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AVERTING MATERNAL DEATH AND DISABILITY

The status of maternal and newborn care services in Sierra Leone 8 years after ceasefire

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ABSTRACT

Objective: To conduct a needs assessment for emergency obstetric care (EmOC) to address the unacceptably high maternal and newborn mortality indices in Sierra Leone 8 years after the end of the civil war. **Methods:** From June to August 2008, a cross-sectional survey was conducted of health facilities in Sierra Leone offering delivery services. Assessment tools were local adaptations of tools developed by the Averting Maternal Death and Disability program at Columbia University, New York, USA. **Results:** There were enough comprehensive EmOC (CEmOC) facilities in the country but they were poorly distributed. There were no basic EmOC (BEmOC) facilities. Few facilities (37% of hospitals and 2% of health centers) were able to perform assisted vaginal delivery (AVD), and 3 potentially BEmOC facilities did not meet the standard only because they did not perform AVD. Severe shortages in staff, equipment, and supplies, and unsatisfactory supply of utilities severely hampered the delivery of quality EmOC services. Demand for maternity and newborn services was low, which may have been related to the poor quality and the high/unpredictable out-of-pocket cost of such services. **Conclusion:** Significant increases in the uptake of institutional delivery services, the linkage of remote health workers to the health system, and the recruitment of midwives, in addition to rapid expansion in the training of health workers (including training in midwifery and obstetric surgery skills), are urgently needed to improve the survival of mothers and newborns.

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1. Introduction

The 10-year Sierra Leone Civil War began to wind down with the signing of the Abuja Ceasefire Agreement of November 2000 [1,2]. The war caused severe destruction to infrastructure, the death or emigration of skilled personnel, and the collapse of services in all sectors of the economy.

At the end of hostilities, the Government of Sierra Leone and its partners invested in reviving services in the face of very limited resources and gargantuan deficits in infrastructure, utilities, and the supply of human resources. Health services depend, to a large extent, on the availability of both human resources and properly equipped health facilities. Maternal and newborn care services are particularly dependent on health facilities with the equipment and skilled staff to

provide the essential life-saving services required for mothers with complicated deliveries and ill newborns.

Eight years after the war, the most recent data available indicate that the maternal mortality ratio (MMR) and neonatal mortality rates are 1300 per 100 000 live births and 159 per 1000 live births, respectively [3]. This MMR is one of the highest in the world. In light of the unacceptable maternal and newborn mortality statistics, coupled with the commitment of the Government of Sierra Leone to attain the 4th and 5th Millennium Development Goals, the Ministry of Health and Sanitation (MoHS) of Sierra Leone and UN Partners commissioned a nationwide needs assessment for emergency obstetric care (EmOC) study in June 2008.

The purpose of the assessment was to identify the specific steps needed to reduce maternal and newborn mortality in Sierra Leone. The specific objectives were as follows: to determine the availability, utilization, and quality of EmOC services in all regions of Sierra Leone; to identify gaps in service delivery and interventions needed to close the gaps; to provide baseline data for monitoring interventions, leading to maternal and newborn mortality reduction using UN EmOC indicators; and to identify areas of the health system that needed strengthening.

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2. Methods

From June to August 2008, a cross-sectional survey was conducted of health facilities offering delivery services. All public, private, mission, and non-governmental organization hospitals providing maternal and child health (MCH) services were selected. A sampling frame of community health centers (CHCs) by health districts was developed from data received from the MoHS and Statistics Sierra Leone. The data were cleaned with the assistance of district Sisters (senior nurses/midwives) who were aware of the current status of health facilities in their districts. In total, 172 CHCs were identified at the time of the survey. A systematic random sample was selected for the study by choosing a sampling interval of 1 in 3 (33%) and applying it to a sampling frame listing CHCs by health districts. Sampling weights were applied to CHC data during analysis. In addition, a convenience sample of 4 community health posts (CHPs) or MCH posts (MCHPs) per health district was selected. The nearest CHPs and MCHPs en route to selected CHCs or hospitals were selected. It was decided that, despite the nonrandom selection, the potential of these health posts would be deducible. The total sample comprised 38 hospitals, 55 CHCs, and 52 MCHPs and CHPs countrywide (Table 1).

Questionnaires and checklists developed by the Averting Maternal Death and Disability program at Columbia University, New York, USA, and UN Partners were adapted for local use at a workshop with local midwives and other health personnel. Local adaptation of tools, pilot testing of tools, training of data collectors, and finalization of tools were carried out before data collectors and supervisors were deployed nationwide. All data collection teams included at least 1 midwife, and all supervisors were nurse/midwives. Data entry was performed on data entry screens created with Epi Info 6.04D (Centers for Disease Control and Prevention, Atlanta, GA, USA), and data were exported into Excel 2007 (Microsoft, Redmond, WA, USA) as needed. Analyses were conducted in accordance with UN guidelines for monitoring obstetric services, performance of signal functions, and the calculation of EmOC indicators [4]. (There has been a revision to the guidelines since the study was conducted [5].) The signal functions are administration of parenteral antibiotics, oxytocics, and anticonvulsants; manual removal of the placenta (MRP); removal of retained products; assisted vaginal delivery (AVD); blood transfusion; and obstetric surgery. Health facilities providing the first 6 signal functions are classified as basic EmOC (BEmOC) facilities and those providing all 8 signal functions are classified as comprehensive EmOC (CEmOC) facilities.

3. Results

3.1. Availability of EmOC services

This indicator uses the performance of signal functions in the 3-month period before the needs assessment to classify health facilities as BEmOC, CEmOC, or partially functioning facilities. In the event that a facility did not perform all of the first 6 signal functions, it was considered a partially functioning facility.

Only 14 of the 38 hospitals qualified as EmOC facilities and all were CEmOC facilities. There were no BEmOC facilities in the country,

although 3 facilities would have qualified had they performed AVD. These were classified as BEmOC-1. All MCHPs and CHPs were partially functioning facilities.

The UN Guidelines for Monitoring the Availability and Use of Obstetric Services [4] recommend that, as a minimum, there should be 1 CEmOC and 4 BEmOC facilities per 500 000 population. [Editor's note: in the 2009 version, the UN recommends 5 EmOC facilities per 500 000 population, at least 1 of which should be a CEmOC facility.] The EmOC coverage for Sierra Leone was 1.2 facilities per 500 000—well below the recommended level.

3.2. Geographic distribution of EmOC facilities

Eastern Province and Southern Province had the lowest coverage, whereas the highest coverage was in Northern Province. Six districts (Bonthe, Kailahun, Kono, Moyamba, Pujehun, and Tonkolili) had no EmOC services, and other districts such as Bombali and Port Loko had CEmOC coverage of 3.5 and 2.1 per 500 000, respectively. Kenema was the only one of 3 health districts in Eastern Province to have EmOC services; similarly, Bo was the only one out of 4 districts in Southern Province.

Fig. 1 highlights the spatial inequalities in the distribution of EmOC services. There was an abundance of CEmOC facilities in Western Area District (where the capital city, Freetown, is located), whereas large populations in Pujehun and Kailahun had no EmOC facilities.

3.3. Proportion of all births in EmOC facilities

The proportion of all births occurring in EmOC facilities is an indication of the utilization of services by expectant mothers. It is recommended that at least 15% of expected births should be in EmOC facilities [4]. The expected births in each region were calculated assuming a crude birth rate of 46 per 1000 [6]. The highest proportion of births in health facilities was in Moyamba District, even though it had no EmOC facility. Western Area District had the highest proportion (6%) of births in EmOC facilities. Only 10% of expected births in Sierra Leone occurred in a health facility of any type, with 2% occurring in an EmOC facility (Table 2).

3.4. Met need for EmOC services

This is an indicator of the utilization of health services by expectant mothers with complications. It is estimated that 15% of pregnancies involve complications [4]; therefore, at least 15% of all expected births should have taken place in EmOC facilities. Only Western Province had a met need above 10%. The national met need was only 7% in the 12 months preceding the survey.

3.5. Cesarean deliveries as a percentage of all births

This indicator computes cesarean deliveries as a fraction of expected births in the population. It is a measure of accessibility and utilization of critical services [7]. The UN Guidelines recommend that 5%–15% of pregnancies can be expected to require cesarean delivery [4]. In the 12 months preceding the needs assessment, less than 1% of expected births in Sierra Leone were cesarean deliveries.

3.6. Case fatality rate (CFR)

This is an indicator of the quality of services rendered to women with obstetric complications. It is defined as the total number of direct obstetric deaths recorded in a facility as a proportion of the total number of direct obstetric complications on record. The CFR should not exceed 1%. Data quality was poor and no data on obstetric complications were recorded in 2 CEmOC facilities. The documentation of maternal death data was even more appalling.

Table 1
Number of facilities selected, classified by ownership, Sierra Leone 2008.

Type of facility	Public	Private	Mission	NGO	Military	Total
Hospital	17	8	8	3	2	38
Community health center	52	0	3	0	0	55
MCHP and CHP	52	0	0	0	0	52
Total	121	8	11	3	2	145

Abbreviations: CHP, community health post; MCHP, maternal and child health post; NGO, non-governmental organization.

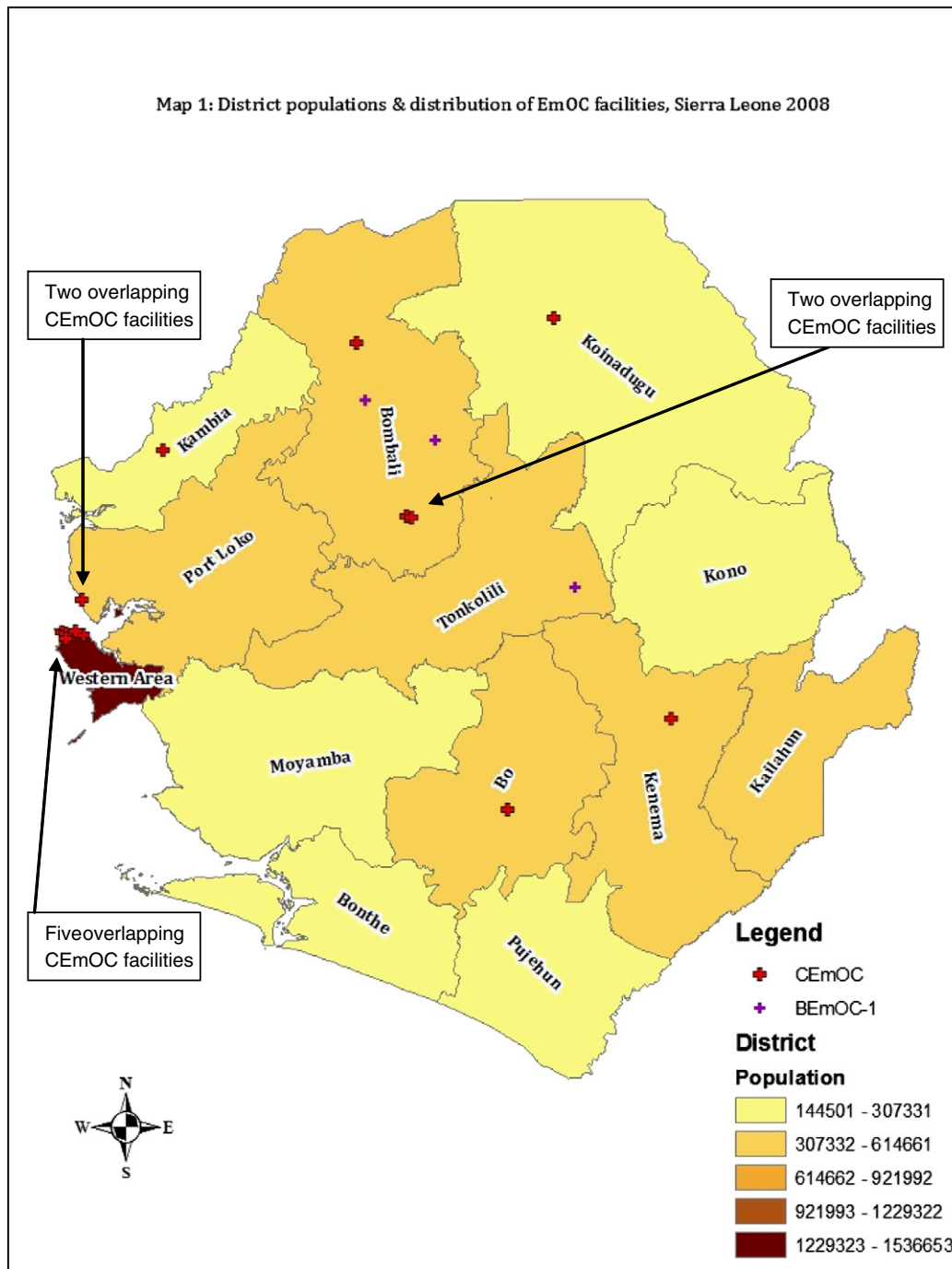


Fig. 1. District populations and distribution of emergency obstetric care (EmOC) facilities, Sierra Leone 2008. Abbreviations: BEmOC, basic EmOC; CEmOC, comprehensive EmOC.

Table 2
EmOC indicators by province, Sierra Leone 2008.

Province	Births in health facility, %	Births in EmOC facility, %	Births by cesarean delivery, %	Met need for EmOC, %
Eastern Province	6.5	0.2	0.6	0.3
Northern Province	7.4	1.6	0.8	6.3
Southern Province	11.1	1.4	0.7	7.4
Western Province	13.6	5.6	1.4	12.9
Total	9.6	2.3	0.9	7.0

Abbreviation: EmOC, emergency obstetric care.

The national CFR was 7% but, because of poor record keeping, this statistic is unreliable.

3.7. Availability of individual signal functions and other vital services

In all facilities visited, fieldworkers asked how often the signal functions had been performed in the past 3 months.

The signal functions most commonly not performed were AVD and manual vacuum aspiration (MVA). In the 3-month period preceding the survey, only 16% of CHCs and hospitals performed AVD and 36%

performed MVA. Less than 40% of CHCs administered parenteral anticonvulsants or performed MRP.

When a particular signal function was not performed, staff were asked for the main reason for not providing the service. More than 70% attributed giving no parenteral anticonvulsants and not performing MRP to the fact that none of the cases needed the intervention. The nonperformance of MVA was attributed to “not authorized” (36%), “no trained staff” (31%), and “no indication” (29%). Similarly, the nonperformance of AVD was because of “no trained personnel” (32%), “no indication” (30%), “no authorization” (24%), or “no supplies and equipment” (15%).

3.8. Availability of services on a 24-hour basis

Data collectors asked about the availability of services around the clock. Normal delivery services were available on a 24-hour basis in 94% of hospitals and CHCs. Anesthesia (11%) and laboratory services (19%) were the least available services.

3.9. Availability of staff trained to perform essential services

Adequate availability of trained staff is essential for providing 24-hour quality services. Table 3 presents the percentages of health facilities in which at least 1 member of any health cadre was trained to perform a signal function. Medical officers were trained to perform AVD in less than 60% of CHCs and hospitals, whereas more than 60% of these facilities had medical officers who were trained to perform cesareans. Only 28% of CHCs and hospitals had midwives trained to perform AVD.

Field workers encountered many unemployed trained health workers (“volunteers”) in public health facilities. They were paid for services by private arrangements with patients and their relatives. Although national policy states that MCH services are free, a variety of fees were paid for pregnant women’s and sick children’s attendance at health facilities. Fees varied widely between facilities and were so unpredictable or arbitrary that patients and their families could not anticipate their out-of-pocket expenditure.

The CHCs and hospitals that were visited were asked to list all the cadres of staff that attended deliveries in the facility. When health workers moonlighted, they were counted at all the sites in which they worked. Anesthetists (2%) and pediatricians (5%) were the scarcest cadre, while most facilities had MCH aides (82%). There were no midwives or registered nurses on the staff in Bonthe, Moyamba, and Tonkolili, and no registered nurses in Koinadugu and Pujehun.

MCH aides attended deliveries in 53% of hospitals and 96% of CHCs. Traditional birth attendants (TBAs) attended deliveries in 61% of CHCs and 11% of hospitals—but only government hospitals. It should be noted that birth in health facilities cannot be assumed to be conducted by a skilled birth attendant (SBA) because many facility births in Sierra Leone are attended by TBAs, MCH aides, and state-enrolled community health nurses, who do not meet the definition of SBA [8].

Table 3
Facilities with cadre trained to perform signal functions, Sierra Leone 2008.

Signal function	Medical officers, %	Registered midwives, %	MCH aides, %
Administer parenteral antibiotics	88	84	74
Administer parenteral oxytocics	79	79	76
Administer parenteral anticonvulsants	76	70	60
Perform manual removal of placenta	81	73	57
Perform removal of retained products	78	38	4
Perform assisted vaginal delivery	59	28	4
Administer blood transfusion	72	65	15
Perform cesarean delivery	61	0	0

Abbreviation: MCH, maternal and child health.

Table 4
Proportion of health facilities with selected amenities by health district, Sierra Leone 2008.

Health district	Ambulance, %	Unequipped ambulance, %	Telephone, %	Mobile, %	Radio, %
Bo	18	27	0	27	27
Bombali	22	22	0	22	11
Bonthe	25	0	0	0	0
Kailahun	0	33	0	0	0
Kambia	25	25	0	25	0
Kenema	0	20	0	30	60
Koinadugu	0	25	0	0	75
Kono	0	20	0	40	20
Moyamba	0	33	0	0	0
Port Loko	29	14	14	0	0
Pujehun	25	0	0	0	0
Tonkolili	0	50	0	25	0
Western Area	0	16	32	11	11
National totals	10	22	7.5	15	17

3.10. Infrastructure, drugs, equipment, and supplies

Health facilities were inspected for utilities and amenities to make maternity services comfortable for both staff and patients. Only 10% of hospitals and CHCs had regular electricity (national grid and backup generator) and only 60% had any form of water supply. Of the 56 hospitals and CHCs that had water, the source of the water was outdoor plumbing in 31 (55%) cases, indoor plumbing from a borehole or well in 11 (20%) cases, and indoor plumbing from a municipal source in 14 (25%) cases. There was running water and functioning toilets in 44% and 67% of CHCs and hospitals, respectively.

In Bonthe, Kailahun, Moyamba, and Pujehun, none of the health facilities visited had means of external communication (Table 4). Seven health districts had no equipped ambulance. Other types of vehicle used for transporting patients included motorcycles and bicycles.

The supply of medicines and other consumables was very poor in most cases. Many of the most important medicines for EmOC were in short supply in CHCs and hospitals: magnesium sulfate, 52%; misoprostol, 6%; anticonvulsants, 7%; and sedatives, 29%. Only 22% of CHCs and hospitals had blood collection, screening, and transfusion materials.

3.11. Equipment and supplies in MCHPs and CHPs

In the 52 health posts visited (MCHPs and CHPs), the supply of staff, equipment, consumables, and utilities was not sufficient to support the delivery of childbirth services.

4. Discussion

In the present study, the coverage of EmOC services in Sierra Leone was woefully inadequate, mainly because there were no BEmOC facilities. A similar situation has been reported in many low-income countries [9]. Pearson and Shoo [10] reported consistent findings in 4 countries in eastern and southern Africa. A lack of BEmOC facilities can lead to excessive use of CEmOC facilities and, consequently, to poor quality of services rendered. It should be noted that EmOC coverage met minimum standards in some areas but there were many districts with no EmOC services at all. With training and equipment for performing AVD (such as vacuum extraction), 3 CHCs could have been operating at BEmOC level. By mapping out the distribution of EmOC services, the inequitable distribution of geographic access to services is obvious. Equitable distribution of health facilities is essential so that no women are denied access.

Only approximately 10% of expected births were seen in health facilities; therefore, interventions to reduce maternal and newborn

morbidity/mortality—which, by definition, are largely facility based—do not reach most women and newborns. Another consequence of the poor utilization is that health workers, especially trainees, may not have enough cases to gain experience and skills. In the same vein, many health facilities are considered to be only partially functioning as EmOC facilities owing to low demand for services [11].

Skilled birth attendants working in an enabling environment are of paramount importance for reducing maternal mortality [12,13]. The MCH aides performed the bulk of deliveries in hospitals, and some hospitals even had TBAs attending deliveries; these categories of health worker are not SBAs [8]. The ineffectiveness of training TBAs and providing them with clean delivery kits for the reduction of maternal mortality has been well documented [14]. Given the large numbers of MCH aides, it might be expedient to upgrade this cadre to midwives through in-service training.

Met need for EmOC is an indicator that reflects a health system's capacity to respond to women's obstetric needs when complications develop. Related to this is CFR, which measures aspects of the quality of clinical care received by mothers with obstetric complications. As useful as these indicators are, the drawback in many low-income countries [11]—as experienced in the present study—is poor record-keeping, especially with regard to obstetric complications and maternal deaths. Despite this, with low utilization of delivery services, the met need is certainly very low.

The cesarean delivery rate is a population-based estimate of the number of cesareans relative to the expected births in the population. The rate in the present study was very low, at least in part as a consequence of low utilization of delivery services.

Two levels of care are recommended for the provision of EmOC: BEmOC and CEmOC. In principle, there should be more facilities offering BEmOC services than CEmOC services, and the former should be nearer to most women. Therefore, the more signal functions that are available at health centers, the better the access mothers will have to the treatment of complications and the fewer the number of women who will have to travel far for CEmOC. The 2008 WHO World Health Report [15] described the inefficiency and inequity associated with a hospital-focused health system. In a continuum of care from home/community to highly specialized care, the more life-saving services that can be provided closer to the periphery, the more efficient and equitable maternal and newborn services will become.

Manual vacuum aspiration/dilation and curettage, and AVD were the signal functions least performed in CHCs (second-tier facilities in Sierra Leone). This reflects both a need for training and a low utilization of services. Similar findings have been obtained in other low-income countries [10], especially where AVD is no longer taught in midwifery and medical schools [9].

Normal delivery services were available on a 24-hour basis in almost all CHCs and hospitals in Sierra Leone. This is a good foundation on which to build by ensuring the availability of SBAs providing quality care in an enabling environment.

Out-of-pocket payment for maternal and newborn health at the point of service is an inefficient way of financing health services [15]. Mothers and newborns are deprived of life-saving services because their families are unable to pay, and this contributes to health inequity. The out-of-pocket expenditure may partly account for the low utilization of services.

There were several limitations to the present needs assessment, the most important of which was the poor quality of maternal complication data. The exercise could have been conducted quicker and cheaper with overall improvement in medical record keeping.

5. Conclusions and recommendations

The utilization of labor and delivery services in Sierra Leone is too low. Effective interventions such as the provision of EmOC services will not reduce maternal mortality unless utilization improves

significantly. Poor quality of care as a result of a lack of SBAs, and user fees and long distances are probably the major deterrents to utilization of services.

In its post-conflict recovery period, Sierra Leone needs significant additional resources for rebuilding dilapidated infrastructure; equipment; and recruitment and retention of midwives. These changes will have system-wide impacts on the delivery health services beyond maternal and newborn health.

It is recommended that: an upgrade of health facilities is undertaken, in compliance with UN recommendations [5], to at least 5 EmOC facilities (including at least 1 CEmOC facility) per 500 000 population in all health districts; a referral system connecting all birth sites to BEmOC and CEmOC facilities is restored; the health management information system (HMIS) is revised to capture morbidity and mortality data, in addition to the performance of critical services; SBAs are recruited and a focus is placed on the maintenance of skills and the expansion of midwifery training; and out-of-pocket expenditure at the point of care is abolished.

6. Postscript

A policy report based on the present needs assessment was presented to the Sierra Leone MoHS [16]. As a result, and much to the credit of the Government and its partners, the following developments have occurred: a rural midwifery school has been established (the first batch of 75 midwifery students began their studies in January 2010) and enrollment into existing midwifery schools has increased (personal communication with J. Shepherd, PhD, May 30, 2010); recruitment of skilled personnel (including absorption of “volunteers”) started in March 2010—Government of Sierra Leone/budgetary support from UK Department for International Development and other donors— and upward revision of remunerations for public sector health workers of all cadres; healthcare free of all costs to pregnant and lactating mothers and children under 5 years was launched on April 27, 2010, with preliminary HMIS returns showing a 179% increase in healthcare visits for under-5s between March and May; and a National Maternal Death Review Committee has been established.

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Conflict of interest

The authors have no conflicts of interest.

References

- [1] United Nations Security Council. Report of the Security Council mission to Sierra Leone United Nations Security Council (S/2000/992). <http://www.securitycouncilreport.org/atf/cf/%7B65BF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/SC%20Mission%20%202000%20992.pdf>. Published 16 October 2000.
- [2] O'Loughlin E. Sierra Leone ceasefire may signal end to civil war. The Independent on Sunday (UK). <http://www.independent.co.uk/news/world/africa/sierra-leone-ceasefire-may-signal-end-to-civil-war-622796.html>. Published 12 November 2000.
- [3] UNICEF. Multiple Indicator Cluster Survey (MICS). Freetown: UNICEF; 2005.
- [4] UNICEF, WHO, UNFPA. Guidelines for Monitoring the Availability and Use of Obstetric Services. <http://www.unicef.org/health/files/guidelinesformonitoringavailabilityofemoc.pdf>. Published October 1997.
- [5] WHO, UNFPA, UNICEF, AMDD. Monitoring Emergency Obstetric Care. A Handbook. http://whqlibdoc.who.int/publications/2009/9789241547734_eng.pdf. Published 2009.
- [6] Population Reference Bureau. http://www.prb.org/Datafinder/Geography/Summary.aspx?region=30®ion_type=2.
- [7] Olsen ØE, Ndeki S, Norheim OF. Complicated deliveries, critical care and quality in emergency obstetric care in Northern Tanzania. *Int J Gynecol Obstet* 2004;87(1): 98–108.

- [8] WHO. Making pregnancy safer: the critical role of the skilled attendant. A joint statement by WHO, ICM and FIGO. <http://whqlibdoc.who.int/publications/2004/9241591692.pdf>. Published 2004.
- [9] Paxton A, Bailey P, Lobis S, Fry D. Global patterns in availability of emergency obstetric care. *Int J Gynecol Obstet* 2006;93(3):300–7.
- [10] Pearson L, Shoo R. Availability and use of emergency obstetric services: Kenya, Rwanda, Southern Sudan, and Uganda. *Int J Gynecol Obstet* 2005;88(2):208–15.
- [11] Paxton A, Bailey P, Lobis S. The United Nations Process Indicators for emergency obstetric care: Reflections based on a decade of experience. *Int J Gynecol Obstet* 2006;95(2):192–208.
- [12] Hussein J, Bell J, Nazzar A, Abbey M, Adjei S, Graham W. The skilled attendance index: proposal for a new measure of skilled attendance at delivery. *Reprod Health Matters* 2004;12(24):160–70.
- [13] Adegoke AA, van den Broek N. Skilled birth attendance-lessons learnt. *BJOG* 2009;116(Suppl 1):33–40.
- [14] Sibley L, Ann Sipe T. What can a meta-analysis tell us about traditional birth attendant training and pregnancy outcomes? *Midwifery* 2004;20(1):51–60.
- [15] WHO. The World Health Report 2008. Primary Health Care (Now More than Ever). <http://www.who.int/whr/2008/en/index.html>. Published 2008.
- [16] Ministry of Health and Sanitation, Government of Sierra Leone. Report of the Nationwide Needs Assessment for Emergency Obstetric and Newborn Care Services in Sierra Leone; 2008.