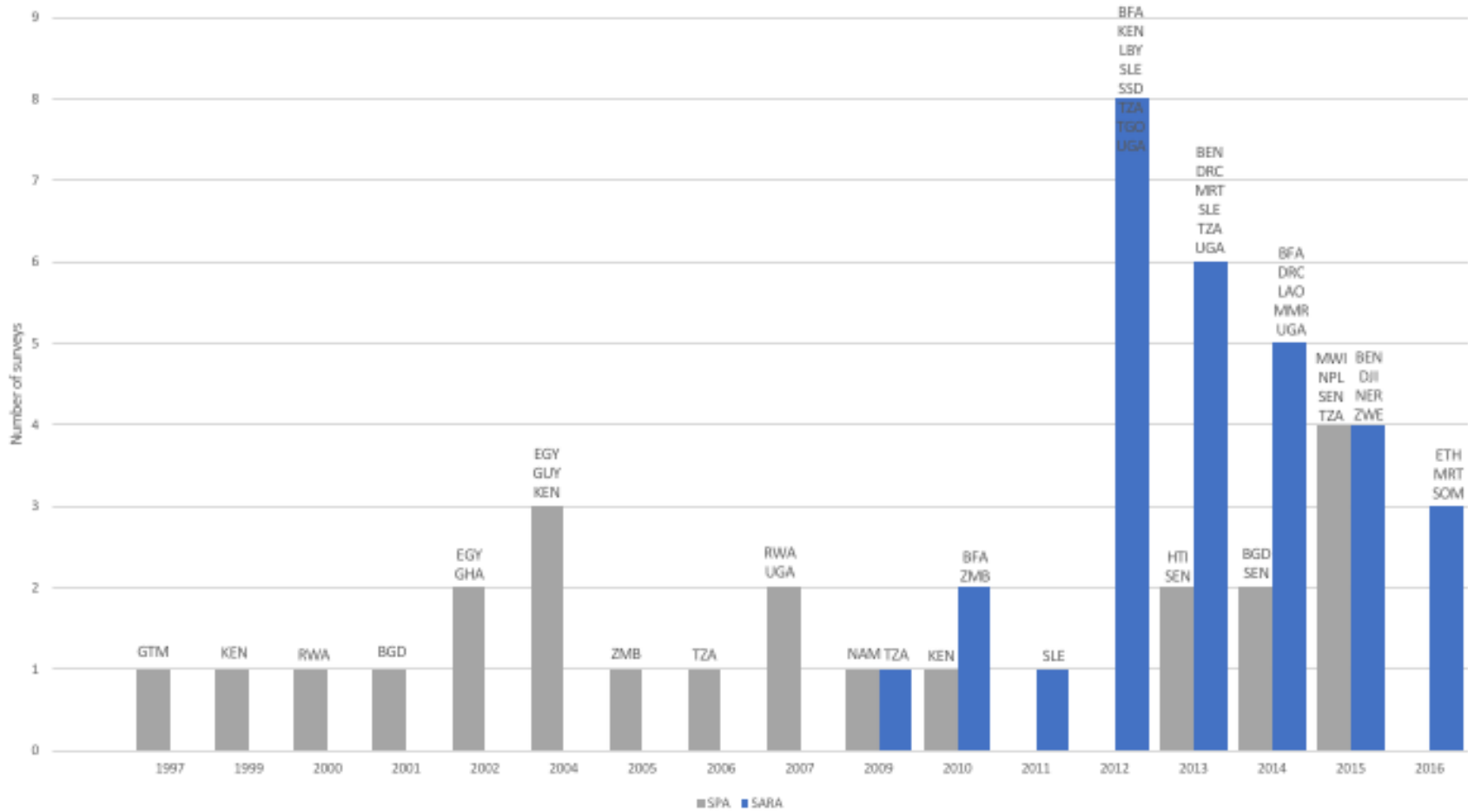


SUPPLEMENTAL TABLES & FIGURES

eFigure 1: Service Provision Assessments (SPA) and Service Availability and Readiness Assessments (SARA) by year and country



e-Table 1: Studies that use SPA/SARA data for measuring maternal and newborn quality of care (QoC)

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Agha et al	2009	The quality of family planning services and client satisfaction in the public and private sectors in Kenya	Kenya	SPA	To compare the quality of family planning services delivered at public and private facilities in Kenya	Family planning	Donabedian - structure, process, outcome	Provision of Care, Experience of Care, Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Allen et al	2017	Measuring facility capability to provide routine and emergency childbirth care to mothers and newborns: An appeal to adjust for delivery caseload of facilities	Kenya	SPA	To develop an approach for monitoring the child birth environment that accounts for the delivery caseload of the facility	Delivery services, Newborn care	None	Cross- cutting human and physical resources	Individual items
Andriantsimiety et al	2016	Service availability and readiness assessment of maternal, newborn and child health services at public health facilities in Madagascar	Madagascar	Modified SARA to focus on MNCH only	To generate information on service availability and readiness to deliver maternal, newborn, and child health services in order to inform the new Ministry of Health sponsored Roadmap Strategy for Acceleration of the Reduction of Maternal and Newborn Mortality for the next five years	Antenatal care, Delivery services, Newborn care	None	Cross- cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Assaf et al	2017	Quality of care in family planning services in Senegal and their outcomes	Senegal	SPA	To examine the provider-related process and the client-focused outcome components of quality of care and specifically the effect of process on the outcomes of client satisfaction and client knowledge of methods of protection from STIs	Family planning	Donabedian-structure, process, outcome; Bruce	Provision of Care, Experience of Care	Individual items, PCA for domain indices

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Barden-O'Fallon et al	2017	Availability of family planning services and quality of counseling by faith-based organizations: a three country comparative analysis	Haiti, Kenya, Malawi	SPA	To investigate the provision of FP services by FBOs in Malawi, Kenya, and Haiti; specifically to examine the availability of FP services and methods and the quality of counseling in FBOs as compared to public and other private sectors	Family planning	None	Provision of Care	Individual items
Benova et al	2014	Where there is no toilet: water and sanitation environments of domestic and facility births in Tanzania	Tanzania	SPA	To assess the water and sanitation environment surrounding births in Tanzania in order to interrogate whether such estimates could be useful for guiding research, policy and monitoring initiatives	Delivery services	None	Cross-cutting physical resources	Individual items
Diamond-Smith et al	2016	Clinical and perceived quality of care for maternal, neonatal and antenatal care in Kenya and Namibia: the service provision assessment	Kenya, Namibia	SPA	1) Describe the clinical quality of facilities in Kenya and Namibia; 2) Describe the perceived quality of patients exiting facilities; and 3) Determine if perceived quality is predictive of clinical quality	Antenatal care, Delivery services, Newborn care	Donabedian, structure, process, outcome; Nesbitt et al quality index dimensions for maternal and neonatal care	Experience of Care, Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Digitale et al	2017	Correlates of Contraceptive Use and Health Facility Choice among Young Women in Malawi	Malawi	SPA	To explore whether differential access to family planning services and the quality of those services explain variability in uptake of contraception among young women in Malawi	Family planning	Donabedian - structure, process, outcome	Cross-cutting human and physical resources	Individual items, Index of items (total number of items in a domain)
Do et al	2017	Quality of antenatal care and client satisfaction in Kenya and Namibia	Kenya, Namibia	SPA	Assess the quality of antenatal care, and relationship between structure, process, and outcome	Antenatal care	Donabedian - structure, process, outcome	Provision of Care, Experience of Care, Cross-cutting human and physical resources	Factor analysis and PCA for domain indices

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Hong et al	2006	Family planning service quality as a determinant of use of IUD in Egypt	Egypt	SPA	To examine the relationship between quality of family planning services and use of intrauterine devices in Egypt	Family planning	None	Cross-cutting human and physical resources	Individual items, Index of items (total number of items in a domain)
Hong et al	2011	Impact of a quality improvement programme on family planning services in Egypt	Egypt	SPA	To assess whether the certified Gold Star facilities had sustained higher quality services than non-Gold Star facilities four years after the conclusion of the quality improvement programme	Family planning	None	Provision of Care, Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Hutchinson et al	2011	Measuring client satisfaction and the quality of family planning services: A comparative analysis of public and private health facilities in Tanzania, Kenya and Ghana	Ghana, Kenya, Tanzania	SPA	To quantify differences in the quality of family planning services at public and private providers in three representative sub-Saharan African countries, to assess how these quality differentials impact upon FP clients' satisfaction, and to suggest how quality improvements can improve contraceptive continuation rates	Family planning	Donabedian - structure, process, outcome	Provision of Care, Experience of Care, Cross-cutting human and physical resources	PCA for domain indices
Jayachandran et al	2016	Quality of facility-based family planning services for adolescents in Malawi: Findings from a national census of health facilities	Malawi	SPA	To describe the quality, in terms of provision and experience of care, of facility-based family planning services for adolescents compared to older clients in Malawi	Family planning	Hulton-provision and experience of care	Provision of Care, Experience of Care	Index of items (average number of items in a domain)

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Kakoko et al	2012	Provision of family planning services in Tanzania: a comparative analysis of public and private facilities	Tanzania	SPA	To assess the variety of family planning services offered in public and private facilities and also compare public and private facilities in terms of availability of visual aids for family planning educations; family planning methods offered; and availability of guidelines or protocols for family planning services	Family planning	None	Cross-cutting human and physical resources	Individual items
Kanyangarara et al	2017	Linking household surveys and health facility assessments to estimate intervention coverage for the Lives Saved Tool (LiST)	Benin, Burkina Faso, Democratic Republic of Congo, Ghana, Kenya, Namibia, Rwanda, Senegal, Sierra Leone, Tanzania, Togo, Uganda, Zimbabwe	SPA and SARA	To use estimates of intervention coverage derived from the linking approach (household and health facility surveys) to guide the development of formulas to calculate new estimates for intervention coverage in LiST	Antenatal care	None	Cross-cutting human and physical resources	Index of items (average number of items in a domain)
Kruk et al	2016	Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys	Kenya, Namibia, Rwanda, Tanzania, Uganda	SPA	To analyze the quality of basic maternal care functions and its association with volume of deliveries and surgical capacity in health-care facilities in five sub-Saharan African countries	Delivery services	None	Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Kruk et al	2017	Variation in quality of primary-care services in Kenya, Malawi, Namibia, Rwanda, Senegal, Uganda and the United Republic of Tanzania	Kenya, Malawi, Namibia, Rwanda, Senegal, Uganda, Tanzania	SPA	To analyze factors affecting variations in the observed quality of antenatal and sick-child care in primary-care facilities in seven African countries	Antenatal care	None	Provision of Care	Index of items (average number of items in a domain)

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Lee et al	2016	Levels and variations in the quality of facility-based antenatal care in Kenya: evidence from the 2010 service provision assessment	Kenya	SPA	To illustrate how data from large-scale facility surveys can be used to gauge the quality of antenatal care services and provide basic decision support to policy makers	Antenatal care	WHO QoC Definition	Provision of Care, Experience of Care, Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Leslie et al	2016	Obstetric Facility Quality and Newborn Mortality in Malawi: A Cross-Sectional Study	Malawi	SPA	To measure the association of quality of delivery care with neonatal mortality in Malawi	Delivery services	WHO Quality of Care Framework for maternal and newborn health	Provision of Care, Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain); PCA for domain indices
Maheu-Giroux et al	2014	Factors affecting providers' delivery of intermittent preventive treatment for malaria in pregnancy: a five-country analysis of national service provision assessment surveys	Kenya, Namibia, Rwanda, Tanzania, Uganda	SPA	To explore factors affecting provider's delivery of IPTp during ANC consultations	Antenatal care	None	Provision of Care, Cross-cutting human and physical resources	Individual items
Ngo et al	2017	Health system changes under pay-for-performance: the effects of Rwanda's national programme on facility inputs	Rwanda	SPA	To examine how providers achieve performance gains and how P4P affects health system quality by changing structural inputs	Delivery services	Donabedian - structure, process, outcome	Cross-cutting human and physical resources	PCA for domain indices; equal weighting to combine indices

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Nguhiu et al	2017	Determining the effective coverage of maternal and child health services in Kenya, using demographic and health survey data sets: tracking progress towards universal health coverage	Kenya	SPA	Aimed to estimate the levels of and inequities in effective coverage of maternal and child health services in Kenya, as a means of tracking the country's progress towards UHC	Family planning, Antenatal care, Delivery services, Newborn care	None	Provision of Care, Cross-cutting physical resources	Index of items (average number of items in a domain)
O'Neill et al	2013	Monitoring service delivery for universal health coverage: the Service Availability and Readiness Assessment	Burkina Faso, Cambodia, Haiti, Sierra Leone, Tanzania, Zambia	SARA	To describe the Service Availability and Readiness Assessment (SARA) and the results of its implementation in six countries across three continents	Antenatal care, Delivery services, PMTCT services	None	Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Owili et al	2017	Quality of maternity care and its determinants along the continuum in Kenya: A structural equation modeling analysis	Kenya	SPA	To explore the characteristics associated with the quality of initial assessment, intrapartum, and immediate postpartum and newborn care	Delivery services, Newborn care	Donabedian - structure, process, outcome	Provision of Care	Individual items
Sharma et al	2017	Poor Quality for Poor Women? Inequities in the Quality of Antenatal and Delivery Care in Kenya	Kenya	SPA	Assess whether high quality maternal care is equitably distributed by (1) mapping the quality of maternal care in facilities located in poorer versus wealthier areas of Kenya; and (2) comparing the quality of maternal care available to Kenyans in and not in poverty	Antenatal care, Delivery services	Donabedian - structure, process, outcome	Provision of Care, Cross-cutting human and physical resources	Index of items (average number of items in a domain)

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Sipsma et al	2012	Identifying characteristics associated with performing recommended practices in maternal and newborn care among health facilities in Rwanda: a cross-sectional study	Rwanda	SPA	To examine the quality of facility-based maternal and newborn health care by describing the implementation of recommended practices for maternal and newborn care among health care facilities and to determine whether increased training, supervision, and incentives for health workers were associated with implementing these recommended practices	Antenatal care, Delivery services, Newborn care	None	Provision of Care, Cross-cutting human and physical resources	Index of items (total number of items in a domain)
Spiegel et al	2017	Retrospective review of Surgical Availability and Readiness in 8 African countries	Benin, Zambia, Burkina Faso, Democratic Republic of Congo, Mauritania, Sierra Leone, Togo, Uganda	SARA	Assess surgical availability and readiness in 8 African countries using the WHO's Service Availability and Readiness Assessment tool	Delivery services	None	Cross-cutting human and physical resources	Index of items (average number of items in a domain)
Tembo et al	2017	Signal functions for emergency obstetric care as an intervention for reducing maternal mortality: a survey of public and private health facilities in Lusaka District, Zambia	Zambia	modified SARA focused on newborn care	To evaluate the use of signal functions for EmONC as an intervention for reducing maternal mortality	Delivery services	None	Cross-cutting human and physical resources	Individual items
Tessema et al	2017	Client and facility level determinants of quality of care in family planning services in Ethiopia: Multilevel modelling	Ethiopia	SPA	To identify the client and facility level determinants of quality of care in FP services in Ethiopia	Family planning	None	Provision of Care, Experience of Care, Cross-cutting human and physical resources	Individual items, Index of items (total number of items in a domain), PCA for domain indices

Author	Year	Title	Country	Survey type	Study objective	Types of services	QoC framework used	Corresponding WHO QoC Framework dimensions measured	Method for metrics creation
Thatte et al	2015	Does human resource management improve family planning service quality? Analysis from the Kenya Service Provision Assessment 2010	Kenya	SPA	To assess the relationship between Human Resources management and family planning service quality	Family planning	None	Provision of Care	Index of items (total number of items in a domain)
VanHuy et al	2017	WHO's Service Availability and Readiness Assessment of primary health care services of commune health centers in a rural district of Northern Vietnam	Vietnam	SARA	To assess the availability and readiness of the primary health care services of commune health centers in Quoc Oai, a rural district of Northern Vietnam	Family planning, Antenatal care, Delivery services	None	Cross-cutting human and physical resources	Individual items, Index of items (average number of items in a domain)
Wang et al	2017	Limited Service Availability, Readiness, and Use of Facility-Based Delivery Care in Haiti: A Study Linking Health Facility Data and Population Data	Haiti	SPA	To link health facility survey data and population survey data to assess the role of the obstetric service environment in affecting women's use of facility delivery care	Delivery services	None	Cross-cutting human and physical resources	PCA for domain indices

Notes: PCA, principal components analysis; QoC, quality of care; WHO, World Health Organization.

Framework Domain Quality standards, statements, indicators	Indicator measurement
Actionable information systems	
<p>Standard 2: The health information system enables use of data to ensure early, appropriate action to improve the care of every woman and newborn.</p> <p>Quality statement 2.1: Every woman and newborn has a complete, accurate, standardized medical record during labour, childbirth and the early postnatal period</p> <p>Input quality measures</p> <ol style="list-style-type: none"> 1. The health facility has registers, data collection forms, clinical and observation charts in place <u>at all time</u> for routine recording and monitoring of <u>all care processes</u> for women and newborns. 2. The health facility has a birth and death registration system in place that is <u>linked to the national vital registration system at all times</u>. <p>Quality statement 2.2: Every health facility has a mechanism for data collection, analysis and feedback as part of its activities for monitoring and improving performance around the time of childbirth.</p> <p>Input quality measures</p> <ol style="list-style-type: none"> 3. The health facility has a data system for collecting <u>and analysing</u> relevant indicators and <u>can produce visual outputs</u> and timely reporting on paper or digitally <u>at all times</u>. 4. Managers and health care workers in the health facility met at least once a month within the past six months to review <u>process and outcome data</u>. 	<p>PARTIAL</p> <p>PARTIAL</p> <p>PARTIAL</p> <p>PARTIAL</p>
Functional referral systems	
<p>Standard 3: Every woman and newborn with condition(s) that cannot be dealt with effectively with the available resources is appropriately referred.</p> <p>Quality statement 3.1: Every woman and newborn is appropriately assessed on admission, during labour and in the early postnatal period to determine whether referral is required, and the decision to refer is made without delay.</p> <p>Quality statement 3.2: For every woman and newborn who requires referral, the referral follows a pre-established plan that can be implemented without delay at any time.</p> <p>Input quality measures</p> <ol style="list-style-type: none"> 1. The health facility has ready access to a functioning ambulance or other vehicle for emergency transport of women and newborns to referral facilities. <p>Quality statement 3.3: For every woman and newborn referred within or between health facilities, there is appropriate information exchange and feedback to relevant health care staff.</p>	<p>FULL</p>
Competent and motivated human resources	
<p>Standard 7: For every woman and newborn, competent, motivated staff are consistently available to provide routine care and manage complications.</p> <p>Quality statement 7.1: Every woman and child has access at all times to at least one skilled birth attendant and to support staff for routine care and management of complications.</p> <p>Input quality measures</p> <ol style="list-style-type: none"> 1. The health facility has skilled birth attendants <u>available at all times, in sufficient numbers</u> to meet the anticipated work load. 	<p>PARTIAL</p>

Quality statement 7.2: The skilled birth attendants and support staff have appropriate competence and skills mix to meet the requirements of labour, childbirth and the early postnatal period.	
Input quality measures	
4. The health facility has sufficient numbers of <u>educated, competent, licensed, motivated, regulated</u> skilled birth attendants with an <u>appropriate skills mix</u> , working in multidisciplinary teams.	PARTIAL
5. The health facility provides an <u>enabling, supportive environment for professional staff development</u> , with regular supportive supervision and <u>mentoring</u> .	PARTIAL
Output/Process quality measures	
2. The proportion of skilled birth attendants at the health facility who received in-service training, <u>a refresher session or mentoring</u> within the past 12 months.	PARTIAL
3. The number of supervisory visits to support clinical competence and performance improvement (in the past three months).	FULL
Quality statement 7.3: Every health facility has managerial and clinical leadership that is collectively responsible for developing and implementing appropriate policies and fosters an environment that supports facility staff in continuous quality improvement.	
Essential physical resources	
Standard 8: The health facility has an appropriate physical environment, with adequate water, sanitation and energy supplies, medicines, supplies and equipment for routine maternal and newborn care and management of complications.	
Quality statement 8.1: Water, energy, sanitation, hand hygiene and waste disposal facilities are functioning, reliable, safe and sufficient to meet the needs of staff, women and their families.	
Input quality measures	
1. The health facility has a functioning source of safe water located on the premises that is <u>adequate to meet all demands</u> for drinking, personal hygiene, medical interventions, cleaning, laundry and cooking for use by staff, women, newborns and their families.	PARTIAL
2. The health facility has leak-proof, covered, labelled waste bins and impermeable sharps containers available in <u>every treatment area</u> , to allow segregation of waste into four categories: sharps, non- sharps infectious waste, <u>general non-infectious waste (e.g. food, packaging) and anatomical waste (e.g. placenta)</u> .	PARTIAL
3. The health facility has at least one functioning hand hygiene station <u>per 10 beds</u> , with soap and water or alcohol-based hand rubs, <u>in all wards</u> .	PARTIAL
4. The health facility has energy infrastructure (e.g. solar, generator, grid) that can meet all the electricity demands of the facility and associated infrastructure at all times, with a back-up power source.	FULL
6. The health facility has sanitation facilities on premises that are usable, <u>appropriately illuminated at night, accessible to people with limited mobility and separated by gender for staff and patients; they include at least one toilet that meets the needs for menstrual hygiene management, with hand- washing stations and soap and water (at least 1 latrine per 20 users for inpatient settings)</u> .	PARTIAL
Quality statement 8.2: Areas for labour, childbirth and postnatal care are designed, organized and maintained so that every woman and newborn can be cared for according to their needs in private, to facilitate the continuity of care.	
Quality statement 8.3: Adequate stocks of medicines, supplies and equipment are available for routine care and management of complications.	
Input quality measures	
1. The health facility has supplies of antihypertensive agents and magnesium sulfate in <u>sufficient quantities, available at all times, in antenatal, labour, childbirth and postnatal areas</u> for the management of women with pre-eclampsia.	PARTIAL

2. The health facility has uterotonic drugs and supplies for intravenous infusion (syringes, needles, infusion sets, intravenous fluid solutions and blood) available in <u>sufficient quantities at all times in the childbirth and postnatal care areas</u> for the management of women with postpartum haemorrhage.	PARTIAL
3. The health facility has supplies of antenatal corticosteroids (dexamethasone or betamethasone), antibiotics and magnesium sulfate available in <u>sufficient quantities at all times</u> to manage preterm births.	PARTIAL
4. The health facility has functioning essential equipment and supplies for the detection of complications (e.g. thermometers, sphygmomanometers, foetal stethoscopes, urine dipsticks, pulse oximeter) <u>in sufficient quantities at all times in the labour and childbirth areas</u> of the maternity unit.	PARTIAL
5. The health facility has supplies of first- and second-line injectable antibiotics and other essential medicines <u>available at all times</u> for the management of women and newborns with, or at risk for, infections during labour, childbirth and the early postnatal period.	PARTIAL
6. The health facility has essential laboratory supplies and tests (blood glucose, haemoglobin or packed cell volume, blood group and cross-matching, bilirubin, urine protein, full blood count, blood culture, electrolytes, renal and liver function tests, syphilis, HIV and malaria rapid diagnostic tests) to support the management of women and newborns.	FULL
7. The health facility has essential supplies and functioning equipment (including childbirth beds, vacuum, forceps, incubators, weighing machine, sterile gloves) available <u>in sufficient quantities at all times in the labour and childbirth areas</u> .	PARTIAL
8. The health facility has supplies and functioning equipment for the emergency care and resuscitation of women (well-stocked resuscitation trolley, suction device, pulse oximeter, airways, laryngoscope, endotracheal tubes, adult bag valve masks, infusion sets, intravenous fluids) available <u>in sufficient quantities all times in areas designated for labour, childbirth and postnatal care</u> .	PARTIAL
9. The health facility has a safe, uninterrupted oxygen source and delivery supplies (nasal prongs, catheters and masks), including nasal continuous positive airway pressure, <u>available at all times in labour, childbirth and neonatal areas and the operating theatre</u> (when available).	PARTIAL
10. The health facility has supplies and functioning equipment for emergency care and resuscitation of newborns (resuscitation table, well-stocked neonatal resuscitation trolley, warmer, suction device, pulse oximeter, laryngoscope) <u>available all times in areas designated for labour, childbirth and neonatal care</u> .	PARTIAL
13. The health facility has a functioning diagnostic ultrasound machine and trained health staff who can conduct a basic obstetric ultrasound examination to determine the number of fetuses present, gestational age, prenatal diagnosis of foetal anomalies or early diagnosis of placental insufficiency.	FULL
Output/Process quality measures	
1. Availability of essential life-saving medicines (oxytocin, magnesium sulfate, dexamethasone, vitamin K, injectable and oral amoxicillin, benzyl penicillin, gentamicin, ceftriaxone, metronidazole, antimalarial drugs, antiretroviral drugs and vaccines against tuberculosis, hepatitis B, poliomyelitis) <u>in the past three months</u> .	PARTIAL

Notes: Quality standards, statements and indicators are from World Health Organization's Standards for improving quality of maternal and newborn care in health facilities. Available at: <http://apps.who.int/iris/bitstream/10665/249155/1/9789241511216-eng.pdf?ua=1>

Underlined text for quality measures that can only partially be measured using SPA/SARA data denotes the specifications not captured in SPA/SARA surveys.