring throughout the country. At the national level, all maternal deaths are reviewed annually by the Family Health Bureau in collaboration with the SLCOG [7,11]. Maternal deaths that occur up to 1 year after delivery are included. The review findings are analyzed according to the “3 delays model” [22] and necessary actions are recommended and implemented. This is a state-driven process involving collaboration with professional organizations via a participatory approach. The reviews are conducted at national and subnational level and look at the total care provided, at field and institutional level, as a fact-finding exercise. This exercise, while reviewing the gaps in provision of care, utilizes information gathered to identify health system failures and implement corrective measures.

Table 1
Development of government-employed birth attendants, Sri Lanka, 1930–1995.

Year	Live births per government midwife	Population (000,000) per 1000 government doctors	Government nurses per government doctor	Specialist obstetricians in government hospitals per 100 000 live births
1930	405	15.4	NA	NA
1935	219	NA	NA	NA
1940	NA	14.8	NA	NA
1945	186	NA	NA	NA
1950	163	11.4	1.7	NA
1955	157	9.2	2.3	NA
1960	143	8.4	2.8	NA
1965	NA	7.5	2.4	NA
1970	NA	6.5	2.9	NA
1975	NA	6.4	2.7	NA
1980	125	7.2	3.3	14.0
1985	85	7.4	3.8	15.0
1990	68	7.0	2.7	20.0
1995	51	4.0	2.9	23.0

Abbreviation: NA, not available.

Source: Pathmanathan et al. [21]. Reproduced with permission from The World Bank.

This process has generated a sense of responsibility and accountability among all categories of maternity service providers.

3.7. Educational reforms

Introduction of compulsory education and provision of a free education system had a long-term beneficial effect on the health status at national level, especially for the health of mothers and children [11]. The literacy rates are high, particularly among young people, reaching 97% for males and 99% for females [16]. Empowerment of women and female education are key factors that have influenced women to utilize health services and follow the advice given. This has contributed significantly to the decline in the MMR.

3.8. Improved access to health care

Sri Lanka is in a geographically advantageous position in relation to its neighbours. Development of roads and transport and the availability of low-cost transport modalities such as auto rickshaws (known as three-wheelers) both in urban and rural areas have enhanced the accessibility of health facilities within a short time.

Between 1948 and 1950, the national ambulance fleet was increased from 12 to 67 ambulances. All provincial hospitals had between 3 and 5 ambulances each, as did major district hospitals and those in more remote areas [23].

3.9. Role of international organizations

International organizations have assisted the government's efforts, primarily via capacity building and system development through the existing government infrastructure. This has ensured implementation of the national policy related to MCH in a uniform manner, institutionalizing key components of reproductive health care and ensuring sustainability.

3.10. The Sri Lanka College of Obstetricians and Gynecologists

The SLCOG was established in 1953 as the Obstetrical and Gynecological Association of Sri Lanka. One of its primary aims was to reduce maternal mortality. Over the years the SLCOG has worked closely with the Ministry of Health in an advisory capacity to direct, support, and implement many programs, including use of the partogram, safe motherhood, and prevention of unsafe abortion. Development of national guidelines and training modules has been

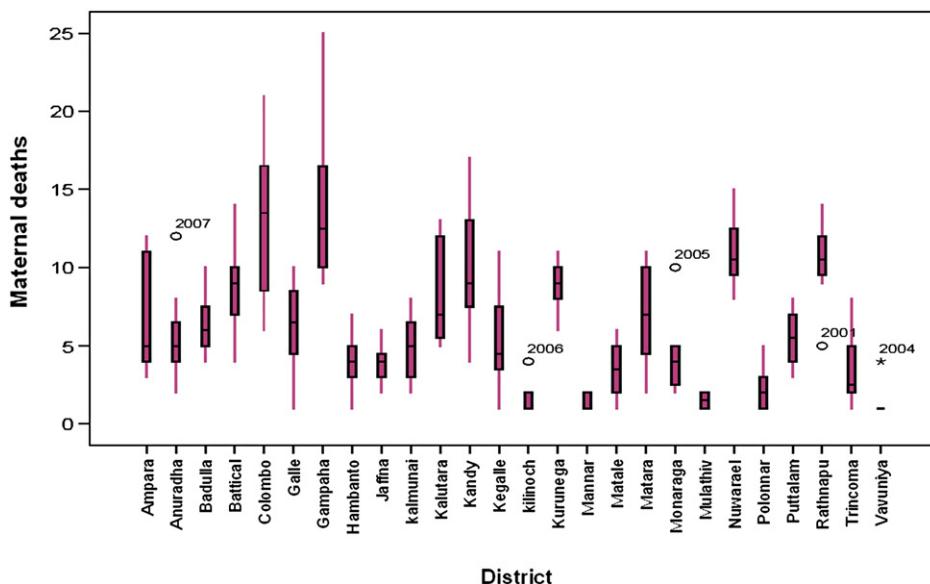


Fig. 3. Differences in maternal deaths by district, 2001–2008.

done with the collaboration of the Ministry of Health. The SLCOG participates in the capacity building of healthcare workers and in postgraduate education, and assists the government in maintaining standards of maternity care. Members of the College are team leaders for the provision of maternity care services.

The SLCOG, along with the Ministry of Health, took a leading role in reducing maternal mortality and morbidity in the areas affected by the tsunami in 2004, and in troubled areas affected by the armed conflict that had lasted for more than 30 years in the north and east of Sri Lanka, and in the estate sector that consists of tea and rubber plantations in the hills of Sri Lanka.

3.11. Improving quality of care

To ensure quality of care, a close supervision and monitoring system has been implemented at institutional and field level. In addition, an in-built auditing and evaluation system is in place. There are monthly perinatal and maternal death audits. Furthermore, staff have to maintain various registers to ensure accountability.

National clinical guidelines have been developed by the Ministry of Health, with assistance from the SLCOG, and disseminated throughout the health institutions. The maternal and newborn care system has been evaluated intermittently through internal and external reviews [7].

Incentives such as subsidized postgraduate education, promotions in job, scholarships and fellowships for education, study tours, and regular in-service training programs have been implemented to encourage staff and promote opportunities in remote areas.

4. Challenges faced by Sri Lanka in sustaining the declining trends

At present there is considerable disparity in the MMR between districts and when compared with the national figure. However, the differences between districts have narrowed over time (Fig. 3) [24]. Health-related factors, as well as nonhealth-related factors such as political, socioeconomic, and cultural determinants, influence these differences. It should be noted that the causes of maternal deaths do not vary greatly between the districts. Accessibility of EmOC services must be improved in every district so that the recommended standards are met.

Addressing unmet need for family planning, increasing awareness of possible complications resulting from septic abortions, and strengthening post-abortion care are some compelling challenges. According to

the global survey on maternal and perinatal health 2007–2008, the rate of cesarean delivery is increasing and 31% of institutional deliveries are performed by cesarean [25]. This scenario will result in increased utilization of limited resources, post-surgical complications, and an increased risk of reproductive morbidity and mortality in subsequent pregnancies, and has to be addressed.

5. The way forward for Sri Lanka

Although Sri Lanka is on target to achieve MDG 5 and the risk of maternal death is 1 in 430, it is prudent to recognize that this risk is nearly 10 times higher than for women in high-income countries.

The value of maternal death reviews should be enhanced by changing the process to a confidential inquiry, as in the UK, by establishing a suitable authority to conduct the investigation and disseminate the findings. Undertaking these reviews confidentially will enable sensitive, crucial information to be collected to improve quality of care. Formal inquiry into severe obstetric morbidities would also contribute to improve services [25].

Future measures that require focus include equitable distribution of physical and human resources, improved and timely access to EmOC for every woman who experiences a complication, refocusing of services to improve quality of care, creating awareness of the process of motherhood, and promoting the concept of planned pregnancy.

6. Conclusion

Factors including free education, a high literacy rate, free health services, and more than 98% of deliveries occurring in hospitals have helped Sri Lanka achieve a low maternal mortality ratio with limited resources.

Conflict of interest

The authors have no conflicts of interest to declare.

References

- [1] Ronson C, Graham WJ. Maternal mortality: who, when, where, and why. Lancet 2006;368(9542):1189–200.
- [2] Hanson C. Documentation for Data on Maternal Mortality Historical information compiled for 14 countries (up to 200 years). Sweden, Stockholm: The Gapminder Foundation; 2009.

- Foundation; 2010. Available at: <http://www.gapminder.org/documentation/documentation/gapdoc010.pdf>.
- [3] Family Health Bureau. Annual Report on Family Health, Sri Lanka 2006–2007. Colombo, Sri Lanka: Ministry of Healthcare and Nutrition; 2009.
- [4] United Nations Development Programme. International Human Development Indicators. Available at: <http://hdrstats.undp.org/en/tables/default.html>.
- [5] United Nations Development Programme. Millennium Development Goals in Sri Lanka. Available at: http://www.undp.lk/development_goals/Pages/MDGs_In_Sri_Lanka.aspx.
- [6] Rodrigo JN, Fernando L, Senanayake L, Gunasekera P, De Silva S. Maternal Deaths in Sri Lanka: A Review of Estimates and Causes 1996. Colombo, Sri Lanka: UNICEF and SLCOG; 2000.
- [7] Ministry of Health Care and Nutrition, World Health Organization. Report of the external review of maternal and newborn health. Colombo, Sri Lanka: WHO; 2007.
- [8] Edirisinghe JS. Historical references to malaria in Sri Lanka and some notable episodes up to present times. *Ceylon Med J* 1988;33(3):110–7.
- [9] Vidyasagara NW. Maternal mortality reduction in Sri Lanka. Colombo, Sri Lanka: WHO; 2003.
- [10] Levine R. Case 6: Saving mothers' lives in Sri Lanka. In: Levine R, editor. Millions Saved: Proven Success in Global Health. Washington, DC: Center for Global Development; 2004. Available at: http://www.cgdev.org/section/initiatives/_archive/millionssaved/studies/case_6.
- [11] Fernando D, Jayatilleka A, Karunaratne V. Pregnancy – reducing maternal deaths and disability in Sri Lanka: national strategies. *Br Med Bull* 2003;67:85–98.
- [12] De Silva J, Wickramasuriya K. Maternal and child health and family planning services in Sri Lanka. *J Coll Community Physicians Sri Lanka (Millenn Suppl)* 2001;6:12–20.
- [13] World Health Organization. Reproductive Health Services in Sri Lanka. Development of reproductive health services - historical background. Available at: http://www.searo.who.int/LinkFiles/Reproductive_Health_Profile_health.pdf.
- [14] Gabrysch S, Zanger P, Seneviratne HR, Mbewe R, Campbell OM. Tracking progress towards safe motherhood: meeting the benchmark yet missing the goal? An appeal for better use of health-system output indicators with evidence from Zambia and Sri Lanka. *Trop Med Int Health* 2011;16(5):627–39.
- [15] Department of Census and Statistics, Ministry of Health. Sri Lanka Demographic and Health Survey 2006–07. Colombo, Sri Lanka: Department of Census and Statistics; 2009.
- [16] UNICEF. Sri Lanka Statistics. Available at: http://www.unicef.org/infobycountry/sri_lanka_statistics.html.
- [17] Family Health Bureau. Needs Assessment Survey 2002. Colombo, Sri Lanka: Ministry of Health; 2002.
- [18] Chatterjee M, Levine R, Murthy N, Rao S. Sparing Lives: Better Reproductive Health for Poor Women in South Asia. Washington DC: World Bank; 2009.
- [19] Department of Census and Statistics. Sri Lanka Demographic and Health Survey 1987. Colombo, Sri Lanka: Department of Census and Statistics; 1989.
- [20] Postgraduate Institute of Medicine of Sri Lanka. University of Colombo. Available at: <http://www.cmb.ac.lk/pgim/>.
- [21] Pathmanathan L, Liljestrand J, Martins JM, Rajapaksa LC, Lissner C, de Silva A, et al. Investing in maternal health: learning from Malaysia and Sri Lanka. Washington, DC: The World Bank; 2003.
- [22] Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med* 1994;66(3):545–57.
- [23] Wickramasinghe WG. Administration Report of the Director of Medical and Sanitary Services for 1951. Colombo, Sri Lanka: Ceylon Government Press; 1952.
- [24] Attygalle DE. Maternal mortality: achieving a single digit. Oral presentation given at the College of Community Physicians of Sri Lanka, Colombo on September 17, 2011; 2011.
- [25] Lumbiganon P, Laopaiboon M, Gülmезoglu AM, Souza JP, Taneepanichskul S, Ruyan P, et al. Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007–08. *Lancet* 2010;375(9713):490–9.