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CLINICAL ARTICLE

Readiness of emergency obstetric and newborn care in public health facilities in Afghanistan between 2010 and 2016

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Keywords

Afghanistan; Emergency obstetric and newborn care; Health facility assessment; Health facility readiness; Maternal health; Newborn health

Synopsis

Despite a number of positive changes, readiness of emergency obstetric and newborn care services declined between 2010 and 2016 in health facilities in Afghanistan.

ABSTRACT

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Objective: To assess changes in readiness to provide emergency obstetric and newborn care (EmONC) in health facilities in Afghanistan between 2010 and 2016.

Methods: A secondary analysis was performed of a subset of data from cross-sectional health facility assessments conducted in December 2009 to February 2010 and May 2016 to January 2017. Interviews with health providers, facility inventory, and record review were conducted in both assessments. Descriptive statistics and χ^2 tests were used to compare readiness of EmONC at 59 public health facilities expected to provide comprehensive EmONC.

Results: The proportion of facilities reporting provision of uterotonic drugs, anticonvulsants, parenteral antibiotics, newborn resuscitation, and cesarean delivery did not change significantly between 2010 and 2016. Provision of assisted vaginal deliveries increased from 78% in 2010 to 98% in 2016 ($P<0.001$). Fewer health facilities had amoxicillin (61% in 2016 vs 90% in 2010; $P<0.001$) and gentamicin (74% in 2016 vs 95% in 2010; $P<0.002$). The number of facilities with at least one midwife on duty 24 hours a day/7 days a week significantly declined (88% in 2016 vs 98% in 2010; $P=0.028$).

Conclusion: Despite a few positive changes, readiness of EmONC services in Afghanistan in 2016 had declined from 2010 levels.

1 INTRODUCTION

Globally, about 275 000 maternal, 2.6 million newborn deaths, and 2.1 million stillbirths occurred in 2015 [1, 2]. Despite declines in the last two decades, in low-income countries preventable maternal, perinatal, and newborn deaths remain high. The United Nations General Assembly has set Sustainable Development Goals (SDGs), with ambitious targets in SDG 3 aimed at reducing the maternal mortality ratio to 70 per 100 000 live births and reducing neonatal mortality to 12 per 1000 live births by 2030 [3].

In low- and middle-income countries (LMIC), health system deficiencies—such as inadequate equipment, supplies, and essential drugs; shortages of competent health workers; and inaccessibility of health facilities—play an important role in high mortality rates [4].

Afghanistan has a high maternal mortality ratio (638 per 100 000 live births), perinatal mortality rate (36 per 1000 live births), and neonatal mortality rate (22 per 1000 live births) [5, 6].

Substandard care is among the most important challenges in providing health services [6, 7]. Despite progress in increasing access to skilled birth attendants (SBA) from 34% in 2010 to 51% in 2015, a recent ethnographic study in a large maternity hospital in Afghanistan showed poor quality maternal and newborn care and disconnection between policy and implementation and performance and behavior of healthcare providers [6, 8].

An effective way of preventing maternal and newborn mortality and morbidity is timely and quality emergency obstetric and newborn care (EmONC) provided by SBAs in health facilities. To assess the functionality and readiness of health facilities, EmONC signal functions, consisting of key lifesaving obstetric and newborn care indicators, are used in Afghanistan and many other LMICs [9].

To reveal gaps in the availability and readiness of EmONC services as well as in knowledge and skills of healthcare providers, Afghanistan assessed EmONC services in 2010 [7]. In 2016, a maternal and newborn quality of care assessment was repeated with a broader scope and additional methods, including direct observation of quality of services [10].

Despite increasing access to health facilities and utilization of maternal and newborn health services, gaps may still be persistent in readiness of EmONC services between 2010 and 2016 in this fragile state.

The aim of the present study is to assess changes in the readiness of EmONC between 2010 and 2016 in Afghanistan, identify persistent gaps, and suggest areas for improvement in the provision of EmONC services.

2 MATERIALS AND METHODS

The common variables in two assessments for health facilities that performed comprehensive EmONC signal functions were compared. Of 78 health facilities in the first assessment and 246 health facilities in the second assessment, 59 health facilities were assessed in both assessments with common variables which included five specialty

hospitals, four regional hospitals, 24 provincial hospitals, 23 district hospitals, and three comprehensive health centers (CHCs) (Fig. 1).

The first study was a 2010 cross-sectional assessment of EmONC needs conducted in 78 health facilities, including five specialty hospitals, five regional hospitals, 25 provincial hospitals, 34 district hospitals, and nine CHCs upgraded to function as district hospitals. The study explored the readiness of the health facility and the availability and utilization of EmONC services. This assessment used the Averting Maternal Death and Disability (AMDD) program needs assessment toolkit [7].

The second study was a new cross-sectional study: the 2016 Afghanistan Maternal and Newborn Health Quality of Care Assessment. This study conducted a census of all public health facilities with five or more deliveries per day, which included five specialty hospitals, five regional hospitals, 27 provincial hospitals, and 40 district hospitals. In addition, a representative sample of public health facilities with four or fewer deliveries per day was assessed, this sample included four district hospitals, 30 CHCs, 61 basic health centers, 43 sub-health centers, and 11 family health houses. The study team adapted the AMDD, Service Provision Assessments, and Service Availability and Readiness Assessment (WHO) survey tools for the Afghanistan context. Facility inventories and records reviews were used as data collection tools to measure the availability of drugs, supplies, and equipment, as well as human resources and infrastructure [10].

To compare readiness of EmONC over time in a subset of data, the 2016 study was intentionally designed with methods and tools content similar to the 2010 study.

Comprehensive EmONC signal functions are: parenteral antibiotics, uterotonics, and parenteral anticonvulsants; manual removal of the placenta; removal of retained products of conception; assisted vaginal delivery; neonatal resuscitation; blood transfusion; and cesarean delivery [10]. We classified each facility based on the performance of those nine essential signal functions during the 3 months before the assessment as reported by hospital or maternity ward in-charges. Basic EmONC facilities are supposed to perform all signal functions, except for blood transfusion and cesarean delivery [11]. The

comprehensive EmONC-designated health facilities are specialty hospitals, regional hospitals, provincial hospitals, district hospitals, and CHCs upgraded to function as district hospitals. The other health facilities are designated as basic EmONC facilities. The 59 overlapping health facilities are located in 29 of 34 provinces (Fig. 2).

Relevant data from both studies were combined in a single dataset for comparative analysis. All comparable fields were dichotomous variables that allowed χ^2 test for significance. In the result tables, the number of facilities was presented by three types of health facility: (1) district hospital and CHC (upgraded to function as a district hospital); (2) provincial hospital; and (3) regional hospital and specialty hospital. Missing data in the 2016 study were removed both from denominators and numerators, and resulting percentages were used for comparison; thus, not all percentages relate to the 59 facilities.

The study protocol for the 2010 assessment of EmONC was approved by the institutional review boards of the Afghanistan Public Health Institute and the John Hopkins School of Public Health (IRB 2333). The 2016 Afghanistan Maternal and Newborn Health Quality of Care Assessment protocol was approved by the ethical review boards of the Afghanistan Ministry of Public Health (361533-01/23/2016) and the Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland (IRB 6799). Written permission for data collection was obtained from the in-charge of the facilities and oral informed consent was obtained from all participating healthcare providers in both assessments.

3 RESULTS

The number of health facilities that performed two signal functions—assisted vaginal deliveries and performing blood transfusion—increased from 2010 to 2016. The number of health facilities performing the other functions remained the same.

In both 2010 and 2016, all health facilities reported providing parenteral antibiotics in the three months before the assessment (Table 1). Parenteral anticonvulsants were provided in 46 of 52 (88%) health facilities in 2016 and 55 of 59 (93%) health facilities in 2010 ($P=0.382$). Removal of retained products of conception was performed in 57 of 57 (100%) health facilities in 2016 compared to 56 of 59 (95%) health facilities in 2010 ($P=0.085$). The

number of health facilities that performed assisted vaginal deliveries significantly increased in 2016 (53/54; 98%) from 2010 (46/59; 78%) ($P<0.001$). The number of health facilities performing blood transfusion significantly increased in 2016 (48/50; 96%) from 2010 (48/59; 81%) ($P=0.019$) (Table 1).

In 2016, availability of several essential drugs had declined from 2010 levels. Availability of amoxicillin (35/57 [61%] in 2016 vs 52/58 [90%] in 2010; $P<0.001$) and gentamicin (42/57 [74%] in 2016 vs 55/58 [95%] in 2010; $P=0.002$) was lower in 2016 compared to 2010 (Table 2). In 2016, magnesium sulfate was available in 56/59 (95%) health facilities in 2016 compared to 57/59 (97%) in 2010 ($P=0.648$). Availability of oxytocin changed in 2016 compared to 2010 levels (55/59 [93%] in 2016 vs 48/56 [86%] in 2010; $P=0.188$) (Table 2). Availability of two out of 22 equipment and supply items—fetoscope and manual vacuum aspiration with cannulas—increased significantly, seven items declined significantly, and no statistically significant change occurred for the rest of the items in 2016 compared to 2010 levels (Table 3). Availability of vacuum extractors had a positive change in 2016 (53 of 59, 90%) compared to 2010 (45 of 59, 76%; $P=0.05$). More health facilities had manual vacuum aspiration in 2016 (51/59, 86%) than in 2010 (40/59, 68%) ($P=0.016$) (Table 3). In 2016, blood pressure cuffs with stethoscopes were available in 48 of 53 (91%) health facilities compared to 58 of 59 (98%) health facilities in 2010 ($P=0.069$). Availability of obstetric forceps for extraction significantly decreased in 2016 from 2010 (21/59 [36%] in 2016 vs 48/58 [83%] in 2010; $P<0.001$).

Availability of bags for newborn resuscitation significantly declined in 2016 from 2010 levels (52/58 [90%] in 2016 versus 58/59 [98%] in 2010; $P=0.049$). In contrast, a slight change occurred in availability of masks for newborn resuscitation in 2016 compared to 2010 (57/59 [97%] in 2010 vs 57/57 [100%] in 2016; $P=0.161$). Availability of newborn suction device significantly decreased in 2016 (48/56, 86%) compared to 2010 (58/59, 98%) ($P=0.012$) (Table 3).

Availability of a number of supplies declined in 2016 compared to 2010, including sharps containers (46/58 [79%] in 2016 vs 58/59 [98%] in 2010; $P<0.001$), cord clamps (46/58

[79%] in 2016 vs 58/59 [98%] in 2010; $P<0.001$), and towels to dry babies at birth (34/58 [58%] in 2016 vs 49/59 [83%] in 2010; $P=0.003$) (Table 3).

The number of health facilities where management reported at least one midwife on duty 24 hours a day/7 days a week (24/7) significantly declined in 2016 compared to 2010 (52/59 [88%] in 2016 vs 58/59 [98%] in 2010; $P=0.028$). The number of health facilities where at least one obstetrician or gynecologist (OBGYN) was on 24/7 duty changed from 31/59 (53%) in 2010 to 32/59 (54%) in 2016 although it was not statistically significant ($P=0.85$).

4 DISCUSSION

Despite minimal improvements in a few EmONC signal function indicators, the major finding of this comparison indicates a decline of the readiness in all levels of health facility expected to serve as comprehensive EmONC facilities between 2010 and 2016.

Increasing provision of assisted vaginal delivery in 2016 indicates important progress. This progress could be attributed to the availability of vacuum extractor equipment and SBAs gaining confidence in using the equipment. Reports from other LMICs indicate that lack of equipment and competent health workers are the primary obstacles to the performance of assisted vaginal deliveries [12]. Assisted delivery with vacuum extraction in LMICs can reduce the need for cesarean deliveries and maternal and newborn mortality and morbidity related to prolonged labor [13].

Provision of other EmONC signal functions remained stationary between 2010 and 2016.

Similar to Afghanistan, studies in other LMICs also show that EmONC signal functions have not improved over time. In Mozambique, for instance, two assessments of EmONC reported that the performance of EmONC signal functions in central hospitals did not change between 2007 and 2012 [14]. In addition, two assessments of EmONC between 2010 and 2014 in Burkina Faso also did not find significant improvement [15]. Lack of progress in performance of EmONC services in these countries could be attributed to insufficient investment and point to the need to address gaps in the provision of EmONC services over time.

In the present study, the reduction in the availability of drugs, supplies, and equipment in 2016 compared to 2010 illustrates problems in supply management within the health

system. Shortage of any life-saving drugs—especially uterotonics, anticonvulsives, and antibiotics—as well as other supplies and equipment, inhibits the ability of healthcare providers to perform EmONC signal functions. While this study did not consider the performance of healthcare providers, other studies have shown that lack of supplies will negatively affect the motivation of healthcare providers and, consequently, quality of care [16]. To understand the reduction in the availability of essential medicine, supplies, and equipment, a bottleneck analysis at the national level is crucial and strategic planning alongside accountability mechanism should be developed to address these persistent gaps. Similar to the findings of the present study, a shortfall of doctors, midwives, and nurses is a common challenge in other LMICs. For example, most Southeast Asian countries are only about halfway toward reaching WHO's Global Strategy on Human Resources for Health 2030 threshold of 44.5 doctors, midwives, and nurses per 10 000 population [17, 18]. Possible reasons could be related to socioeconomic burdens and challenges in education, deployment, and retention of the workforce [17]. In Afghanistan, besides these factors, unavailability of healthcare providers could be affected by political instability, the deteriorating security situation, and armed conflict [19].

Although a deteriorating security situation in Afghanistan may have increased turnover of midwives in recent years, midwives are more available than other cadres in health facilities. This difference can be linked to the effective implementation of community midwifery education programs and their deployment to health facilities closer to their communities [20]. Midwives in Afghanistan complete competency-based education in basic EmONC signal functions and are central to a functional healthcare system for EmONC services [21].

Despite a decline in the readiness of EmONC services in selected health facilities between 2010 and 2016, service utilization increased: the rate of institutional deliveries steadily increased from 32.4% in 2010 to 50.5% 2015 [6]. Yet, the maternal mortality ratio and rate of perinatal mortality remained persistently high [5, 6].

A possible reason for these high mortality rates could be linked to the inability of the health system—affected by conflict, poverty, and political instability—to improve referrals and

address gaps in health facilities' readiness and provision of quality maternal and newborn care [22].

Nevertheless, Afghanistan has successfully increased coverage and access to maternal and newborn health services through health system reforms, including the introduction of Basic Package of Health Services and Essential Package for Hospital Services over the past 15 years [20]. Without improving quality of care, increasing coverage and access to health services is insufficient to reduce preventable maternal and perinatal mortality [22].

To improve maternal and perinatal health outcome, rather than just expanding geographical access, the country should upgrade the delivery of health services. Upgrading requires multi-sectoral governance and partnerships to address: the population's health needs and expectations; a shortage of a competent workforce and resources; and the need for data generation for planning. Investment in the development and retention of workforce skills should be at the epicenter. Data use is also needed to focus on persistent gaps in quality and to measure progress over time, such as the readiness of health facilities and provision of rights-based care. WHO's "Strategies toward ending preventable maternal mortality" and UNICEF's "Every Newborn Action Plan," which were adapted to the Afghanistan context, are useful tools to be implemented and achieve SDGs targets [23, 24].

The present study had several limitations. It was impossible to identify and control for any biases that may have affected the results. The first study was conducted about a decade ago and its environmental factors, including security, demographics, resources, and expectations, may not have a similar commonality with the study in 2016. The tests for statistical significance were performed under the assumption of similarities between the studies, but should be considered with caution. Despite these limitations, the present study provides important evidence on the changes in readiness of EmONC services in Afghan health facilities between 2010 and 2016.

5 CONCLUSION

Despite a number of positive changes, readiness of EmONC services declined between 2010 and 2016 in health facilities in Afghanistan. To reduce high maternal and newborn

mortality, policy makers and international donors should invest in the readiness of the EmONC services and in improving quality of care in all health facilities in Afghanistan.

Author contributions

NA served as co-investigator for 2010 EmONC needs Assessment and 2016 Afghanistan Maternal and Newborn Health Quality of Care Assessment, contributed to analysis and interpretation of study findings, and wrote the first draft of the manuscript. HT served as principal investigator for the 2016 Afghanistan Maternal and Newborn Health Quality of Care Assessment, contributed to the analysis and interpretation of study findings, and revision of the manuscript. PM served as co-investigator for both assessments, led the data analysis and contributed to the interpretation of findings for this study, and contributed to revision of the manuscript. ZA served on the advisory board for the 2016 assessment and contributed to the review and revision of the manuscript. YMK served as the principal investigator of the 2010 assessment and contributed to the review and revision of the manuscript. JVR and JS served as study advisory board members of the 2016 assessment and contributed to the review and revision of the manuscript. All authors read and approved the final manuscript.

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Conflicts of interest

The authors have no conflicts of interests.

References

- [1] Kassebaum NJ, Barber RM, Bhutta ZA, et al. Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388:1775–812.
- [2] Global Burden of Disease 2015 Child Mortality Collaborators. Global, regional, national, and selected subnational levels of stillbirths, neonatal, infant, and under-5 mortality, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2017;388:1980–2015.
- [3] United Nations. *Transforming our world: the 2030 Agenda for Sustainable Development*. Gen Assem 70 Sess. 2015;16301(October):1–35.

- [4] Bohren MA, Hunter EC, Munthe-Kaas HM, Souza JP, Vogel JP, Gülmezoglu AM. Facilitators and barriers to facility-based delivery in low- and middle-income countries: a qualitative evidence synthesis. *Reprod Health*. 2014;11(1):71.
- [5] World Health Organization. Trends in maternal mortality: 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019 [WHO Website].
<https://www.who.int/reproductivehealth/publications/maternal-mortality-2000-2017/en/> 2019. Accessed September 22, 2019
- [6] Central Statistics Organization, Ministry of Public Health, and ICF. Afghanistan Demographic and Health Survey. 2015. Kabul, Afghanistan: Central Statistics Organization; 2017.
- [7] Kim YM, Zainullah P, Mungia J, Tappis H, Bartlett L, Zaka N. Availability and quality of emergency obstetric and neonatal care services in Afghanistan. *Int J Gynecol Obstet*. 2012;116(3):192–6.
- [8] Arnold R, van Teijlingen E, Ryan K, Holloway I. Parallel worlds: An ethnography of care in an Afghan maternity hospital. *Soc Sci Med*. 2018;216:33–40.
- [9] Banke-Thomas A, Wright K, Sonoiki O, Banke-Thomas O, Ajayi B, Ilozumba O, et al. Assessing emergency obstetric care provision in low- and middle-income countries: a systematic review of the application of global guidelines. *Glob Health Action*. 2016;9(1):31880.
- [10] Jhpiego. Afghanistan National Maternal and Newborn Health Quality of Care Assessment 2016 Key Findings Report [Jhpiego website]. 2016.
- [11] WHO, UNFPA, UNICEF. Averting Maternal Death and Disability Program. Monitoring emergency obstetric care: a handbook. Geneva: WHO; 2009.
- [12] Bailey PE, van Roosmalen J, Mola G, Evans C, Bernis L De, Dao B. Assisted vaginal delivery in low and middle income countries: an overview. *BJOG*. 2017;1–10.
- [13] Nolens B, Capelle M, van Roosmalen J, et al. Use of assisted vaginal birth to reduce unnecessary caesarean sections and improve maternal and perinatal outcomes. *Lancet Glob Health*. 2019;7(4):e408-e409.

- [14] Augusto O, Keyes EE, Madede T, et al. Progress in Mozambique: Changes in the availability, use, and quality of emergency obstetric and newborn care between 2007 and 2012. *PLoS One*. 2018;13(7):1–15.
- [15] Kouanda S, Ouédraogo AM, Ouédraogo GH, Sanon D, Belemviré S, Ouédraogo L. Emergency obstetric and neonatal care needs assessment: Results of the 2010 and 2014 surveys in Burkina Faso. *Int J Gynecol Obstet*. 2016;135(S1):S11–5.
- [16] Solnes Miltenburg A, Kiritta RF, Bishanga TB, van Roosmalen J, Stekelenburg J. Assessing emergency obstetric and newborn care: Can performance indicators capture health system weaknesses? *BMC Pregnancy Childbirth*. 2017;17(1):1–9.
- [17] World Health Organization South East Asia Regional Office (SEARO). Decade for health workforce strengthening in the South-East Asia Region 2015–2024 [WHO website]. 2018. <https://apps.who.int/iris/handle/10665/274310>. Accessed October 20, 2018.
- [18] World Health Organization. Global strategy on human resources for health: Workforce 2030 [WHO website]. 2016. <https://www.who.int/hrh/resources/globstrathrh-2030/en/>. Accessed October 20, 2018.
- [19] United Nations Assistance Mission in Afghanistan. Afghanistan: Protection of Civilians in Armed Conflict, Annual Report. UNAMA, Kabul. 2016.
- [20] Mansoor GF, Hashemy P, Gohar F, Wood ME, Ayoubi SF, Todd CS. Midwifery retention and coverage and impact on service utilisation in afghanistan. *Midwifery*. 2013;29(10):1088–94.
- [21] Dalil S, Newbrander W, Loevinsohn B, Naeem AJ, Griffin J, Salama P, et al. Aid effectiveness in rebuilding the Afghan health system: A reflection. *Glob Public Health*. 2014;9:37–41.
- [22] Kruk ME, Gage AD, Joseph NT, Danaei G, García-Saisó S, Salomon JA. Mortality due to low-quality health systems in the universal health coverage era: a systematic analysis of amenable deaths in 137 countries. *Lancet*. 2018;6736(18).
- [23] World Health Organization. Strategies toward ending preventable maternal mortality (EPMM) [WHO website]. 2015.

https://www.who.int/reproductivehealth/topics/maternal_perinatal/epmm/en/. Accessed October 20, 2018.

[24] UNICEF/World Health Organization. Every Newborn: an action plan to end preventable deaths [WHO website]. 2014.

https://www.who.int/maternal_child_adolescent/documents/every-newborn-action-plan/en/. Accessed October 20, 2018.

FIGURE LEGENDS

Figure 1. Health facilities in the 2010 and 2016 studies. Abbreviations: BHC, basic health center; CHC, comprehensive health center; DH, district hospital; EmONC, emergency obstetric and newborn care; FHH, family health houses; HF, health facility; MCH, maternal and child health; NA, not applicable; PH, provincial hospital; PPH, postpartum hemorrhage; RH, regional hospital; SH, specialty hospital; SHC, sub-health centers.

Figure 2. Geographical distribution of 59 overlapping health facilities in the 2010 and 2016 studies.

Table 1. Performance of EmONC signal functions at least once in 3 months before the 2010 and 2016 assessments in selected HFs.^a

Signal functions (3 months before the assessments)	2010 HFs			2016 HFs			Number of HFs providing services		<i>P</i> value (χ^2 test)
	DH + CHC	PH	RH + SH	DH + CHC	PH	RH + SH	2010	2016	
Parenteral antibiotics	26	24	9	25	22	9	59/59 (100)	56/56 (100)	NA
Parenteral anticonvulsants	22	24	9	20	18	8	55/59 (93)	46/52 (88)	0.382
Uterotonics for labor	26	24	9	NA	NA	NA	59/59 (100)	NA	NA
Uterotonics for prevention of PPH ^b	NA	NA	NA	24	23	9	NA	56/56 (100)	NA
Manual removal of placenta	26	24	9	23	23	8	59/59 (100)	54/55 (98)	0.298
Removal of retained products	23	24	9	24	24	9	56/59 (95)	57/57 (100)	0.085
Assisted vaginal delivery	19	18	9	23	22	8	46/59 (78)	53/54 (98)	0.001
Newborn resuscitation	23	24	9	25	24	9	56/59 (95)	58/58 (100)	0.082
Cesarean delivery	19	24	9	22	20	8	52/59 (88)	50/52 (96)	0.123
Blood transfusion	16	23	9	22	19	7	48/59 (81)	48/50 (96)	0.019

Abbreviations: CHC, comprehensive health center; DH, district hospital; HF, health facility; NA, not applicable; PH, provincial hospital; PPH, postpartum hemorrhage; RH, regional hospital; SH, specialty hospital.

^a Values are given as number (percentage).

^b Use of oxytocin was measured specifically for prevention of PPH in the 2016 study.

Table 2. Availability of drugs in 2010 and 2016 at the point of care in selected HFs.^a

Availability of drugs	2010 HFs			2016 HFs			Number of HFs with the medicine		P value (χ^2 test)
	DH + CHC	PH	RH + SH	DH + CHC	PH	RH + SH	2010	2016	
Intravenous solutions	25	24	9	24	22	8	58/59 (98)	54/58 (93)	0.164
Ergometrine injection	22	21	7	19	17	7	50/56 (89)	43/59 (73)	0.025
Oxytocin	22	20	6	25	22	8	48/56 (86)	55/59 (93)	0.188
Diazepam injection	24	23	7	20	21	9	54/59 (92)	50/58 (86)	0.36
Magnesium sulfate	24	24	9	25	22	9	57/59 (97)	56/59 (95)	0.648
Calcium gluconate	20	20	8	23	22	8	48/58 (83)	53/58 (91)	0.166
Amoxicillin	20	23	9	12	17	6	52/58 (90)	35/57 (61)	<0.001
Ampicillin	21	23	8	23	21	6	52/58 (90)	50/58 (86)	0.569
Gentamicin	25	21	9	17	19	6	55/58 (95)	42/57 (74)	0.002
Lignocaine local anesthetic	23	24	9	23	22	8	56/58 (97)	53/57 (93)	0.389

Abbreviations: CHC, comprehensive health center; DH, district hospital; HF, health facility; PH, provincial hospital; RH, regional hospital; SH, specialty hospital.

^a Values are given as number (percentage).

Table 3. Availability of functional equipment and supplies in 2010 and 2016 at the point of care in selected HFs^a.

	2010 HFs			2016 HFs			Number of HFs with the items		P value (χ^2 test)
	DH + CHC	PH	RH + SH	DH + CHC	PH	RH + SH	2010	2016	
<i>Availability of equipment</i>									
Blood pressure cuff and stethoscope	26	24	8	22	18	8	58/59 (98)	48/53 (91)	0.069
Fetoscope/fetal stethoscope	12	13	8	23	17	7	33/59 (56)	47/52 (90)	<0.001
Obstetrical forceps for extraction	18	21	9	9	8	4	48/58 (83)	21/59 (36)	<0.001
Vacuum extraction	16	20	9	24	21	8	45/59 (76)	53/59 (90)	0.05
Manual vacuum aspiration with cannulas	16	17	7	22	21	8	40/59 (68)	51/59 (86)	0.016
Incubator	16	21	8	20	13	4	45/58 (78)	37/58 (64)	0.103
Bag for resuscitation	26	24	8	21	23	8	58/59 (98)	52/58 (90)	0.049
Mask for resuscitation	25	24	8	25	24	8	57/59 (97)	57/57 (100)	0.161
Suction device	26	23	9	19	21	8	58/59 (98)	48/56 (86)	0.012
Electronic suction device	21	21	9	21	19	8	51/59 (86)	48/59 (81)	0.452
Newborn resuscitation table	17	19	9	18	17	4	45/59 (76)	39/58 (67)	0.278
<i>Availability of guidelines</i>									
EmONC guidelines	21	20	8	17	15	3	59/59 (100)	58/58 (100)	0.006
Normal labor guidelines	24	22	9	18	16	5	55/59 (93)	39/57 (68)	0.001
<i>Availability of selected supplies</i>									
Sterile gloves	23	24	9	24	21	8	56/59 (95)	53/59 (90)	0.298

Sharps container	26	23	9	20	19	7	58/59 (98)	46/58 (79)	0.001
Soap	24	24	9	23	22	9	57/59 (97)	54/59 (92)	0.247
Running water	23	22	8	24	23	9	53/59 (90)	56/59 (95)	0.298
Syringes	26	24	9	24	23	8	59/59 (100)	55/58 (95)	0.077
Scissors/blade to cut cord with	14	11	7	24	22	9	32/39 (82)	55/57 (96)	0.017
Cord ties/clamps	26	23	9	19	20	7	58/59 (98)	46/59 (78)	0.001
Towel to dry baby	21	21	7	14	16	4	49/59 (83)	34/59 (58)	0.003
Blank partographs	23	22	9	24	23	9	54/59 (92)	56/59 (95)	0.464

Abbreviations: CHC, comprehensive health center; DH, district hospital; EmONC, emergency obstetric and newborn care; HF, health facility; PH, provincial hospital; RH, regional hospital; SH, specialty hospital.

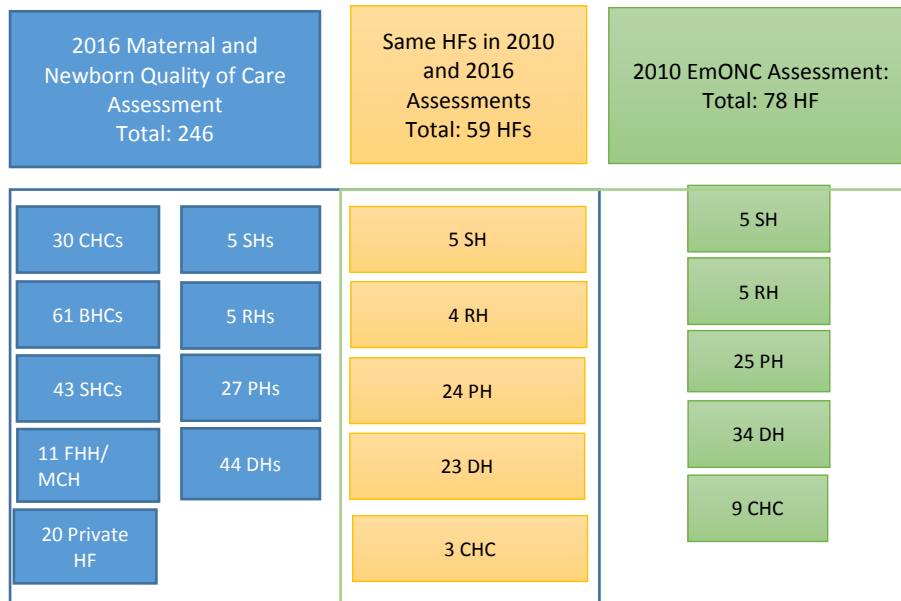
^a Values are given as number (percentage).

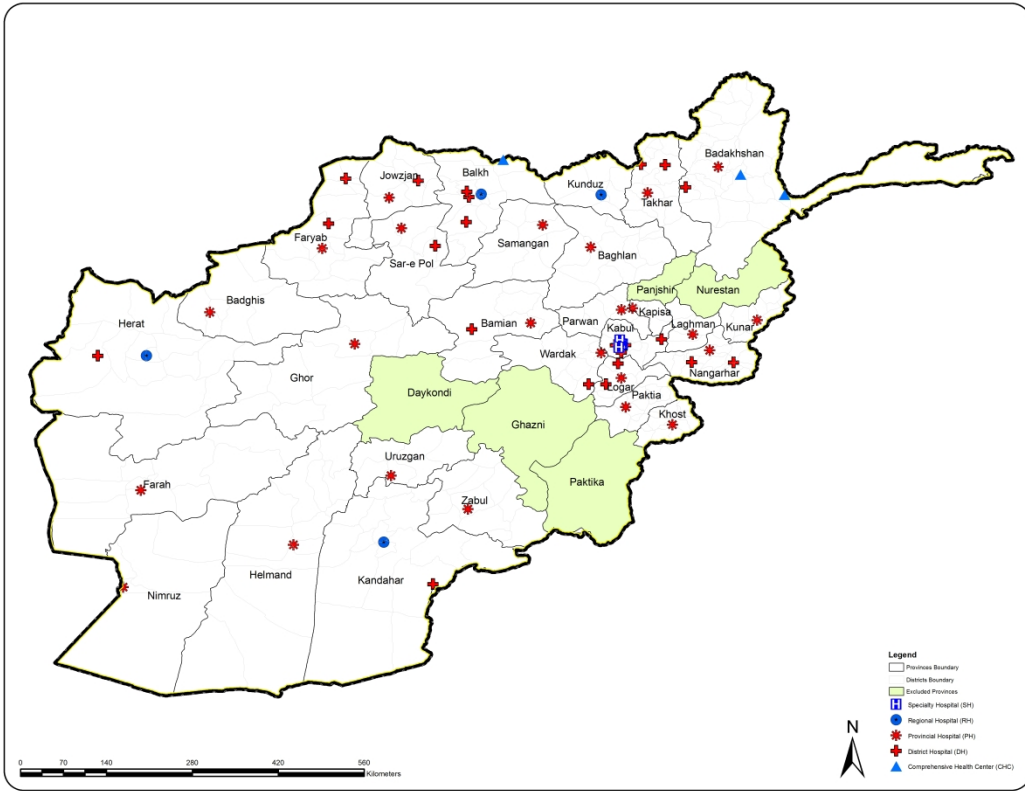
Table 4. HFs with 24/7 availability of healthcare providers with minimum requirement for provision of EmONC services by facility type in 2010 and 2016.^a

24/7 availability healthcare providers by type	2010 HFs			2016 HFs			Number of HFs with the providers		P value (χ^2 test)
	DH + CHC	PH	RH + SH	DH + CHC	PH	RH + SH	2010	2016	
Doctors	24	19	8	24	19	4	51/59 (86)	47/59 (80)	0.326
Obstetrician/gynecologist	6	16	9	16	12	4	31/59 (53)	32/59 (54)	0.85
Surgeon	18	19	8	21	17	3	45/59 (76)	41/59 (69)	0.408
Pediatrician	4	15	9	18	17	2	28/59 (47)	37/59 (63)	0.096
Midwives	26	24	8	23	22	7	58/59 (98)	52/59 (88)	0.028
Anesthetist	21	22	6	23	18	7	49/58 (84)	48/59 (81)	0.653
Laboratory technician	19	22	8	23	21	6	49/57 (86)	50/59 (85)	0.853

Abbreviations: 24/7, 24 hours a day/7 days a week; CHC, comprehensive health center; DH, district hospital; EmONC, emergency obstetric and newborn care; HF, health facility; PH, provincial hospital; RH, regional hospital; SH, specialty hospital.

^a Values are given as number (percentage).

Figure 1. Health facilities in 2010 and 2016 studies



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