



USAID
FROM THE AMERICAN PEOPLE

PROPOSAL OF A QUALITY OF CARE INDEX (QOCI)

DHS METHODOLOGICAL REPORTS 29



AUGUST 2020

This publication was produced for review by the United States Agency for International Development. It was prepared by Lindsay Mallick, Rukundo K. Benedict, Courtney Allen, and Bradley Janocha.

DHS Methodological Report No. 29

Proposal of a Quality of Care Index (QOCI)

Lindsay Mallick^{1,2}
Rukundo K. Benedict^{1,3}
Courtney Allen^{1,3}
Bradley Janocha^{1,3}

ICF
Rockville, Maryland, USA

August 2020

¹ The DHS Program

² Avenir Health

³ ICF

Corresponding author: Lindsay Mallick, International Health and Development, ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; phone: +1 301-572-0211; fax: +1 301-407-6501; email: lmallick@avenirhealth.org

Acknowledgments:

Editor: Kerry Aradhya

Document Production: Natalie Shattuck

This study was carried out with support provided by the United States Agency for International Development (USAID) through The DHS Program (#720-OAA-18C-00083). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Additional information about The DHS Program can be obtained from ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; phone: +1 301-407-6500; fax: +1 301-407-6501; email: info@DHSprogram.com; internet: www.DHSprogram.com.

Recommended citation:

Mallick, Lindsay, Rukundo K. Benedict, Courtney Allen, and Bradley Janocha. 2020. *Proposal of a Quality of Care Index (QOCI)*. DHS Methodological Report No. 29. Rockville, Maryland, USA: ICF.

CONTENTS

TABLES	v
FIGURES	vii
PREFACE	ix
ACKNOWLEDGMENTS	xi
ABSTRACT	xiii
ACRONYMS AND ABBREVIATIONS	xv
1 INTRODUCTION	1
2 LITERATURE REVIEW AND INDICATOR SELECTION	5
2.1 Literature Review.....	7
2.1.1 Family planning.....	7
2.1.2 Maternal and newborn health.....	8
2.1.3 Child health.....	10
2.1.4 Malaria.....	12
2.1.5 Nutrition.....	13
2.1.6 Water, sanitation, and hygiene.....	14
2.2 Indicators.....	15
3 DATA AND METHODS	19
3.1 Data.....	19
3.2 Methods.....	21
4 RESULTS	23
4.1 Bangladesh.....	23
4.2 Democratic Republic of the Congo.....	26
4.3 Haiti.....	30
4.4 Malawi.....	33
4.5 Nepal.....	36
4.6 Senegal.....	39
4.7 Tanzania.....	42
5 DISCUSSION	47
5.1 Overview of Findings.....	47
5.2 Limitations of the Index and Broad Recommendations.....	48
5.3 Limitations of the Indicators and Related Recommendations.....	50
5.3.1 Family planning.....	51
5.3.2 Antenatal care.....	52
5.3.3 Delivery care.....	52
5.3.4 Immunization.....	53
5.3.5 Child curative care.....	53
5.3.6 Water, sanitation, and hygiene.....	55
5.4 Conclusion and Next Steps.....	56
REFERENCES	57
APPENDIX	69

TABLES

Table 1	Definitions of indicators and considerations	16
Table 2	Surveys and samples of facilities and clients	20
Table 3	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Bangladesh SPA 2017	25
Table 4	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Democratic Republic of the Congo SPA 2017-18	28
Table 5	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Haiti SPA 2017-18	32
Table 6	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Malawi SPA 2013-14	35
Table 7	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Nepal SPA 2015	38
Table 8	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Senegal SPA 2016 and 2017	41
Table 9	Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Tanzania SPA 2014-15	44
Table 10	Limitations and broad recommendations to improve the index and SPA surveys ..	48
Table 11	Summary of limitations and recommendations.....	50
Appendix Table 1	Original set of indicators for consideration for inclusion in the quality of care index	69
Appendix Table 2	Facility categories by country	70
Appendix Table 3	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Bangladesh SPA 2017	71
Appendix Table 4	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Democratic Republic of the Congo SPA 2017-18.....	72
Appendix Table 5	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Haiti SPA 2017-18.....	74
Appendix Table 6	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Malawi SPA 2013-14.....	75

Appendix Table 7	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Nepal SPA 2015.....	76
Appendix Table 8	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Senegal SPA 2016 and 2017	77
Appendix Table 9	Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Tanzania SPA 2014-15	78

FIGURES

Figure 1	Health services along the continuum of care during the reproductive life cycle.....	5
Figure 2	Process of selecting indicators for the quality of care index.....	7
Figure 3	WHO 2016 framework for the quality of maternal and newborn health care.....	10
Figure 4	QOCI results in the divisions of Bangladesh	23
Figure 5	National average score, service scores, and highest- and lowest-scoring indicators, Bangladesh 2017	24
Figure 6	QOCI results in the provinces of the Democratic Republic of the Congo.....	26
Figure 7	National average score, service scores, and highest- and lowest-scoring indicators, Democratic Republic of the Congo 2017-18	27
Figure 8	QOCI results in the departments of Haiti	30
Figure 9	National average score, service scores, and highest- and lowest-scoring indicators, Haiti 2017-18	31
Figure 10	QOCI results in the regions of Malawi	33
Figure 11	National average score, service scores, and highest- and lowest-scoring indicators, Malawi 2013-14	34
Figure 12	QOCI results in the regions of Nepal	36
Figure 13	National average score, service scores, and highest- and lowest-scoring indicators, Nepal 2015	37
Figure 14	QOCI results in the regions of Senegal	39
Figure 15	National average score, service scores, and highest- and lowest-scoring indicators, Senegal 2016 and 2017	40
Figure 16	QOCI results in the regions of Tanzania.....	42
Figure 17	National average score, service scores, and highest- and lowest-scoring indicators, Tanzania 2014-15	43

PREFACE

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to continually assess and improve the methodology and procedures used to carry out national-level surveys as well as to offer additional tools for analysis. Improvements in methods used will enhance the accuracy and depth of information collected by The DHS Program and relied on by policymakers and program managers in low- and middle-income countries.

While data quality is a main topic of the DHS Methodological Reports series, the reports also examine issues of sampling, questionnaire comparability, survey procedures, and methodological approaches. The topics explored in this series are selected by The DHS Program in consultation with the U.S. Agency for International Development.

It is hoped that the DHS Methodological Reports will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries, and will be used to enhance the quality and analysis of survey data.

Sunita Kishor
Director, The DHS Program

ACKNOWLEDGMENTS

We are grateful to the experts at the United States Agency for International Development who advised in the design of this research concept and the selection of meaningful indicators: Misun Choi, Robert Cohen, Troy Jacobs, Apoorva Jadhav, Ryan Mahoney, Erin Milner, Elizabeth Noonan, Pavani Ram, Vanessa Vassall, Kristen Wares, and William Weiss. To Ruilin Ren, our DHS sampling statistician, thank you for engaging with us during this process and sharing your advice on our sampling-related concerns. The authors of this report also wish to thank Wenjuan Wang for her guidance and leadership during the early phases of research for this report as well as her persistent mentorship on quality of care research. We are enormously grateful to Cameron Taylor for her support with malaria-related content, feedback related to quality of care, and review of the report. To Hamdy Moussa, we thank you for your review, encouragement, and recommendations for improving the report. We also offer our gratitude to Erica Nybro for designing and preparing both creative data visuals for this report and a summary brief. We thank Thomas Pullum and Sunita Kishor for their mentorship and support throughout the development of this report. And, finally, to Hannah Leslie, we cannot thank you enough for taking the time to thoughtfully reflect on the content of this report, which vastly improved its quality.

ABSTRACT

As the use of health facilities along the continuum of care for women and children increases, focus must turn toward the provision of effective, high-quality care across services to end preventable maternal and child death. While health management information systems continue to develop, periodic health facility surveys like the Service Provision Assessment (SPA) provide information to monitor progress and target interventions. However, these surveys are complex, and consensus around key indicators or summary measures is lacking. The authors of this report have identified a short list of indicators that measure readiness for and provision of highly effective interventions and propose a quality of care index (QOCI) that spans reproductive, maternal, newborn, and child health and nutrition (RMNCHN) as well as water, sanitation, and hygiene (WASH).

To select the indicators, we conducted a preliminary literature review; an initial set of indicators was then refined following feedback from a group of subject-matter experts associated with the United States Agency for International Development. The agreed-upon indicators reflected international guidelines, had demonstrated relationships with relevant health outcomes, were measurable with current SPA data, and informed readiness to provide services (e.g., availability of medications) as well as observed delivery of services (e.g., providing counseling or appropriately assessing conditions). The QOCI was composed of 17 indicators across six health areas: family planning, antenatal care, delivery care, immunization, child curative care, and WASH. We used a weighted average approach to calculate the index.

Quality could not be directly compared across countries given the differences in indicators and timing of surveys; thus, the findings are reported separately for each country. Within many countries, the QOCI showed geographic differences in total scores. Where comparable items were available across countries, we found that nutritional status was rarely assessed during child curative care visits. Conversely, availability of oral rehydration salts or zinc for diarrhea, WASH resources, immunizations, and blood pressure measurements during antenatal care were common.

This analysis revealed several limitations, both within the index and within the SPA questionnaires. These limitations are discussed in detail in this report, alongside actionable recommendations. In summary, the proposed indicators should undergo additional scrutiny to ensure that they hold the highest construct validity, and the SPA questionnaires should be revised accordingly. The SPA instruments should also align with other tools to more widely monitor progress toward global goals for universal coverage of high-quality health care.

KEY WORDS: quality of care, service readiness, health facility, service provision assessment surveys

ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
ANC	antenatal care
ARI	acute respiratory infection
BCG	bacillus Calmette-Guérin
BEmOC	basic emergency obstetric care
CCI	composite coverage index
CEmOC	comprehensive emergency obstetric care
CH	child health
DEL	delivery
DHS	Demographic and Health Survey(s)
DPT	diphtheria-pertussis-tetanus
DRC	Democratic Republic of the Congo
ETAT	emergency triage assessment and treatment
FP	family planning
IM	immunization
IMCI	integrated management of childhood illness
KMC	kangaroo mother care
LiST	Lives Saved Tool
ORS	oral rehydration salts
QOCI	quality of care index
RDT	rapid diagnostic test
RMNCH	reproductive, maternal, newborn, and child health
RMNCHN	reproductive, maternal, newborn, and child health and nutrition
SARA	Service Availability and Readiness Assessment
SDG	Sustainable Development Goal
SPA	Service Provision Assessment
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development

WASH water, sanitation, and hygiene
WHO World Health Organization

1 INTRODUCTION

In many low- and middle-income countries, primary health-care facilities provide essential preventive and lifesaving services for communities. In the era of the Sustainable Development Goals (SDGs), the role of primary health care in achieving universal health coverage and quality health services has become increasingly important (WHO 2017b). Under SDG 3 is target 3.8: *Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all* (United Nations 2015). The Lancet Global Health Commission on High-Quality Health Systems in the SDG Era asserts that high quality of care is central to the tenet that health is a human right; it is also essential to the improvement of health systems (Kruk et al. 2018). With access to and use of health facilities increasing, focus must turn toward the provision of effective, high-quality care across services, with attention given to the continuum of services for women and children to end preventable maternal and child morbidity and mortality (WHO 2018). It is no longer enough to measure the coverage of reproductive, maternal, newborn, and child health (RMNCH) and reproductive, maternal, newborn, and child health and nutrition (RMNCHN) interventions without considering whether the services provided by facilities are adequate (Leslie et al. 2017; Marsh et al. 2020).

Effective coverage—the product of crude coverage (i.e., the proportion of the population in need that uses a service)—and measures of quality can be used to more comprehensively understand progress within the health system (Kruk et al. 2018; Ng et al. 2014). Although the concept of effective coverage has existed for decades, it has recently gained the spotlight among global health researchers and stakeholders who want to better monitor progress toward SDG targets (Leslie and Gage 2020). The Effective Coverage Think Tank Group, hosted by the World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) in 2019, supported a standardized framework proposed by Amouzou and colleagues (2019) (Marsh et al. 2020). In this framework, effective coverage is represented along a cascade that moves from crude coverage through input-adjusted coverage, quality-adjusted coverage, and outcome-adjusted coverage (Amouzou et al. 2019).

Although critiqued for being complex or their data being difficult to use, periodically conducted Service Provision Assessment (SPA) surveys, or similar national health facility surveys that include observation of services, are critical sources of information on quality of care. They can be used to glean information not only about quality of care within health facilities, nationally or subnationally, but also about quality-adjusted effective coverage. Provision of care and select services can be captured through health management information systems at lower administrative levels, even at the facility level, and at more frequent intervals. However, these systems are still under development and are often limited by lack of representativeness, incomplete reporting, and not typically being publicly available (Mallick et al. 2020; MCSP 2018; WHO 2019a). Periodic health facility surveys with observation of services provide information about whether structural inputs are available, whether they are being used, whether providers are adhering to standards, and how clients perceive their visits (Kruk et al. 2018; Leslie and Gage 2020).

Through the measurement of quality of care, decision makers and stakeholders can identify weakness within the health system and address gaps through targeted improvement efforts (Kruk et al. 2018; WHO 2017b; WHO 2015b), although advancements in measurement of quality of care are needed. With an abundance of

measures available, developing summary measures or quality indexes can be useful for more broadly assessing and monitoring progress, benchmarking within and across countries, and targeting areas for improvement (Kruk et al. 2018; WHO 2017b; Wilhelm et al. 2019)—for example, the Countdown to 2030 tracks RMNCH intervention coverage for preventive and curative ailments using a composite coverage index (CCI) (Wehrmeister et al. 2016; WHO 2017b). The index is a weighted average of eight RMNCH indicators that lie along the continuum of maternal and child health, and the index uses data from population-based surveys. However, although the CCI is straightforward, easy to calculate, and helpful in tracking trends over time or across countries (Wehrmeister et al. 2016), it measures RMNCH coverage and not RMNCH care—a critical aspect of the health system. Currently, there is a need to identify the most critical indicators of quality of care that can further serve in benchmarking progress (Brizuela et al. 2019). Although an index comprising indicators across many health areas can provide an overall summary of quality at national and subnational levels, examining key indicators can drive monitoring of specific services. These key indicators should encompass not only the availability of life-saving equipment, medication, and technologies, but also the process under which care is provided.

Quality of care is a multifaceted concept usually measured with indicators that cover multiple dimensions of quality typically based on the seminal 1988 framework of Donabedian, including structure (i.e., the setting of care), process (i.e., how the care is delivered), and outcome (i.e., the impact of care on individuals) (Akachi and Kruk 2017; Donabedian 1988; Wilhelm et al. 2019). Measures of quality of care from facility-based studies have included the availability of essential medicines, equipment, and skilled staff (structure); interpersonal and technical aspects of the provider-client interaction (process); and client satisfaction with care and other health outcomes (outcome) as seen, for example, in Brizuela et al. (2019); Gage et al. (2018); Leslie et al. (2017); Mallick, Temsah, and Wang (2019); Mallick, Temsah, and Benedict (2018); Sheffel et al. (2019); Taylor et al. (2018); Tessema et al. (2016); Tumlinson et al. (2015); and Wilhelm et al. (2019).

As demonstrated in the above-mentioned studies, measurements of quality of care are currently siloed within health areas; further, there is no agreement on a minimum set of standardized indicators for quality of care (Akachi and Kruk 2017; Wilhelm et al. 2019). However, multilateral actors and researchers are working on refining and building consensus on key indicators to improve the measurement of quality of care for RMNCHN, including the Network for Improving Quality of Care and WHO (WHO 2019c). For example, the Network for Improving Quality of Care developed a list of 15 common indicators for monitoring maternal and newborn health for countries in the network that use information from facility registers, surveys, and client questionnaires (WHO 2019c). This work was part of a larger monitoring framework for improving quality of care that aligns with WHO standards on maternal, newborn, child, and adolescent care in facilities and includes several facility indicators (WHO 2016b, 2018, 2019c). Consensus is also being built around family planning indicators, pediatric indicators, and nutrition indicators (Jain, Townsend, and RamaRao 2018; WHO 2018).

This report aims to build off the work of the Countdown team and others by documenting the development of a composite quality of care index (QOCI) for RMNCHN services in facilities. The QOCI is intended to complement the CCI and also highlight the cross-cutting importance of water, sanitation, and hygiene (WASH). This paper presents an initial attempt to select a list of core quality of care indicators and summarize these key components across RMNCHN services available in The DHS Program's SPA to create one singular measure. The indicators are calculated among respective facility or client populations. For example, indicators representing family planning service availability are calculated only among facilities

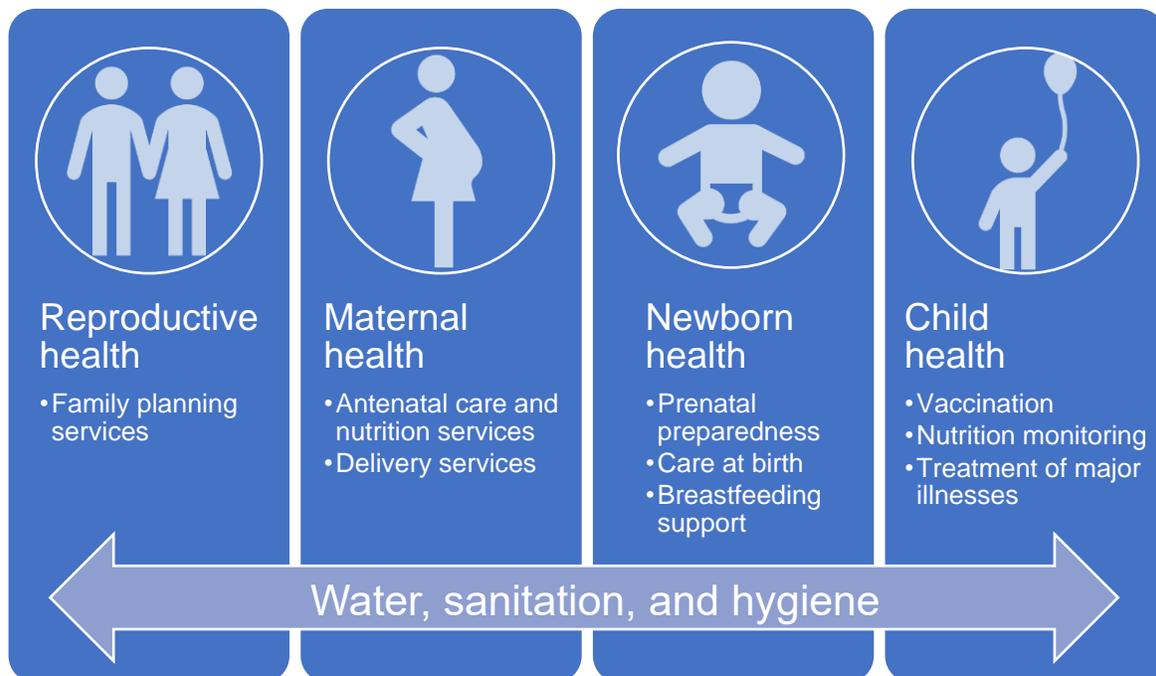
providing family planning services; likewise, care provided during family planning visits are calculated using family planning clients as the base. The index is therefore intended to be aggregated at national or subnational levels rather than for individual facilities. The development of the indicators used to create the index was based on the current SPA questionnaires and sampling processes (DHS Phase VII). The indicators are not intended to be comprehensive of all health services or to include all important factors within each service; they focus solely on structural and process components of quality and omit the component reflecting the client experience of care, given the limitations of collecting such data in exit interviews (e.g., courtesy bias and selection bias) (Bessinger and Bertrand 2001; Chavane et al. 2017; Hameed et al. 2017).

This report does not provide external validation for the index or the indicators. Rather, both the index and indicators were chosen to serve as tracers for quality of care—a starting point for launching a conversation about what areas need to be more holistically explored to improve quality of care. Ideally, the indicators could be assessed alongside health outcome data from population surveys or health management information systems to better understand stopgaps within the health system. This report describes the steps used to develop the index, illustrates how it can be used to report at the national and subnational levels, and discusses the strengths and limitations of the indicators and index with a focus on how SPA surveys can be enhanced for future quality of care research.

2 LITERATURE REVIEW AND INDICATOR SELECTION

We employed a multistage process to select the indicators. We first identified the service areas within formal health-care facilities that addressed RMNCHN and WASH. Figure 1 demonstrates how we conceptualized the continuum of health-care services. This figure shows that WASH is critical and cross-cutting across each service or health need. Nutrition services are also cross-cutting, embedded within various stages of the continuum of care.

Figure 1 Health services along the continuum of care during the reproductive life cycle



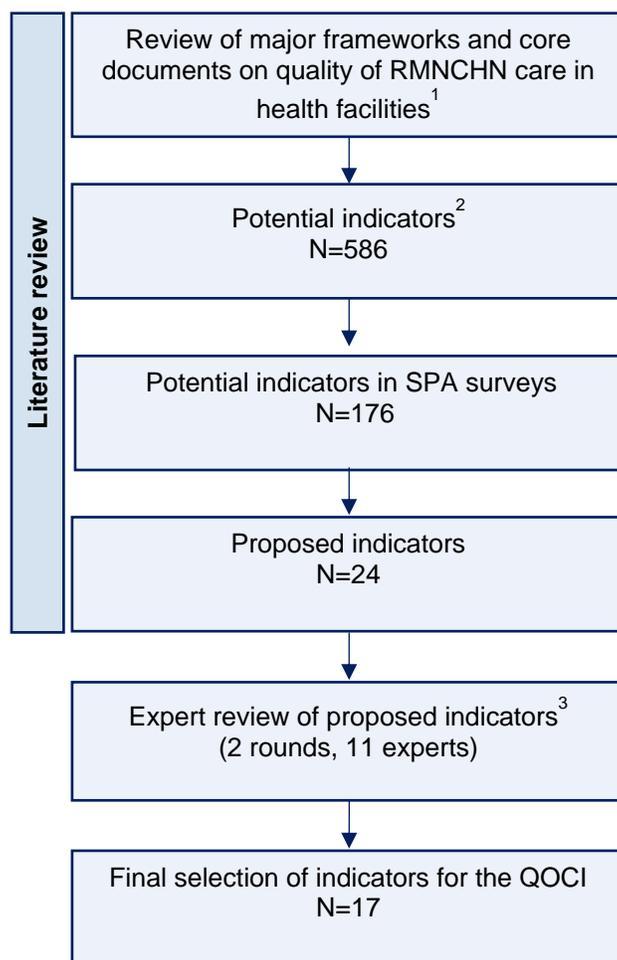
We then performed a literature review to identify the most impactful components of care for each health area according to recent research and international guidelines. That is, within each health service, we sought to identify the aspects of quality of care that are critical for alleviating the most pressing health issues—the elements of services that are key for preventing or treating the diseases or illnesses that contribute the most to adverse health outcomes such as mortality. We described the literature and aspects of quality using the Donabedian framework of quality of care, which comprises three components—structure, process, and outcome.

To guide the literature review, we sought to answer several questions:

- What are the key frameworks or global guidelines on quality of care within these health service areas?
- How have these frameworks been applied or translated into indicators?
- How have these indicators been prioritized, or what evidence exists about how the services measured by the key indicators have affected health outcomes (e.g., mortality)?

The selection of the indicators followed the process depicted in Figure 2. Following and based upon the literature review, we selected an initial set of indicators within each service area that 1) were recommended by international guidelines; 2) were related to relevant health outcomes; 3) were available in SPA surveys; and 4) reflected structural readiness or capacity to provide services as well as important components of service delivery (i.e., quality of care). After an initial list of indicators was proposed (Appendix Table 1), topical subject matter experts affiliated with the United States Agency for International Development (USAID) provided clarification and additional guidance for final indicator selection. The final indicators within each service area were intended to balance the breadth of aspects of care related to major burdens of disease or health conditions with the pragmatism of a short index. Although the initial literature review identified evidence-based aspects of care, the final selection of indicators was based on existing frameworks, guidelines, and global or USAID priorities within quality of care; thus, the process was not wholly empirical.

Figure 2 Process of selecting indicators for the quality of care index



Notes:

¹ Donabedian framework (1988); Bruce framework 1990 (family planning); Newborn Services Rapid Health Facility Assessment (2012); Gabrysch et al. (2012) (obstetric and newborn signal functions); WHO Service Availability and Service Readiness (SARA) (2015); WHO and Partnership for Maternal, Newborn, and Child Health (2013) (quality of care); WHO standards for quality of maternal and newborn care in health facilities (2016); WHO standards for quality of care for children and young adolescents in health facilities (2018); Integrated Management of Childhood Illness guidelines; WHO pediatric emergency triage, assessment, and treatment guidelines (2016); WHO Global Malaria Programme's T3: Test, Treat, and Track initiative (2012); WHO and UNICEF core questions and indicators for monitoring WASH in health facilities (2018).

² Potential indicators were identified from the literature review.

³ USAID topic experts, led by the DHS management team, reviewed proposed indicators via written feedback and telephone consultations in two separate rounds.

2.1 Literature Review

2.1.1 Family planning

The Bruce framework is a foundational framework for understanding the quality of family planning services (Bruce 1990). The domains from the Bruce framework fit within Donabedian's quality of care framework and describe the structure of the care program (i.e., method choice, technical competence of providers, and constellation of services) and the process of service (i.e., exchange of information, interpersonal relationships, and mechanisms for follow-up) (Bruce 1990; Jain, Townsend, and RamaRao 2018). Among the proposed indicators, there remains a need for consensus on the indicators that best reflect quality of

care. Various attempts to understand quality of care have often included many indicators within summary index measures (Bellows et al. 2016; Do and Koenig 2007; Hong, Montana, and Mishra 2006; Jain, Townsend, and RamaRao 2018; Jain et al. 2019; Jayachandran, Chapotera, and Stones 2016; Mallick, Temsah, and Wang 2019; Mensch, Arends-Kuenning, and Jain 1996; RamaRao et al. 2003; Tessema et al. 2016; Tumlinson et al. 2015).

The three structural indicators in the Bruce framework are the availability of an array of contraceptive methods, the technical competence of providers to administer the methods, and the availability of other services such as antenatal care (ANC) or sick-child care. Method availability lacks consensus in definition, though studies have defined it as the availability of at least one short-acting method, one long-acting method, and one barrier method (Mallick, Temsah, and Wang 2019; Tumlinson et al. 2015; Wang and Mallick 2019); the availability of the three most commonly used methods in the country (Mpunga et al. 2017); or even the availability of a client’s preferred method (Slater et al. 2018). There is evidence that the number of methods available is positively associated with contraceptive use (Ross and Stover 2013; Ross et al. 2002; Wang and Mallick 2019; Wang et al. 2012). Jain, Townsend, and RamaRao (2018) suggest that method availability is also a product of the technical competence in offering the method and the availability of the required equipment. This suggests that method availability also crosses into the process domain of quality of care to incorporate whether clients are being offered and receiving help choosing appropriate methods.

The information offered to a client—another element in the Bruce framework—can include a provider helping a woman choose a method, instructions on using a method, or information about the side effects of a method. Provider counseling on method preference and selection, side effects, and good treatment of clients has been shown to be positively associated with modern contraceptive use (Tumlinson et al. 2015). Recently, Jain et al. (2019) validated an index reflecting the process component of quality of care, finding that high quality of care was associated with contraceptive continuation. In this 10-item index, the primary factor was identified as “effective use of method selected,” which comprised three items related to counseling about side effects and warning signs associated with the method. Previous research has also shown that women with concerns about side effects are more likely than those without concerns to discontinue method use and have unmet need (Bradley, Schwandt, and Khan 2009). This indicator is particularly useful because it is available from facility-based surveys that observe family planning visits or interview clients, as well as from household surveys in which women self-report receipt of counseling (Choi 2018).

Measures of the outcome dimension of quality of care for family planning (e.g., contraceptive uptake or contraceptive continuation) are largely limited or unavailable in health facility surveys. Although client satisfaction could be an outcome measure, studies have found that family planning clients often have high satisfaction regardless of services received (Assaf, Wang, and Mallick 2015; Galle et al. 2018).

2.1.2 Maternal and newborn health

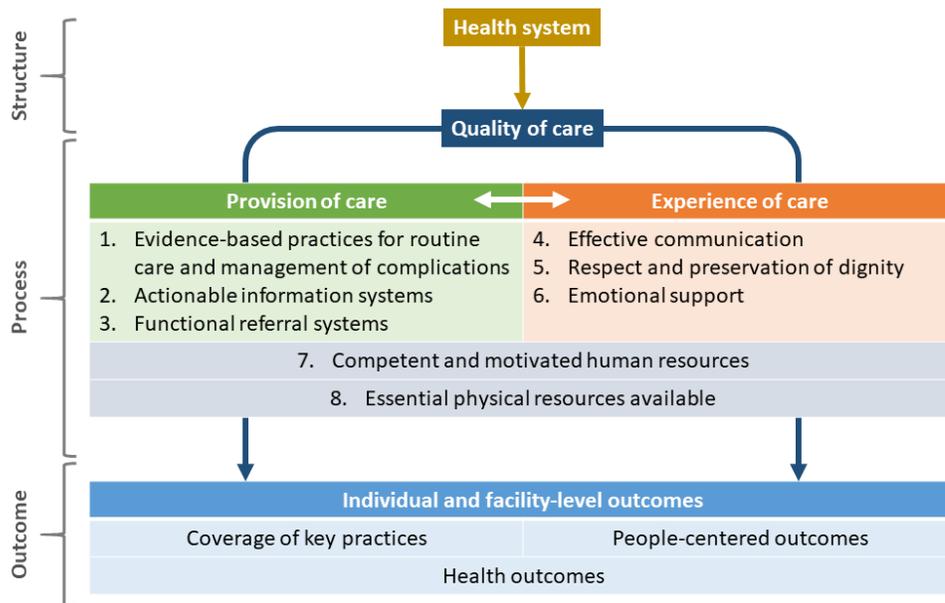
With the increased recognition of the importance of quality of care in preventing maternal and newborn deaths (Black et al. 2016), considerable effort has been made to develop quality of care frameworks and indicators that assess the quality of health services for mothers and newborns at health facilities. For example, the Newborn Indicators Technical Group developed indicators that measure the service availability, equipment, supplies, staff training, and supervision that are essential for newborn care

(Newborn Indicators Technical Working Group 2012). Gabrysch and colleagues (2012) proposed obstetric and newborn signal functions that cover general health requirements, routine care for mothers and newborns, basic emergency care for mothers and babies with complications, and comprehensive emergency care functions. The WHO Service Availability and Readiness Assessment (SARA) Reference Manual includes indicators measuring readiness for a wide range of services including obstetric and newborn care provided at health facilities (WHO 2015b). In 2013, the WHO and Partnership for Maternal, Newborn, and Child Health went through a Delphi process that included extensive literature review, expert consultations, and achievement of consensus; the partnership identified 19 core indicators for measuring quality of care for mothers, newborns, and children at health facilities (WHO 2014a). Other criteria such as measurability, reliability, validity, and usefulness were also considered in the selection of indicators (WHO 2014a).

The maternal indicators covered antenatal, intrapartum, and postpartum care, and most measured the process aspect of quality of care (WHO 2014a). For example, given the importance of the diagnosis and early management of hypertensive disorders in pregnancy, measuring blood pressure for women during ANC visits was identified as one core quality of care indicator. Other indicators such as magnesium sulfate treatment for women with severe preeclampsia or eclampsia and women's receipt of oxytocin were also included. For newborn care, the availability of functional bags and masks in health facilities to prevent birth asphyxia and the availability of kangaroo mother care (KMC) were among the indicators included.

In more recent efforts to improve quality of care, WHO defined standards for quality of maternal and newborn care in health facilities and developed a quality of care framework that contains eight domains of quality of care (Figure 3) (WHO 2016b). Standards of care were developed for each of the domains, with Standard 1 being that all women and newborns receive routine, evidence-based care during labor, during delivery, and in the immediate postpartum period. Within this standard, quality statements and measures were created to assess the structure, process, and outcome components of quality of care for labor, delivery, and postnatal care. The structural measures focus on the availability of basic essential equipment, supplies, up-to-date written protocols, staff training, and supervision for routine care for mothers and newborns to detect and manage complications such as preeclampsia or eclampsia, postpartum hemorrhage, prolonged or obstructed labor, birth asphyxia, puerperal sepsis, and other infections. The process indicators focus on receipt of routine care or appropriate management of complications. The outcome indicators focus on institutional and population mortality estimates of pre-discharge maternal and neonatal death, prenatal mortality, early neonatal death, stillbirth, and the proportion of women with complications that are properly treated. Most recently, the Quality, Equity, Dignity Network has pared down this list of measures, identifying 15 common indicators for monitoring within and across countries (WHO 2019c).

Figure 3 WHO 2016 framework for the quality of maternal and newborn health care



Estimates of the effectiveness of interventions on maternal mortality and neonatal mortality can help prioritize indicators that measure quality of care for mothers and newborns. The Lives Saved Tool (LiST) is a computer-based model that estimates the impact of various interventions on maternal and child mortality; while it was being updated, the effectiveness of various interventions in preventing maternal mortality was estimated (Pollard, Mathai, and Walker 2013). Comprehensive emergency obstetric care (CEmOC) was highly effective in preventing five major causes of maternal death (i.e., preeclampsia/eclampsia, puerperal sepsis, antepartum hemorrhage, obstructed labor, and postpartum hemorrhage); basic emergency obstetric care (BEmOC) was also highly effective at preventing preeclampsia/eclampsia, pregnancy-related sepsis, and postpartum hemorrhage (Pollard, Mathai, and Walker 2013). An analysis using LiST ranked the importance of interventions for mothers, newborns, and children based on the estimated number of deaths averted (stillbirth, neonatal, maternal) and attributed the most lives saved of any intervention to labor and delivery management (Marchant et al. 2016).

Although observation (as opposed to retrospective reports) is the gold standard for capturing the quality of delivery care, observation of delivery for the purpose of collecting data is hindered by the time needed and lengthy instruments that could result in measurement error (Tripathi et al. 2015). Some indicators related to the structural aspect of quality of care could be obtained from health facility surveys (Brizuela et al. 2019). However, process indicators are more complex and difficult to measure, and most health facility surveys do not observe delivery.

2.1.3 Child health

Building on the WHO 2016 standards for quality of maternal and newborn care in health facilities, in 2018 the WHO followed a similar process to develop a set of standards for pediatric quality of care (WHO 2018). These standards center around the eight domains of quality of care that were revised from the maternal and newborn quality of care framework specifically for children. For each standard, indicators of quality of care were identified to measure the structure, process, and outcome dimensions.

Although all standards are important components of quality of care that contribute to child health, Standard 1 is particularly critical for reducing child morbidity and mortality. It requires that every child receive evidence-based care and management of illness according to WHO guidelines. Standard 1 structural indicators focus on the availability of basic essential equipment, supplies, up-to-date written protocols, staff training, and supervision for routine children's health services such as vaccinations, for emergency care, for infant and young child feeding, and for management of conditions such as bacterial infections, respiratory infections, diarrhea, fever, acute malnutrition, chronic and infectious disease, and maltreatment (WHO 2018). The process indicators focus on children's receipt of routine care or appropriate management of their conditions. The outcome indicators cover a range of outcomes including estimates of facility-related mortality and case fatality due to common childhood illnesses as well as treatment rates (WHO 2018).

Researchers have developed summary indices of quality of care for sick children that often reflect and demonstrate the importance of facility readiness (i.e., structure) and clinical quality of care (i.e., process) in improving health outcomes (Leslie, Sun, and Kruk 2017; Leslie et al. 2017; Liu et al. 2019). The readiness to treat children with two simple interventions—antibiotics for pneumonia and oral rehydration salts (ORS) for diarrhea—is an important input for the quality of care of high-impact interventions. If universal coverage for providing these two interventions is achieved, 670,000 children's lives could be saved by 2030 (Marchant et al. 2016). Treatment of diarrhea with zinc supplementation can further alleviate diarrheal disease burden by shortening the duration of diarrheal episodes (Lazzerini and Wanzira 2016). Another high-impact intervention is basic vaccinations (Marchant et al. 2016), which can include diphtheria-pertussis-tetanus (DPT), oral polio, measles, and bacillus Calmette-Guérin (BCG) to prevent tuberculosis; these are strongly associated with falling rates of mortality in children (McGovern and Canning 2015). These vaccines were the first included in the Expanded Programme on Immunization, which was launched in the 1970s. In addition to providing critical life-saving interventions, facility readiness can motivate individuals to seek care. In a study in Malawi, higher quality of care (reflecting both the readiness of the facility and the clinical process) was associated with higher utilization of sick-child health care (Liu et al. 2019). Caretakers may bypass facilities, traveling longer distances to attend facilities with more structural readiness (Kahabuka et al. 2011). Similarly, for vaccination, facility readiness was strongly associated with uptake of basic vaccinations in some areas (Gage et al. 2018).

Another important dimension of the clinical process relies on appropriate diagnosis and treatment—aspects of the process component of quality of care. Adherence to integrated management of childhood illness (IMCI) guidelines should result in children being correctly diagnosed and treated for illness (WHO 2014b). The IMCI diagnostic guidelines ensure that providers correctly check a child for important symptoms that signify a diagnosis of diarrhea, pneumonia, or malaria (Krüger, Heinzl-Gutenbrunner, and Ali 2017). Although children are commonly prescribed antibiotics unnecessarily (Fink et al. 2020), missed diagnoses of pneumonia are also problematic (Uwemedimo et al. 2018). Indeed, research identified variable or low adherence to IMCI diagnostic guidelines; however, providers with recent training performed better (Krüger, Heinzl-Gutenbrunner, and Ali 2017; Kruk et al. 2018). Further, the IMCI guidelines ensure that children receive the appropriate treatment, such as specific antibiotics for community-acquired bacterial pneumonia (Kogan et al. 2003). Although several antibiotics can be used to treat community-acquired bacterial pneumonia in children, the recommended first-line treatment is amoxicillin, as common pneumonia-causing bacteria are developing resistance to antibiotics such as co-trimoxazole (Fink et al. 2020; Ginsburg and Klugman 2017; Low, Pichichero, and Schaad 2004).

Although IMCI applies to all children, the pediatric emergency triage assessment and treatment (ETAT) guidelines were written to ensure that very sick children are correctly identified and initiate treatment as soon as they arrive at the health facility (WHO 2016a). Given that most deaths occur within 24 hours of admission, it is critical to identify children in need of life-saving treatment (WHO 2016a). In a study in which adherence to ETAT was low, between 7% and 18% of health workers were unable to identify several emergent conditions such as convulsion (13%), central cyanosis (18%), and open fractures (18%); between 6% and 45% of health workers failed to identify conditions requiring urgent treatment, including severe pallor (19%), severe visible wasting (41%), and edema in both feet (45%) (Gargamo, Fantahun, and Abiso 2019). Several studies have demonstrated the benefits of ETAT, such as improvements in the performance of health workers after training (Hategekimana et al. 2016) and reductions in child mortality (Molyneux, Ahmad, and Robertson 2006; Ralston et al. 2013; Robison et al. 2012).

Aside from appropriate diagnosis and treatment, another important aspect of the process component of quality of care is counseling for caregivers during child health visits. During clinical interactions, parents should be counseled on diagnoses, danger signs of illness, feeding and drinking instructions for their children, and when to return for follow-up. These four items reflect provider communication with clients. Previous research found that poor communication is associated with lower levels of client satisfaction and intent to return for care (Larson, Leslie, and Kruk 2017).

Facility readiness and adherence to treatment guidelines cover important elements of quality of care, providing useful measures for assessing the quality of child health services and improving health outcomes. Although process components can be found in periodic health facility surveys, information on outcome indicators (e.g., case fatality) is less readily available in health facilities.

2.1.4 Malaria

Assessing the quality of malaria services at health facilities has been largely guided by the IMCI guidelines (WHO 2018) and the WHO Global Malaria Programme's T3: Test, Treat, and Track initiative (WHO 2012). Both emphasize that every suspected malaria case in malaria-endemic regions should be tested by microscopy or rapid diagnosis test (RDT) and that every confirmed malaria case should be treated with antimalarial medicine. Given these guidelines, assessments of the quality of malaria services at health facilities have focused on structural indicators such as a facility's readiness to provide malaria tests and treatment and process indicators such as provider adherence to guidelines when providing these services (Davlantes et al. 2019; Millar et al. 2014; Steinhardt et al. 2015; Taylor, Ahmed, and Wang 2019; Taylor et al. 2018; Zurovac et al. 2014).

Malaria service readiness is usually measured with multiple indicators on the availability of supplies, equipment, and human resources that are essential for providing malaria diagnosis and treatment services. These indicators are assessed individually or are combined into composite indices for overall facility performance assessment and comparison across countries or over time (Ssempiira et al. 2018; Taylor et al. 2018). In a study based on SPA data in Tanzania, Malawi, and Senegal, a facility was considered malaria-service ready if it had diagnostic capacity for malaria and had drugs available for artemisinin-based combination therapy (ACT) (Taylor et al. 2018). Malaria diagnostic capacity requires a facility to have the capacity to perform a malaria test with microscopy (i.e., trained personnel and microscopy supplies) or an RDT (i.e., trained personnel, RDT supplies, and protocol) (WHO 2015a). ACT is the first-line antimalarial treatment recommended by the WHO; assessment of its availability needs to be country-specific, as

countries often have different antimalarial drugs available at health facilities. Other structural indicators, such as the availability of national guidelines and relevant training for providers, were also included in assessments of the quality of malaria services (Candrinho et al. 2019). Malaria service readiness is poor even in malaria-endemic countries (Candrinho et al. 2019; Macarayan, Papanicolas, and Jha 2020; Taylor, Ahmed, and Wang 2019); for example, only 18% of facilities in Tanzania and 25% in Malawi are considered ready to provide malaria services (Taylor et al. 2018). Although countries perform differently in individual components of service readiness, some components such as diagnostic capacity and personnel training are concerning across countries. Availability of ACT, however, is less of a problem (Taylor et al. 2018).

Although it is important that facilities are ready to provide malaria diagnosis and treatment services, the process component (i.e., the provider's adherence to guidelines for managing suspected malaria cases) is even more critical. Studies have measured the process component of quality of care according to the national malaria control program or WHO guidelines (Millar et al. 2014; Rowe et al. 2009). In the study by Taylor and colleagues (2018), quality of case management was assessed by examining 1) if the provider asked about fever; 2) if a child was felt for a temperature, had his or her temperature taken with a thermometer, or was checked for pallor by looking at his or her palms; and 3) if the provider instructed the child to see another provider or laboratory for a finger or heel stick for blood testing. The authors found that a low proportion of children (34% in Malawi and 25% in Tanzania) received all three services. When data are available, studies can assess the quality of case management of suspected malaria. One study in Mozambique examined whether suspected malaria cases were tested with microscopy or RDT and were treated appropriately (given ACT only following a positive test); the study found that failure to test was the largest gap, and only about half or fewer of all cases were appropriately managed (Candrinho et al. 2019).

Both malaria service readiness and quality of case management are important for universal access to malaria diagnosis and treatment. Measuring the quality of malaria services should take both into consideration.

2.1.5 Nutrition

Facility-based nutrition interventions primarily target pregnant and lactating women, newborns, and young children to prevent maternal and child undernutrition and their consequences (Black et al. 2013; UNICEF 2015). Although there is growing literature on quality of care, the literature is sparse with respect to the quality of delivery of nutrition interventions. Only a handful of studies have described structural, process, or outcome indicators for essential nutrition interventions such as iron supplementation, growth monitoring, and breastfeeding counseling (Kanyangarara, Munos, and Walker 2017; Mallick, Temsah, and Benedict 2018; Munos et al. 2017; Nguhiu, Barasa, and Chuma 2017; Winter et al. 2017). However, more recently, WHO guidance on standards to improve the quality of care for mothers, newborns, children, and adolescents has included several nutrition interventions (WHO 2016b, 2018).

Structural indicators from the WHO quality of care standards (WHO 2016b, 2018) focus on infant feeding, treatment of acute malnutrition and anemia in children, and information and communication materials for women and their families. Indicators include the availability of basic equipment, supplies, job aids, treatment protocols, staff training, and outpatient referrals. Researchers have incorporated structural indicators such as the availability of weighing scales and micronutrient supplements into their reporting on intervention coverage (Munos et al. 2017; Nguhiu, Barasa, and Chuma 2017). Among studies describing facility readiness for maternal, newborn, and child nutrition services, indicators have included the availability of micronutrient supplements, functioning adult and child/infant weighing scales, stadiometers

or height rods, and tape measures as well as provider training related to infant and young child feeding and assessing the nutritional status of pregnant women (Winter et al. 2017, Mallick et al. 2018). Often, medications and equipment are more available than the human resource (training-related) indicators (Kanyangarara, Munos, and Walker 2017; Mallick, Temsah, and Benedict 2018; Winter et al. 2017). Availability of medications is fundamental for health outcomes; for example, research in Haiti and Malawi found that iron availability was associated with increased odds of adherence to iron consumption during pregnancy in both countries (Wang, Benedict, and Mallick 2019).

The process indicators focus on adherence to feeding and growth monitoring guidelines and appropriate treatment and management of conditions, although these indicators are less represented in research related to nutrition quality of care. Nguhiu, Barasa, and Chuma (2017), in their study on effective coverage of maternal and child health services in Kenya, included only one process indicator from ANC—client recall of prescription of iron supplements. However, Mallick, Temsah, and Benedict (2018) and Joseph et al. (2020) identified several process indicators. For ANC, these included observation or client reports of iron supplementation, prescription, and counseling and physical examination of pregnant women including anemia testing, advice on nutrition during pregnancy, and breastfeeding counseling (Joseph et al. 2020; Mallick, Temsah, and Benedict 2018). Process indicators for child curative care included physical examination of child, growth monitoring, receipt of vitamin A supplementation, and infant feeding practices during illness (Mallick, Temsah, and Benedict 2018). Among the process indicators, the prescription component tended to be conducted more often than counseling-related components of care (Mallick, Temsah, and Benedict 2018). Process indicators such as counseling are important for maternal and child health outcomes; for example, a study of facility breastfeeding counseling during ANC showed that high levels of counseling were associated with early breastfeeding in urban Malawi (Mallick, Benedict, and Wang 2020). In facilities, breastfeeding counseling is recommended to support optimal breastfeeding practices that contribute to child growth, development, and survival (WHO 2017a).

Outcome indicators are few and focus on estimates of institutional mortality such as case fatality rates from complicated severe malnutrition, receipt of counseling services, and satisfaction with care (WHO 2016b, 2018). Very few nutrition outcome indicators on quality of care were identified in the literature—only those from the WHO standards described previously.

Similar to child health, many elements of quality of care for delivery of nutrition interventions (particularly structural indicators) are available in health facility surveys. Process indicators are also available in health facility surveys but are limited to a few maternal health and child curative care services. Outcome indicators are rarely captured in health facility surveys.

2.1.6 Water, sanitation, and hygiene

The importance of WASH for improving the quality of care in facilities is increasingly recognized (WHO and UNICEF 2018). In 2016, a WHO/UNICEF expert group finalized a set of five core indicators that cover basic WASH, waste management, and environmental cleaning services for health facilities (WHO and UNICEF 2018). Several of these indicators are included in the WHO standards for quality of care for mothers, newborns, children, and adolescents (WHO 2016b, 2018). Specifically, Standard 8 requires health facilities to have an appropriate physical environment with adequate water, sanitation, and energy supplies and to have medicines, supplies, and equipment for routine maternal and newborn care, management of

related complications (WHO 2016b), and routine care and management of common childhood illnesses (WHO 2018).

The structural indicators focus on the availability of basic essential equipment, WASH facilities, supplies, up-to-date written protocols, staff training, and sufficient funding for maternal, newborn, and child health care. They include functioning safe water sources, drinking water stations, hand hygiene stations, nappy-changing stations, sanitation facilities, laundry facilities, and waste bins (WHO 2016b, 2018). The process indicators include the number of days in a quarter without water from an improved water source and without soap/disinfectant, the number of days in a year with unsafe waste disposal or no waste treatment, and the proportion of providers and staff trained in WASH and infection prevention (WHO 2016b, 2018). The outcome indicators include patient, provider, and staff satisfaction and observations of provider handwashing or alcohol rubs before examination (WHO 2016b, 2018).

Among studies examining WASH in facilities, structural indicators are most common (Maina et al. 2019; WHO and UNICEF 2019). A global study reported that more than 20% of health-care facilities had no basic water services, 10% had no basic sanitation services, and 15% did not have handwashing facilities at the point of care (WHO and UNICEF 2019). Another study evaluating WASH readiness against antimicrobial resistance in hospitals in Kenya found that readiness was lowest for hygiene at 57%, followed by sanitation (61%), and water (65%); the authors noted variation within the facilities based on location, which reflected differences in infrastructure (Maina 2019).

Handwashing with soap is a high-impact intervention that can reduce infection and could save more than 235,000 children's lives by 2030 (Marchant et al. 2016). However, even when facilities and supplies are available, poor adherence to infection-control practices such as handwashing are common (Bedoya et al. 2017; Seward et al. 2015); provider behaviors related to WASH adherence can also impact client satisfaction (Bouزيد, Cumming, and Hunter 2018). A review of WASH in facilities in low- and middle-income countries found that poor WASH services were associated with low client satisfaction and impacted care-seeking behavior, although it did not fully deter it (Bouزيد, Cumming, and Hunter 2018).

Although health facility surveys provide some information on structural indicators, they rarely include process or outcome measures. WASH readiness and compliance with WASH protocols are important for reducing maternal, newborn, and child mortality. Thus, it is important to capture these measures as part of quality of care in health facilities.

2.2 Indicators

Table 1 presents the agreed-upon indicators following the selection process described above. The table contains health areas, lists the short name of each indicator, and defines the numerator and denominator of each indicator. Additional considerations are presented in the right-hand column to clarify items that were used to calculate indicators, limitations of indicators, or specific instruments used (e.g., if an indicator represents data from the observation protocol or exit interview). This column also provides additional justification for selection of indicators, especially related to proxy indicators or indicators that are limited by the current SPA questionnaire design.

Table 1 Definitions of indicators and considerations

Service, indicator, and domain structure (S) or process (P)	Numerator (N) and denominator (D)	Considerations
Family planning (FP)		
FP1-S: Method choice	N: Number of facilities with at least one short-acting, one long-acting, and one barrier or fertility awareness method D: Number of facilities that provide FP services	Specific methods vary by country. Short-acting methods include emergency contraceptive pills, monthly pills, and injectables. Long-acting methods include implants, intrauterine devices, and male and female sterilization. Barrier and fertility awareness methods include male and female condoms, spermicides, diaphragms, and cycle beads. Commodities must be provided and available at the facility at the time of the survey, except for sterilization, which is based on a facility's report of provision of the procedure alone.
FP2-P: Counseling on side effects	N: Number of clients who were counseled about side effects and health concerns about the method chosen or provided D: Number of clients who were given or prescribed a FP method	This could be calculated among new users, but the sample size may be too small.
Antenatal care (ANC)		
ANC1-P: Blood pressure measurement	N: Number of ANC clients who were measured for blood pressure D: Number of ANC clients	This is calculated according to observation of client visits.
ANC2-P: Counseling on iron	N: Number of ANC first-visit clients who were observed and reported receiving counseling on use or side effects of iron supplements D: Number of ANC first-visit clients	This uses concordant responses between observation and the exit interview. However, iron counseling may occur during group counseling sessions.
ANC3-P: Breastfeeding counseling	N: Number of ANC clients who reported receiving breastfeeding counseling during ANC at this visit or prior visit D: Number of ANC clients	This is based on the exit interview to capture counseling that occurs outside of the individual client visit (i.e., in group counseling sessions). It includes client reports of any breastfeeding-related counseling at the current or any prior visit during that pregnancy. Self-report in exit interviews can be biased toward overreporting of counseling.
Delivery care (DEL)		
DEL1-S: Basic emergency obstetric care (BEmOC)	N: Number of facilities that reported performing all of the BEmOC signal functions at least once during the last three months D: Number of facilities providing normal delivery services	BEmOC signal functions include parenteral administration of antibiotics, parenteral administration of uterotonic drugs/oxytocin, parenteral administration of anticonvulsants for hypertensive disorders of pregnancy, manual removal of placenta, assisted vaginal delivery, and removal of retained products.
DEL2-S: Essential drugs	N: Number of facilities with a uterotonic and magnesium sulfate in stock D: Number of facilities providing normal delivery services	
DEL3-S: Newborn resuscitation	N: Number of facilities with a functional bag and masks D: Number of facilities providing labor and delivery services	Two neonatal sizes are preferred although SPA questionnaires do not specify size.
Immunization (IM)		
IM1-S: Availability of viable vaccines and syringes	N: Number of facilities that have all age-appropriate primary vaccines available (per country schedule) and coupled with appropriate syringes and appropriate refrigeration (2-8 degrees) D: Number of facilities that provide vaccination services, including outreach	Basic vaccination includes pentavalent (or DPT-containing vaccine), oral polio, measles, and BCG. Country-specific adaptations are possible.
Child curative care (CH)		
CH1-S: Antibiotics for pneumonia	N: Number of facilities that have first-line antibiotics D: Number of facilities that provide child curative care services	Antibiotics include amoxicillin suspension or dispersible pediatric-dosed tablets.
CH2-S: Zinc/oral rehydration salts (ORS) for diarrhea	N: Number of facilities that have ORS or zinc D: Number of facilities that provide child curative care services	Although ORS and zinc are complementary in treating diarrhea, the indicator is coded with an "or" for a baseline assessment. Future iterations could reconsider this.

Continues...

Table 1—Continued

Service, indicator, and domain structure (S) or process (P)	Numerator (N) and denominator (D)	Considerations
Child curative care (CH)		
CH3-S: Malaria diagnostic and treatment capacity	N: Number of facilities that have diagnostic capacity (microscopy diagnostic capacity or malaria rapid diagnostic test capacity) and have ACT or first-line antimalarial available D: Number of facilities that provide child curative care services	This indicator does not align with the global definition of malaria diagnostic and treatment capacity. That is, it does not capture having a trained provider. This is discussed in detail in the discussion section.
CH4-P: Assessment for acute respiratory infection (ARI)	N: Number of children whose breaths were counted D: Number of children whose caretaker reported and provider discussed symptoms of ARI	The denominator includes visits in which both the provider asked about signs of illness and the caretaker reported respective signs in order to capture the appropriate denominator of children presenting with symptoms.
CH5-P: Assessment for diarrhea	N: Number of children who were checked for signs of dehydration D: Number of children whose caretaker reported and provider discussed symptoms of diarrhea	
CH6-P: Anemia assessment	N: Number of children who were assessed for anemia D: Number of sick-child visits	Assessment includes checking palms and conjunctiva.
CH7-P: Nutritional status assessment	N: Number of children whose weight was taken, weight was plotted on a growth chart, and growth was discussed. D: Number of sick-child visits	This does not include measurement of mid-upper arm circumference (only weight for height). However, height measurements are not recorded in the SPA protocol.
Water, sanitation, and hygiene (WASH)		
WASH1-S: Basic services for WASH	N: Number of facilities with improved water on premises, handwashing in general service area, and improved latrine for client use in outpatient area D: All facilities	Improved water is piped into the facility or piped onto facility grounds; bottled water is available; or water is available from a public tap or standpipe, a tube well or borehole, a protected dug well, a protected spring, rainwater, a cart with a small tank or drum, or a tanker truck; and the outlet from this source is within 500 meters of the facility. An improved latrine is a functioning flush or pour-flush toilet, a ventilated improved pit latrine, or a composting toilet.

3 DATA AND METHODS

3.1 Data

This analysis used data from seven nationally representative SPA surveys conducted since 2013. SPA surveys are typically conducted among a nationally representative sample or through a census of formal sector health facilities in a country. These facilities include public, private, and mixed private-public facilities but exclude health service provision from informal outlets (e.g., pharmacies and mobile clinics). Appendix Table 2 lists the facilities that are sampled in each survey.

The SPA instruments are designed to collect information about the facilities' capacity to provide services. The interviewers assess basic infrastructure and availability of equipment, medicines, guidelines, and human resources at the facility. Health providers are interviewed about their routine duties as well as qualifications and training. SPA surveys are unique among health facility surveys, especially nationally representative health facility surveys, in that they include observation of health-care visits for select services: family planning, ANC, and child curative care. Interviewers observe up to 15 consultations per service per facility. After client observation, the client (or caretaker) has the opportunity to participate in an exit interview, during which information is solicited from the client about his or her perceptions of the visit.

Table 2 presents each survey's country, year, number of facilities analyzed, and country-specific considerations. Several criteria guided the selection of countries for this analysis. We included countries that conducted a SPA survey following the most recent revision and standardization of the surveys (i.e., the most recent survey conducted in any country since 2013). Although a recent SPA survey was conducted in Afghanistan, this survey was not conducted among a nationally representative sample of all facilities; thus, it was excluded from our study.

Table 2 Surveys and samples of facilities and clients

Country and year of survey(s)	Subnational unit (N)	Number of facilities		Number of family planning clients		Number of ANC clients		Number of child clients		Country-specific notes
		N	Subnational median	N	Subnational median	N	Subnational median	N	Subnational median	
Bangladesh 2017	Divisions (8)	1,524	190	na	na	na	na	na	na	The survey did not include observations of any services; thus, the score calculation differed from that in other countries. More information is presented in the methods section.
Democratic Republic of the Congo (DRC) 2017-18	Provinces (26)	1,380	42	273	na	4,512	113	2,660	99	Very few family planning clients were observed (273); the indicator based on this population was omitted from the index in this country.
Haiti 2017-18	Departments (11)	1,007	78	1,107	76	1,526	115	2,166	128	
Malawi 2013-14	Regions (3)	977	362	1,482	597	2,068	884	3,329	1,161	
Nepal 2015	Regions (5)	940	202	754	104	1,509	232	2,186	313	Stand-alone HIV testing and counseling sites were excluded.
Senegal 2016 and 2017	Regions (14)	1,249	89	639	38	849	44	1,064	61	Analysis combined survey data from 2016 and 2017, as this continuous survey model did not sample or observe clients from all three service areas (antenatal care, family planning, and child curative care) in each survey year. Client-based indicators about antenatal care visits were based on 2016 survey data; client-based family planning and child curative care service variables were based on 2017 data. Facility-based indicators included data from both 2016 and 2017 surveys. Health huts were excluded from analysis of client-based indicators, as observation data were not collected from these facilities.
Tanzania 2014-2015	Regions (30)	1,188	39	1,689	50	4,007	120	4,961	144	

3.2 Methods

We created the QOCI using two types of indicators. The first type is a structural indicator, which is facility-based (i.e., calculated using facilities as the unit of the analysis) and reflects the structural component of Donabedian’s quality of care framework. This represents the availability and readiness to provide services. The second type of indicator is client-based, using clients as the unit of analysis, and reflects Donabedian’s process component (i.e., service delivery). Each type of indicator is calculated as the percentage of facilities or clients that meet the criteria for the indicator among the facilities providing the service or clients receiving the service, with a possible range of 0 to 100. These percentages are calculated at national and subnational (e.g., regional, provincial) levels. Each percentage is calculated using appropriate facility or client weights.

The index was created using an equal-weight (or weighted additive) approach as applied in prior RMNCH and quality of care indices (Jain et al. 2019; Mallick, Temsah, and Wang 2019; Shwartz et al. 2013; Wang et al. 2019; Wehrmeister et al. 2016; WHO 2015b). Each service area can have both types of indicators (i.e., facility- and client-based). In this approach, the indicators within each service are averaged, assigning an equal weight to each indicator within the service that is inversely proportional to the number of indicators within that service. That is, the more indicators in a service, the less weight those indicators carry; conversely, indicators in services with fewer indicators carry greater weight in the overall index. The service scores are then averaged to obtain a total score; thus, each service is weighted equally. Assuming equal weights in this way ignores the sample size for each indicator, as the samples size varies based on the type of service and whether the indicator is facility-based or client-based.

Given that each indicator has a range of 0 to 100, the index also has a potential range of 0 to 100. The formula for calculating the index is:

$$\frac{\left(\frac{FP1 + FP2}{2}\right) + \left(\frac{ANC1 + ANC2 + ANC3}{3}\right) + \left(\frac{DEL1 + DEL2 + DEL3}{3}\right) + \left(\frac{IM1}{1}\right) + \left(\frac{CH1 + CH2 + CH3 + CH4 + CH5 + CH6 + CH7}{7}\right) + \left(\frac{WASH1}{1}\right)}{6} \times 100$$

Table 1 defines each indicator, where FP is family planning, ANC is antenatal care, DEL is delivery care, IM is immunization, CH is child curative care (including diarrhea, pneumonia/ARI, malaria, and general nutrition), and WASH is water, sanitation, and hygiene. The index includes 17 indicators.

In countries that do not have observation data from which to calculate client-based indicators or do not collect malaria data (e.g., Bangladesh), the calculation can be adjusted by removing the unavailable indicators and calibrating the denominator for the service-specific and overall averages. An index such as this can be used with data from health facility surveys that do not collect client-based indicators, such as the SARA survey:

$$\frac{\left(\frac{FP1}{1}\right) + \left(\frac{DEL1 + DEL2 + DEL3}{3}\right) + \left(\frac{IM1}{1}\right) + \left(\frac{CH1 + CH2}{2}\right) + \left(\frac{WASH1}{1}\right)}{5} \times 100$$

We calculated the score at national and subnational levels. Given differences in the calculation of the index across countries (e.g., exemption of all client-based indicators in Bangladesh, exemption of client-based family planning indicators in the DRC) and the varying data collection times among the surveys (ranging from 2014-15 in Tanzania to 2017-18 in the DRC and Haiti), scores are not directly comparable across countries. For each country, we present the percentage of facilities or clients meeting the criteria for each indicator, the service area scores, and the overall scores. Appendix tables are included for each country to detail the number of facilities or clients analyzed for each indicator, overall, by service, and by indicator. Analyses were conducted using Stata 16.0 and Microsoft Excel 2016.

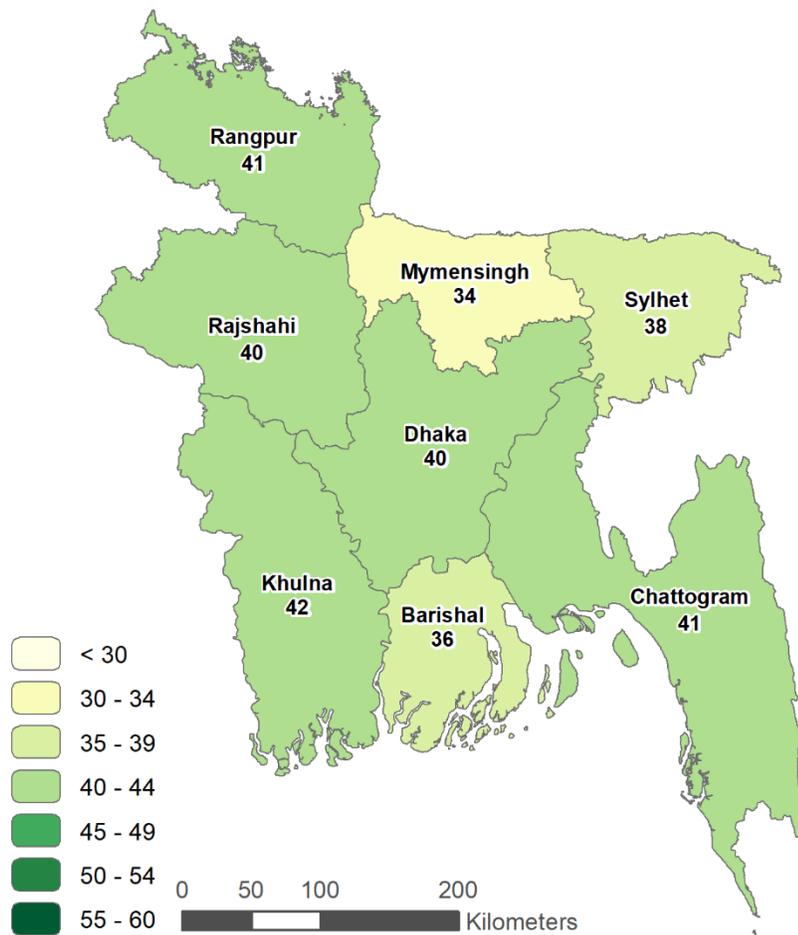
4 RESULTS

In the following sections, we discuss the results for each country separately. Figures 4 to 10 are maps reflecting subnational variation in overall quality of care. Tables 3 to 9 show the subnational and national scores for each country, by indicator, service area, and total score. Appendix Tables 3 to 9 show the weighted (and unweighted) sample sizes for each indicator at subnational and national levels; sample sizes are important considerations when drawing conclusions about quality of care, especially at subnational levels where the number of facilities or clients can be quite small.

4.1 Bangladesh

Bangladesh received a quality score of 40 out of 100 (Figure 4); scores ranged only 8 points across divisions, from 34 in Mymensingh to 42 in Khulna. As mentioned earlier, although the client-based indicators presented in Table 1 are included in the other country indices, they are not included in the index for Bangladesh. It is, therefore, difficult to compare this country's composite score with the scores of the other countries in this study. Comparison can be made, however, among the divisions of Bangladesh and among the services that comprise its QOCI.

Figure 4 QOCI results in the divisions of Bangladesh



Nationally, the two highest-scoring service areas were child curative care and basic WASH services, which scored 78 and 66, respectively (Figure 5 and Table 3). Immunization received the lowest score, with only 3% of facilities in Bangladesh providing viable vaccines and syringes. The other two services, delivery care and family planning, had scores of 28 and 24, respectively. The ANC service was not included in the index, as this service includes only client-based indicators. Although most of the services varied little between administrative divisions, basic WASH services had a notable variety of results. In Khulna, 83% of facilities had basic WASH services. In Mymensingh, however, only 39% of facilities provided basic WASH services.

Figure 5 National average score, service scores, and highest- and lowest-scoring indicators, Bangladesh 2017



In addition, two indicators in the delivery care service area had large disparities among divisions. In Rangpur, 42% of facilities were counted as having performed BEmOC signal functions in the past three months, while only 3% of facilities in Sylhet performed these functions—a difference of 39 percentage points. The neonatal resuscitation indicator had slightly less variation. Although 73% of facilities in Sylhet had equipment for neonatal resuscitation, only 44% of facilities in Rangpur had these items—a difference of 29 percentage points.

Table 3 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Bangladesh SPA 2017

Unit*	Service or indicator	Barishal	Chattogram	Dhaka	Khulna	Rajshahi	Rangpur	Sylhet	Mymensingh	National
Family planning										
F	Method availability	20.5	25.3	26.5	24.8	23.7	21.1	19.3	20.6	23.6
C	Counseling on side effects	na								
	Family planning average	20.5	25.3	26.5	24.8	23.7	21.1	19.3	20.6	23.6
Antenatal care										
C	Blood pressure measurement	na								
C	Counseling on iron	na								
C	Counseling on breastfeeding	na								
	Antenatal care average	na								
Delivery care										
F	BEmOC signal functions performed	6.1	10.5	9.6	10.3	6.0	41.7	3.4	5.5	11.8
F	Essential drugs	6.1	19.4	10.5	8.7	9.2	13.0	14.7	6.6	11.9
F	Neonatal resuscitation	57.3	61.7	62.5	59.1	55.2	43.6	72.8	59.5	58.8
	Delivery care average	23.2	30.5	27.5	26.0	23.5	32.8	30.3	23.9	27.5
Immunization										
F	Availability of viable vaccines and syringes	2.4	2.6	4.2	2.3	2.5	2.6	2.5	1.7	2.8
Child curative care										
F	Antibiotics for children	79.6	78.0	67.6	64.9	75.9	73.6	78.2	79.4	73.7
F	ORS/Zinc for diarrhea	87.2	78.7	81.9	85.0	81.6	83.7	83.8	88.8	83.0
F	Malaria diagnosis and treatment capacity	na								
C	ARI assessment	na								
C	Diarrhea assessment	na								
C	Anemia assessment	na								
C	Nutritional status assessment	na								
	Child curative care average	83.4	78.4	74.8	75.0	78.8	78.7	81.0	84.1	78.4
WASH										
F	Basic services for WASH	50.5	70.3	66.1	83.1	71.2	68.3	57.2	38.8	66.1
	Total	36.0	41.4	39.8	42.2	39.9	40.7	38.1	33.8	39.7

Notes:

*Unit of analysis: F = facility; C = client.

ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.2 Democratic Republic of the Congo

In the DRC, the overall quality of care score was 37 out of 100 maximum possible points. As shown in Figure 6, quality of care varied greatly across provinces in the DRC, from 19 in Sankuru to 55 in Nord-Kivu. Of the seven countries in this study, the DRC had the second-most administrative divisions and the highest range of quality of care scores—36 points.

Figure 6 QOCI results in the provinces of the Democratic Republic of the Congo

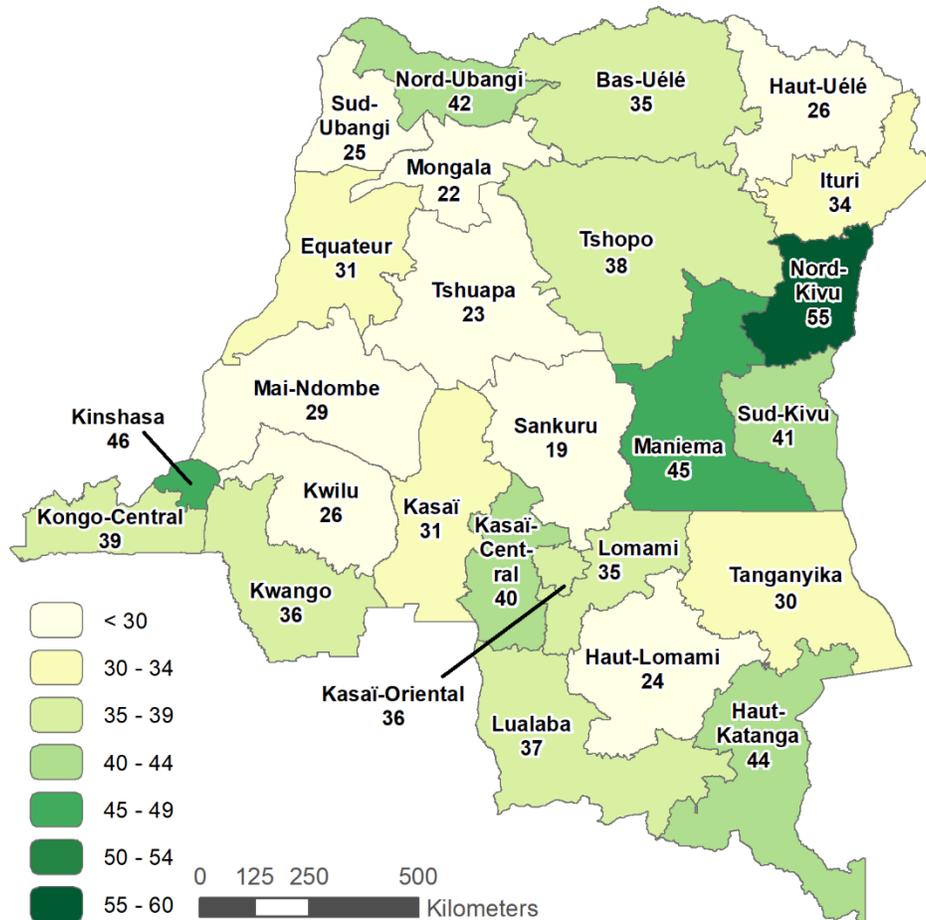
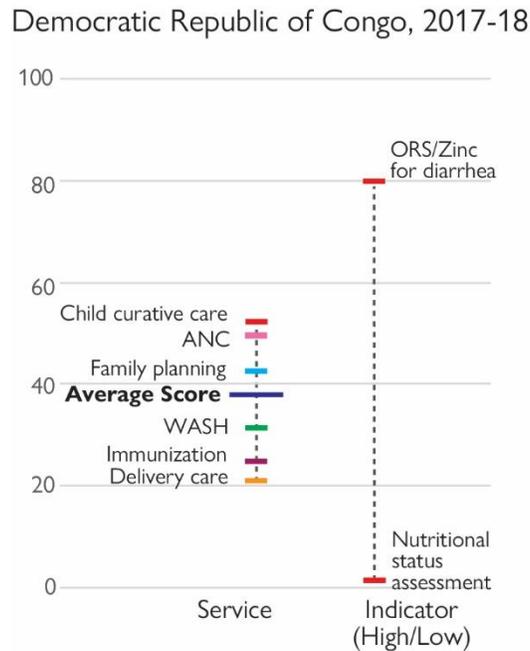


Table 4 and Figure 7 show, at the national level, that the services varied in level of quality, from a score of 21 for delivery care to a score of 52 for child curative care. These, too, fluctuated widely across provinces and within services. For delivery care, which included facility report of recent provision of BEmOC signal functions, availability of essential drugs, and equipment for neonatal resuscitation, Equateur had a score of only 3. Kasai-Central and Nord-Kivu were more equipped, each scoring an average of 38 for the three indicators. Child curative care scores were higher, ranging from 31 in Sankuru to 62 in Nord-Ubangi and Nord-Kivu.

Figure 7 National average score, service scores, and highest- and lowest-scoring indicators, Democratic Republic of the Congo 2017-18



Within services, however, the indicator scores also varied substantially, particularly within the child curative care service. That is, provision of care related to nutritional status assessment was very uncommon or nonexistent in some regions (ranging from 0% to 17%), while availability of ORS or zinc was much more common, available at nearly all facilities in Nord-Kivu and Sud-Kivu. For family planning, only one indicator (based on facilities) was included, as there were too few clients to include a client-based indicator; the indicator that was included varied greatly. In both Sud-Ubangi and Haut-Uélé, 6% of facilities had a mix of short-acting, long-acting, and barrier methods or fertility awareness methods (cycle beads), while 77% of facilities met these criteria in Bas-Uélé. However, very few facilities provided family planning services in some regions (e.g., only 11 facilities, unweighted, in Bas-Uélé and Tanganyika). Blood pressure measurement was 78% nationally but was as low as 29% in one province (Sankuru). Across provinces, only 7% to 61% had all four basic vaccinations available and properly stored. Additionally, 4% to 67% of facilities had basic services for WASH (i.e., improved water, handwashing resources, and an improved latrine for clients).

Table 4 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Democratic Republic of the Congo SPA 2017-18

Unit*	Service or indicator	Sud-Kivu	Kinshasa	Kongo-Central	Mai-Ndombe	Kwilu	Kwango	Equateur	Sud-Ubangi	Nord-Ubangi	Mongala	Tshuapa	Tshopo	Bas-Uélé	Haut-Uélé	
Family planning																
F	Method availability	38.8	63.7	40.8	39.9	18.6	61.4	40.9	6.2	59.5	26.0	15.4	74.6	77.8	6.0	
C	Counseling on side effects	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
Family planning average		38.8	63.7	40.8	39.9	18.6	61.4	40.9	6.2	59.5	26.0	15.4	74.6	77.8	6.0	
Antenatal care																
C	Blood pressure measurement	84.4	78.4	96.7	49.8	86.1	74.8	86.1	84.8	88.3	78.6	84.8	70.9	47.8	73.2	
C	Counseling on iron	68.7	35.4	61.9	12.4	27.3	52.4	2.0	34.2	44.2	30.7	27.7	19.1	8.2	15.8	
C	Counseling on breastfeeding	35.3	32.3	8.4	22.6	32.9	46.2	39.8	16.1	44.4	17.1	36.4	23.2	34.0	39.2	
Antenatal care average		62.8	48.7	55.7	28.3	48.8	57.8	42.6	45.0	59.0	42.1	49.6	37.7	30.0	42.7	
Delivery care																
F	BEEmOC signal functions performed	12.9	22.9	16.0	4.8	11.1	7.2	6.2	20.2	2.2	6.0	12.7	1.3	10.9	7.8	
F	Essential drugs	14.7	29.4	22.5	7.4	13.5	6.6	0.6	5.0	12.2	0.0	0.0	0.4	24.3	7.8	
F	Neonatal resuscitation	43.6	45.3	37.7	5.1	12.8	19.6	2.2	21.7	34.8	5.3	7.0	18.7	1.7	2.4	
Delivery care average		23.7	32.5	25.4	5.8	12.5	11.1	3.0	15.6	16.4	3.8	6.6	6.8	12.3	6.0	
Immunization																
F	Availability of viable vaccines and syringes	7.2	10.3	22.8	18.3	15.7	21.4	31.4	27.2	49.4	14.1	15.0	33.3	19.5	20.1	
Child curative care																
F	Antibiotics for children	45.4	47.3	72.3	55.2	52.2	63.2	37.4	29.8	83.1	11.1	61.4	32.5	36.3	39.5	
F	ORS/Zinc for diarrhea	96.1	64.4	68.1	94.0	90.9	88.3	89.3	72.8	82.4	81.8	58.7	82.9	78.9	86.6	
F	Malaria diagnosis and treatment capacity	61.5	43.3	68.0	55.5	36.6	56.8	69.4	53.5	81.3	58.0	64.8	60.3	64.3	71.3	
C	ARI assessment	60.5	47.5	47.0	31.2	31.1	38.4	5.7	33.4	24.4	13.8	7.2	40.5	32.6	16.9	
C	Diarrhea assessment	63.6	91.8	80.2	48.5	93.7	76.1	37.5	63.4	83.4	38.1	67.1	69.0	84.1	52.7	
C	Anemia assessment	72.5	70.1	85.7	71.6	83.4	88.5	81.3	76.9	74.4	51.8	73.8	69.6	83.0	77.0	
C	Nutritional status assessment	4.5	0.0	0.0	1.0	0.0	4.0	0.0	0.1	0.3	0.2	7.5	0.9	0.3	11.2	
Child curative care average		57.7	52.1	60.2	51.0	55.4	59.3	45.8	47.1	61.3	36.4	48.6	50.8	54.2	50.7	
WASH																
F	Basic services for WASH	57.1	66.6	27.1	30.4	4.0	4.8	23.4	7.5	6.9	7.3	2.6	24.6	15.1	32.4	
Total		41.4	45.8	38.8	29.1	26.0	36.1	31.2	25.4	42.2	22.1	23.2	38.2	35.0	26.8	

Notes:

*Unit of analysis: F = facility; C = client.

ARI = acute respiratory infection; BEEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

Continues...

Table 4—Continued

Unit*	Service or indicator	Ituri	Nord-Kivu	Haut-Katanga	Lualaba	Haut-Lomami	Tanganyika	Kasai-Oriental	Sankuru	Lomami	Kasai	Kasai-Central	Maniema	National
Family planning														
F	Method availability	22.5	60.1	40.9	37.5	15.3	49.3	57.2	28.5	49.9	42.5	53.7	64.0	41.7
C	Counseling on side effects	na	na	na	na	na	na	na	na	na	na	na	na	na
Family planning average		22.5	60.1	40.9	37.5	15.3	49.3	57.2	28.5	49.9	42.5	53.7	64.0	41.7
Antenatal care														
C	Blood pressure measurement	86.8	89.7	98.4	84.5	37.6	83.6	78.5	28.5	60.7	49.6	71.7	40.2	78.2
C	Counseling on iron	41.7	52.1	39.5	27.5	13.6	50.3	15.2	6.5	17.9	17.5	57.0	50.4	41.4
C	Counseling on breastfeeding	55.7	41.8	22.6	16.7	36.1	3.1	24.5	16.8	32.9	26.0	25.8	29.7	30.6
Antenatal care average		61.4	61.2	53.5	42.9	29.1	45.7	39.4	17.3	37.2	31.0	51.5	40.1	50.1
Delivery care														
F	BEEmOC signal functions performed	16.5	30.1	9.9	9.1	1.7	10.6	1.4	5.6	1.2	14.7	18.5	12.1	12.4
F	Essential drugs	8.9	31.7	48.7	28.5	30.7	6.0	7.3	6.0	10.5	19.6	42.8	11.7	18.8
F	Neonatal resuscitation	12.5	50.8	43.9	58.4	57.7	25.7	37.1	34.4	16.1	22.5	53.9	32.7	30.7
Delivery care average		12.6	37.5	34.2	32.0	30.0	14.1	15.3	15.3	9.3	18.9	38.4	18.8	20.6
Immunization														
F	Availability of viable vaccines and syringes	30.7	55.8	27.7	11.2	25.5	5.2	20.9	15.1	52.2	21.3	29.7	60.9	25.3
Child curative care														
F	Antibiotics for children	24.8	53.3	44.9	36.0	23.2	27.7	42.3	6.0	30.7	84.1	65.5	47.7	46.5
F	ORS/Zinc for diarrhea	84.7	99.9	83.2	78.3	67.5	67.1	50.0	35.1	83.1	80.4	92.7	56.2	79.5
F	Malaria diagnosis and treatment capacity	37.9	67.8	52.0	67.8	31.7	36.1	48.3	17.2	66.5	46.0	44.7	67.8	53.9
C	ARI assessment	50.3	65.3	53.5	51.7	22.9	35.1	57.7	17.4	46.9	9.4	22.2	46.7	40.5
C	Diarrhea assessment	65.0	70.2	71.9	68.4	76.5	68.8	29.3	60.9	46.5	83.2	75.9	88.0	68.6
C	Anemia assessment	82.2	62.1	83.0	94.3	56.1	70.7	95.6	71.8	67.4	48.6	66.7	71.1	71.7
C	Nutritional status assessment	1.2	2.8	0.7	17.3	0.2	0.0	0.8	0.0	2.3	2.9	0.0	0.0	2.0
Child curative care average		49.4	60.2	55.6	59.1	39.7	43.6	46.3	29.8	49.1	50.7	52.5	53.9	51.8
WASH														
F	Basic services for WASH	25.8	55.9	52.5	38.0	7.1	22.4	34.6	8.1	14.6	20.2	15.4	35.0	30.7
Total		34.1	55.4	44.2	37.2	24.6	30.5	35.9	19.3	35.6	30.9	40.3	45.6	36.9

Notes:

*Unit of analysis: F = facility; C = client.

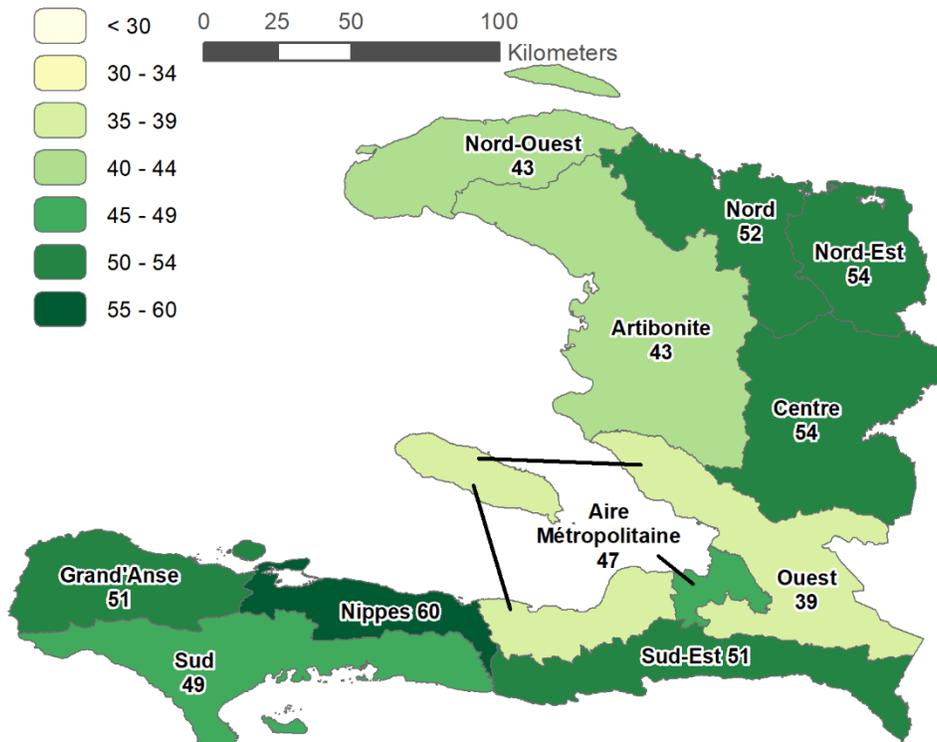
ARI = acute respiratory infection; BEEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.3 Haiti

Although Haiti received an overall score of 47 out of a possible 100, the results varied from department to department. As seen in Figure 8, half of the departments (i.e., five out of eleven) had scores above 50. Nippes department received a score of 59—the highest composite score. Of the departments with scores below 50, Ouest department had the lowest, at 38.

Figure 8 QOCI results in the departments of Haiti



On a national level, family planning had the lowest score (Figure 9). Although the results fluctuated among departments, ranging from 11 to 28, the overall score was only 19. This was low compared to the other services, notably child curative care, ANC, and WASH, which received national scores of 52, 52, and 70, respectively. Although most services did not vary greatly from department to department, immunization had the most extreme variation (Table 5), where availability of viable vaccines and syringes ranged from 23% in Reste-Ouest to 93% in Nippes.

Within ANC and child curative care services, indicators ranged by 65 and 81 percentage points, respectively, at the national level. For the ANC service, 94% of ANC clients nationally had their blood pressure measured. Across Haiti, not a single department was below 86% for this indicator. In contrast, counseling on iron and counseling on breastfeeding (i.e., the two other indicators making up the ANC service) were observed less often; nationally, only 33% and 29% of clients, respectively, received counseling on these topics. Child curative care was more complicated. As shown in Table 1, this service is made up of seven indicators—some facility-based and some client-based. Generally, availability of treatments for pneumonia and diarrhea were observed more often than appropriate assessment of childhood illness and nutrition. For example, antibiotics for children had the highest scores across the departments;

not a single department had fewer than 72% of facilities with antibiotics. On the other end of the spectrum, only 2% of children nationally received the recommended assessment of nutritional status, ranging from 1% in Artibonite department to 7% in Centre department. Nationally, ARI assessment (i.e., counting breaths) was observed in only 38% of children whose caretaker reported and provider discussed symptoms of ARI, ranging from 16% in Centre to 47% in Ouest. Finally, malaria diagnostic and treatment capacity ranged from 33% in Aire Metropolitaine to 85% in Nord'Est. It should be noted that malaria endemicity varies greatly within the country and within departments, although malaria readiness does not necessarily correlate to endemicity.

Figure 9 National average score, service scores, and highest- and lowest-scoring indicators, Haiti 2017-18

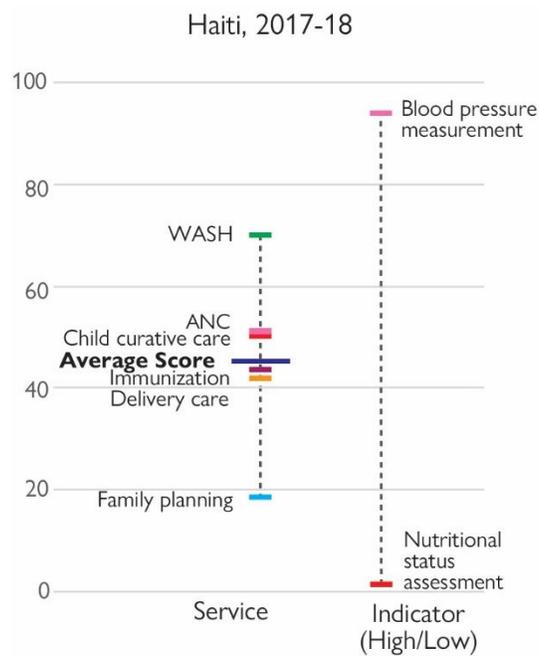


Table 5 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Haiti SPA 2017-18

Unit* Service or indicator	Aire											National
	Metropo-Itatine	Reste-Ouest	Sud'Est	Nord	Nord'Est	Artibonite	Centre	Sud	Grand'Anse	Nord'Ouest	Nippes	
Family planning												
F Method availability	15.1	4.3	8.0	16.1	13.9	8.8	28.9	10.9	12.8	9.3	14.3	11.7
C Counseling on side effects	37.5	30.0	27.0	15.2	10.3	22.0	27.4	11.9	34.2	24.3	13.9	27.0
Family planning average	26.3	17.2	17.5	15.7	12.1	15.4	28.2	11.4	23.5	16.8	14.1	19.4
Antenatal care												
C Blood pressure measurement	86.6	95.1	95.6	98.0	100.0	90.4	100.0	96.4	96.4	99.0	100.0	94.1
C Counseling on iron	27.6	27.0	42.1	34.4	52.7	39.1	27.3	23.7	29.3	19.6	62.8	32.8
C Counseling on breastfeeding	24.7	25.9	34.0	29.2	29.3	34.8	28.5	26.9	45.3	36.3	35.9	29.4
Antenatal care average	46.3	49.3	57.2	53.9	60.7	54.8	51.9	49.0	57.0	51.6	66.2	52.1
Delivery care												
F BEmOC signal functions performed	27.0	14.3	25.7	36.1	28.6	35.3	50.0	16.0	15.0	4.7	41.7	24.9
F Essential drugs	47.6	26.5	40.0	38.9	61.9	35.3	62.5	52.0	45.0	33.7	50.0	42.4
F Neonatal resuscitation	74.6	45.2	62.9	77.8	71.4	64.7	58.3	64.0	70.0	38.4	91.7	62.9
Delivery care average	49.7	28.7	42.9	50.9	54.0	45.1	56.9	44.0	43.3	25.6	61.1	43.4
Immunization												
F Availability of viable vaccines and syringes	37.7	22.6	68.9	58.5	75.0	33.0	65.8	54.1	71.1	46.6	92.6	48.2
Child curative care												
F Antibiotics for children	75.8	72.2	80.6	93.2	92.7	80.8	86.3	91.8	84.6	88.1	100.0	83.0
F ORS/Zinc for diarrhea	53.1	63.9	82.1	74.8	82.9	69.2	84.3	94.5	98.1	85.4	94.1	73.9
F Malaria diagnosis and treatment capacity	32.6	35.3	52.2	55.3	85.4	64.2	84.3	65.8	73.1	56.8	73.5	54.0
C ARI assessment	44.2	47.3	30.1	40.7	23.6	37.7	16.3	31.3	35.3	12.1	42.8	37.7
C Diarrhea assessment	68.2	55.6	42.9	66.7	46.2	52.8	36.5	40.1	33.8	33.4	39.3	55.0
C Anemia assessment	51.7	54.2	41.4	51.2	47.3	46.0	39.7	54.7	46.9	43.7	58.9	49.4
C Nutritional status assessment	3.5	1.5	1.8	1.2	1.9	0.0	6.6	1.8	2.5	0.6	1.4	2.4
Child curative care average	47.0	47.1	47.3	54.7	54.3	50.1	50.6	54.3	53.5	45.7	58.6	50.8
WASH												
F Basic services for WASH	72.1	67.1	72.1	79.0	68.3	61.2	69.2	80.8	60.4	71.7	64.7	70.2
Total	46.5	38.7	51.0	52.1	54.1	43.3	53.8	48.9	51.5	43.0	59.6	47.3

Notes:

*Unit of analysis: F = facility; C = client.

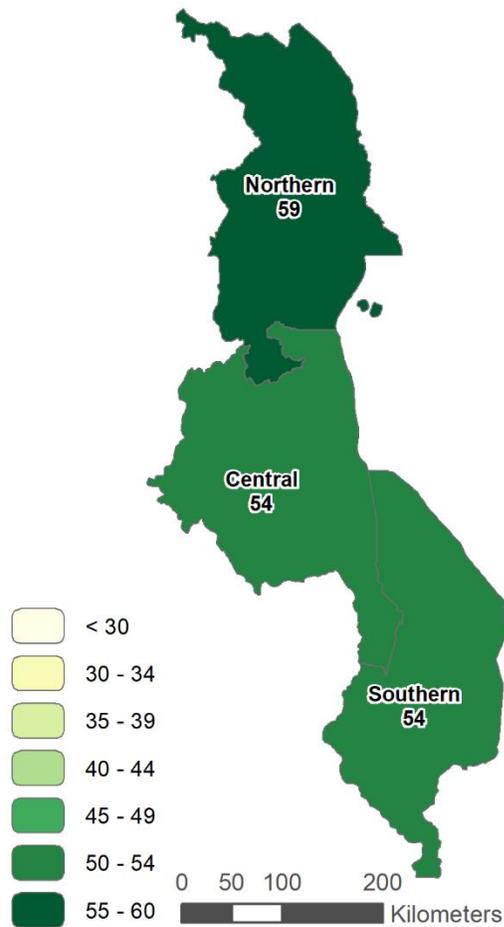
ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.4 Malawi

Nationally, Malawi received a score of 55, and its three regions—North, Central, and South—scored 59, 54, and 55, respectively (Figure 10). Of the seven countries in this study, Malawi had both the fewest administrative divisions (i.e., three) and the smallest range of quality scores (i.e., five points). Although the North scored higher than the other two regions in most services, the regional scores were largely similar. Individual service scores differed by only 12 points at most among the three regions.

Figure 10 QOCI results in the regions of Malawi



Of the six services, half (ANC, delivery care, and WASH) had scores above 50, and the other half (family planning, immunization, and child curative care) scored slightly below 50, as seen in Figure 11. The lowest-scoring service was child curative care, which had a score of 47. This was 21 points below the highest-scoring service, basic WASH services. In the WASH service area, the North, Central, and South regions had scores of 66, 70, and 67, respectively (Table 6).

Two services (delivery care and child curative care) performed fairly evenly across regions, though the prevalence of individual indicators varied. Although large percentages of facilities offered essential drugs and neonatal resuscitation (82% and 93%, respectively), only 15% of facilities had performed BEmOC signal functions in the three months preceding the survey. Of the seven indicators comprising the child curative care service, two were 80% or higher nationally; antibiotics and ORS or zinc for diarrhea were available in 76% and 91% of facilities, respectively. The ARI assessment and the nutritional assessment (both client-based indicators) scored the lowest. They were observed in 24% and 2% of cases, respectively.

Within two other services, family planning and ANC, results varied more across regions. In the family planning service, the availability of a mix of methods ranged from 46% of facilities in the South to 65% in the North—a difference of 19 percentage points. Blood pressure measurement, a client-based ANC indicator, varied even more. In the Central region, 41% of ANC clients received this service. In the North, however, 81% of ANC clients had their blood pressure measured.

Figure 11 National average score, service scores, and highest- and lowest-scoring indicators, Malawi 2013-14

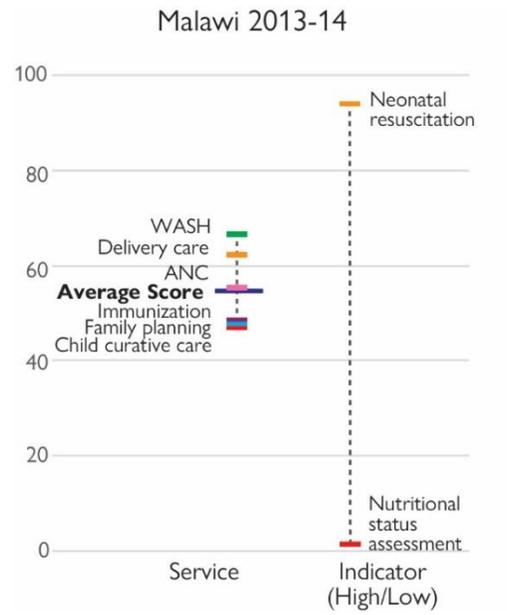


Table 6 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Malawi SPA 2013-14

Unit*	Service or indicator	North	Central	South	National
Family planning					
F	Method availability	64.9	46.3	54.5	53.2
C	Counseling on side effects	45.1	43.5	42.9	43.4
	Family planning average	55.0	44.9	48.7	48.3
Antenatal care					
C	Blood pressure measurement	80.5	40.9	52.9	50.9
C	Counseling on iron	63.4	66.7	61.2	63.8
C	Counseling on breastfeeding	52.7	52.6	52.5	52.6
	Antenatal care average	65.5	53.4	55.5	55.8
Delivery care					
F	BEmOC signal functions performed	16.3	16.1	12.4	14.5
F	Essential drugs	79.6	82.3	83.1	82.1
F	Neonatal resuscitation	97.1	95.1	90.2	93.3
	Delivery care average	64.3	64.5	61.9	63.3
Immunization					
F	Availability of viable vaccines and syringes	54.3	43.2	50.4	48.5
Child curative care					
F	Antibiotics for children	81.8	81.3	68.8	75.7
F	ORS/Zinc for diarrhea	90.0	93.7	90.0	91.4
F	Malaria diagnosis and treatment capacity	48.1	44.2	42.8	44.2
C	ARI assessment	27.2	27.5	16.7	24.2
C	Diarrhea assessment	37.3	47.0	37.3	42.1
C	Anemia assessment	47.0	44.5	40.9	43.6
C	Nutritional status assessment	0.2	1.4	2.1	1.5
	Child curative care average	47.4	48.5	42.7	46.1
WASH					
F	Basic services for WASH	66.4	70.2	67.4	68.2
	Total	58.8	54.1	54.4	55.0

Notes:

*Unit of analysis: F = facility; C = client.

ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.5 Nepal

Nepal also had few administrative regions and little variation among them. Together, the regions of Nepal received a composite score of 38. Separately, they had similar scores, which were all within a range of five points. The Central region scored 37, while the Far-Western region scored 42 (Figure 12).

Figure 12 QOCI results in the regions of Nepal

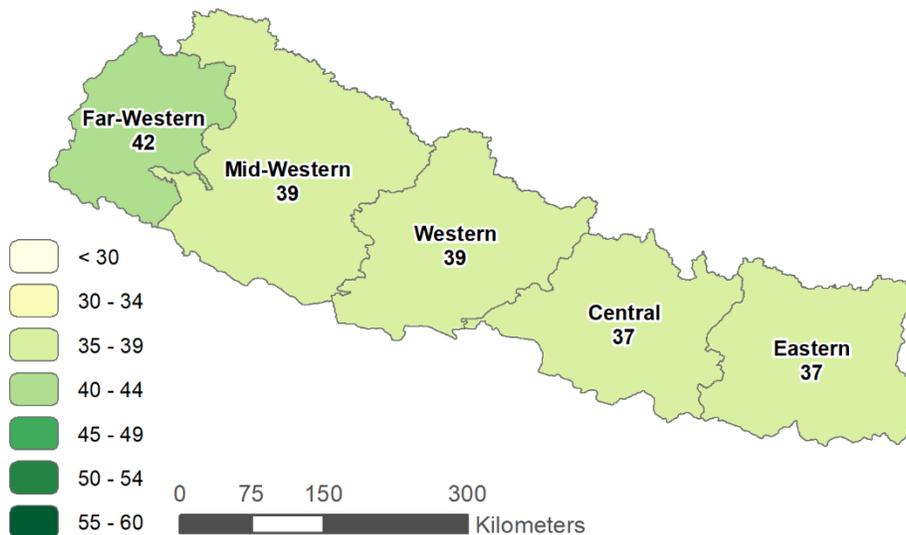


Figure 13 shows that all but one service score (for ANC) varied by fewer than 15 points across Nepal's regions. There was, however, variation between the service scores themselves. Although 67% of facilities had basic resources for WASH, family planning received a low score of 22. The lowest-scoring service was immunization. As a whole, only 6% of facilities in Nepal were equipped with all (properly stored) basic vaccines and syringes (Table 7).

Several indicators stood out from the others in their respective services. Blood pressure measurement was much higher than the other two counseling-related indicators in the ANC service area. Although counseling on iron and counseling on breastfeeding received scores of 27 and 16, respectively, the majority (81%) of clients had their blood pressure measured in Nepal. Counseling also varied across regions. Only 8% of ANC clients in the Central region were counseled on breastfeeding, while 34% of ANC clients in the Far-Western region were counseled.

Additionally, the BEmOC indicator scored much lower than the other two indicators of delivery care. Only 5% of facilities had performed BEmOC signal functions in the three months preceding the survey, but essential drugs were available in 69% of facilities (ranging from 58% to 85%), and neonatal resuscitation equipment was available in 84% (ranging from 78% to 93%). The indicators comprising child curative care also varied greatly. Despite the high availability of ORS/zinc for diarrhea (97%), the composite score for child curative care was 37. This was due, in part, to the two lowest-scoring indicators, the anemia and nutritional status assessments, which were observed nationally among 14% and 1% of sick children, respectively.

Figure 13 National average score, service scores, and highest- and lowest-scoring indicators, Nepal 2015

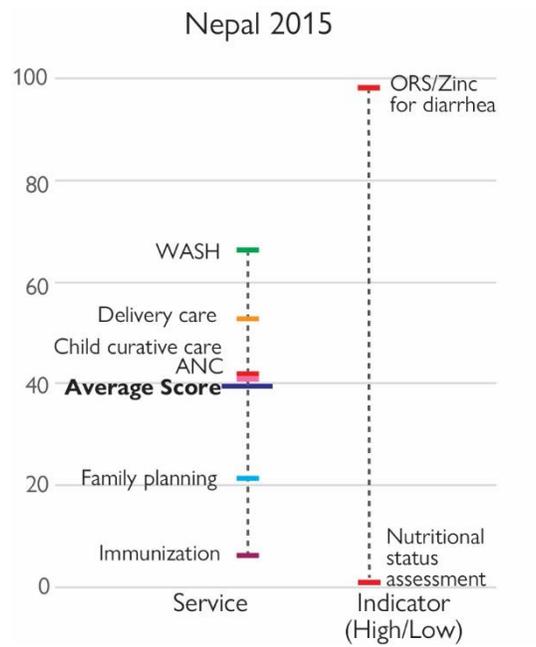


Table 7 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Nepal SPA 2015

Unit*	Service or indicator	Eastern	Central	Western	Mid-Western	Far-Western	National
Family planning							
F	Method availability	22.0	21.1	21.5	30.8	33.4	23.9
C	Counseling on side effects	16.7	16.1	17.8	29.8	30.4	19.0
Family planning average		19.4	18.6	19.7	30.3	31.9	21.5
Antenatal care							
C	Blood pressure measurement	80.2	77.1	85.4	91.0	87.7	81.1
C	Counseling on iron	26.2	22.6	34.7	37.0	23.9	26.9
C	Counseling on breastfeeding	21.3	8.4	12.0	31.2	34.0	15.9
Antenatal care average		42.6	36.0	44.0	53.1	48.5	41.3
Delivery care							
F	BEmOC signal functions performed	3.6	7.2	2.9	5.2	1.8	4.5
F	Essential drugs	62.2	57.8	82.2	66.0	85.3	69.1
F	Neonatal resuscitation	83.0	92.5	78.2	78.6	88.6	84.3
Delivery care average		49.6	52.5	54.4	49.9	58.6	52.6
Immunization							
F	Availability of viable vaccines and syringes	4.5	11.0	3.3	2.2	8.4	6.4
Child curative care							
F	Antibiotics for children	16.5	30.6	29.0	14.4	23.1	24.1
F	ORS/Zinc for diarrhea	95.7	96.4	99.3	97.2	99.8	97.3
F	Malaria diagnosis and treatment capacity	na	na	na	na	na	na
C	ARI assessment	53.0	52.4	56.6	57.1	65.5	55.1
C	Diarrhea assessment	22.4	32.7	47.8	24.5	29.0	30.0
C	Anemia assessment	11.9	13.4	20.0	15.2	15.4	14.4
C	Nutritional status assessment	0.8	0.7	1.8	2.6	2.9	1.3
Child curative care average		33.4	37.7	42.4	35.2	39.3	37.0
WASH							
F	Basic services for WASH	72.1	63.2	69.7	64.1	66.1	67.0
Total		36.9	36.5	38.9	39.1	42.1	37.6

Notes:

*Unit of analysis: F = facility; C = client.

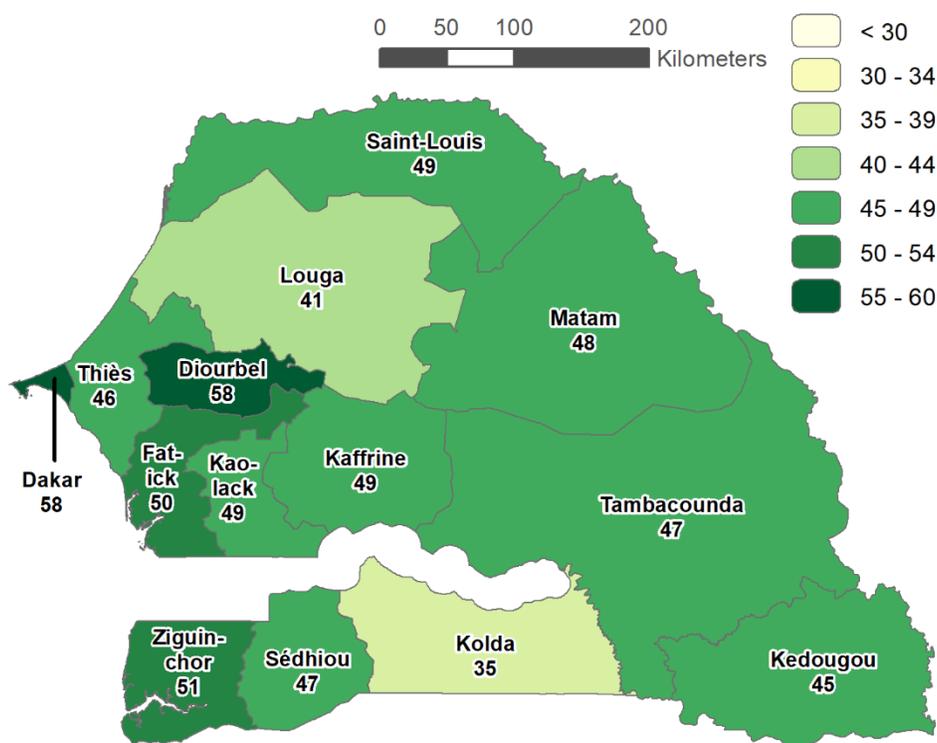
ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.6 Senegal

Senegal received an overall quality score of 48, with a range of 23 points among regions. The highest-scoring regions were Dakar and Diourbel, which both received a score of 58. As illustrated in Figure 14, the only other regions with composite scores of at least 50 were Fatick and Ziguinchor. Kolda, the lowest-scoring region, scored only 35. The remaining nine regions had scores between 40 and 50.

Figure 14 QOCI results in the regions of Senegal



Of all the services, only two had scores above 50 on the national level (Figure 15). Family planning scored 52 and basic WASH services scored 81. The latter was 57 points higher than Senegal's lowest-scoring service, immunization. As a whole, immunization scored 24, but results varied across Senegal's regions (Table 8). On the high end, 46% of facilities in Dakar had viable vaccines and syringes. On the other hand, only 9% of facilities in Thiès had them. Despite the high score for WASH at the national level, there was large regional variation within this service as well. Although 99% of facilities in Dakar had basic WASH services, about half of the facilities (51%) in Kedougou and Kolda had such services—a 48-point difference.

Individual indicators revealed additional variability across Senegal's regions. Neonatal resuscitation and the diarrhea assessment, in particular, varied greatly from region to region. In Kaffrine, 84% of facilities offered neonatal resuscitation—a service available in only a quarter of Kolda's facilities. The diarrhea assessment had even more variability. In Kaolack, 79% of children whose caretakers reported diarrhea were checked for dehydration. In Sédhiou and Ziguinchor, however, 5% and less than 1% of children with diarrhea, respectively, were checked for dehydration. Although it had less variability, the nutritional status assessment was one of the lowest-scoring indicators (8% nationally), followed by the anemia assessment

(18% nationally). Although 29% of sick children received a nutritional status assessment in Kedougou, fewer than 1% of sick children in Matam and Tambacounda received one.

Figure 15 National average score, service scores, and highest- and lowest-scoring indicators, Senegal 2016 and 2017

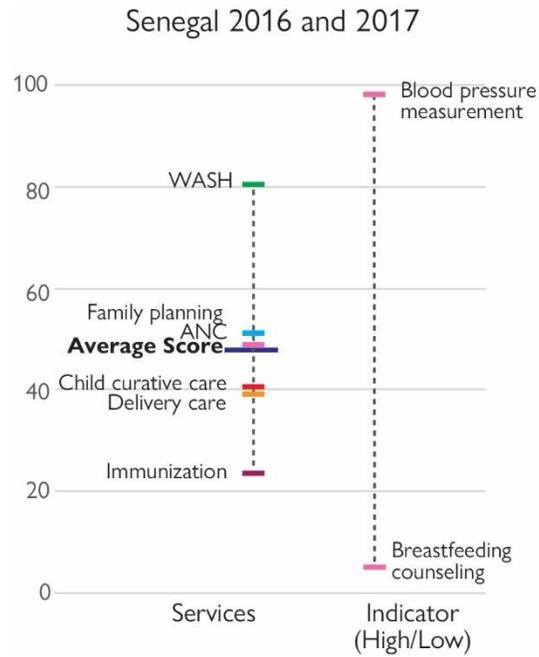


Table 8 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and averages of service provision among observed clients, Senegal SPA 2016 and 2017

Unit*	Service or indicator	Dakar	Diourbel	Fatick	Kaffrine	Kaolack	Kedougou	Kolda	Louga	Matam	Saint-Louis	Sédhiou	Tamba-counda	Thiès	Ziguinchor	National
Family planning																
F	Method availability	79.6	78.3	55.9	50.2	45.6	52.9	28.4	47.7	62.4	52.7	53.7	47.4	45.0	73.6	54.1
C	Counseling on side effects	33.4	78.7	52.2	48.9	65.1	86.4	54.2	24.1	38.1	48.9	47.5	61.5	54.7	44.5	50.3
	Family planning average	56.5	78.5	54.1	49.6	55.4	69.7	41.3	35.9	50.3	50.8	50.6	54.5	49.9	59.1	52.2
Antenatal care																
C	Blood pressure measurement	97.6	98.1	98.1	91.2	100.0	88.8	100.0	98.3	97.6	95.4	98.0	96.5	96.1	93.7	96.9
C	Counseling on iron	49.8	30.3	53.9	33.2	63.6	40.6	15.3	45.3	32.7	51.5	58.0	46.1	40.7	59.4	46.6
C	Counseling on breastfeeding	5.1	1.9	1.9	15.7	2.6	4.7	4.0	0.0	2.4	0.0	4.1	0.0	7.0	14.7	4.6
	Antenatal care average	50.8	43.4	51.3	46.7	55.4	44.7	39.8	47.9	44.2	49.0	53.4	47.5	47.9	55.9	49.4
Delivery care																
F	BEmOC signal functions performed	17.8	14.8	8.1	11.9	12.6	0.0	6.1	12.4	8.2	11.9	5.3	21.7	8.8	2.9	10.4
F	Essential drugs	57.4	56.2	63.5	51.1	42.7	31.2	28.5	33.1	17.7	35.9	59.7	34.7	41.5	63.6	44.0
F	Neonatal resuscitation	77.0	76.8	71.4	83.5	49.1	49.3	24.9	53.5	70.2	69.6	53.4	62.1	64.3	61.0	61.1
	Delivery care average	50.7	49.3	47.7	48.8	34.8	26.8	19.8	33.0	32.0	39.1	39.5	39.5	38.2	42.5	38.5
Immunization																
F	Availability of viable vaccines and syringes	46.4	37.0	21.1	30.1	34.3	27.0	18.8	13.5	32.7	27.2	21.2	22.3	8.7	18.8	24.0
Child curative care																
F	Antibiotics for children	66.3	53.0	45.1	40.0	24.0	29.9	21.6	35.3	47.0	54.1	34.4	55.1	41.3	52.5	43.1
F	ORS/Zinc for diarrhea	48.7	75.3	55.2	42.6	40.3	43.5	21.1	49.6	72.9	56.9	49.0	57.9	44.6	62.7	49.6
F	Malaria diagnosis and treatment capacity	61.5	55.2	54.9	45.3	28.0	43.9	20.7	51.4	66.7	56.2	49.4	47.9	46.2	64.6	48.4
C	ARI assessment	54.0	77.2	65.0	85.7	81.6	94.6	85.2	57.1	67.5	79.9	82.0	46.4	85.4	82.7	73.5
C	Diarrhea assessment	38.6	34.8	21.3	52.6	78.7	62.9	73.6	38.2	38.5	37.3	4.7	32.2	61.3	0.0	41.3
C	Anemia assessment	19.1	6.1	9.5	15.1	29.5	41.0	41.2	23.7	11.6	23.1	2.8	35.8	23.3	2.2	17.7
C	Nutritional status assessment	11.7	6.7	4.2	8.6	10.1	28.6	2.3	5.0	0.6	3.6	4.2	0.0	14.3	9.9	7.6
	Child curative care average	42.8	44.0	36.5	41.4	41.7	49.2	38.0	37.2	43.5	44.4	32.4	39.3	45.2	39.2	40.2
WASH																
F	Basic services for WASH	98.7	94.1	89.0	75.1	73.4	50.9	51.3	77.1	84.1	82.1	86.2	80.8	87.9	87.7	81.4
	Total	57.7	57.7	49.9	48.6	49.2	44.7	34.8	40.8	47.8	48.8	47.2	47.3	46.3	50.5	47.6

Notes:

*Unit of analysis: F = facility; C = client.

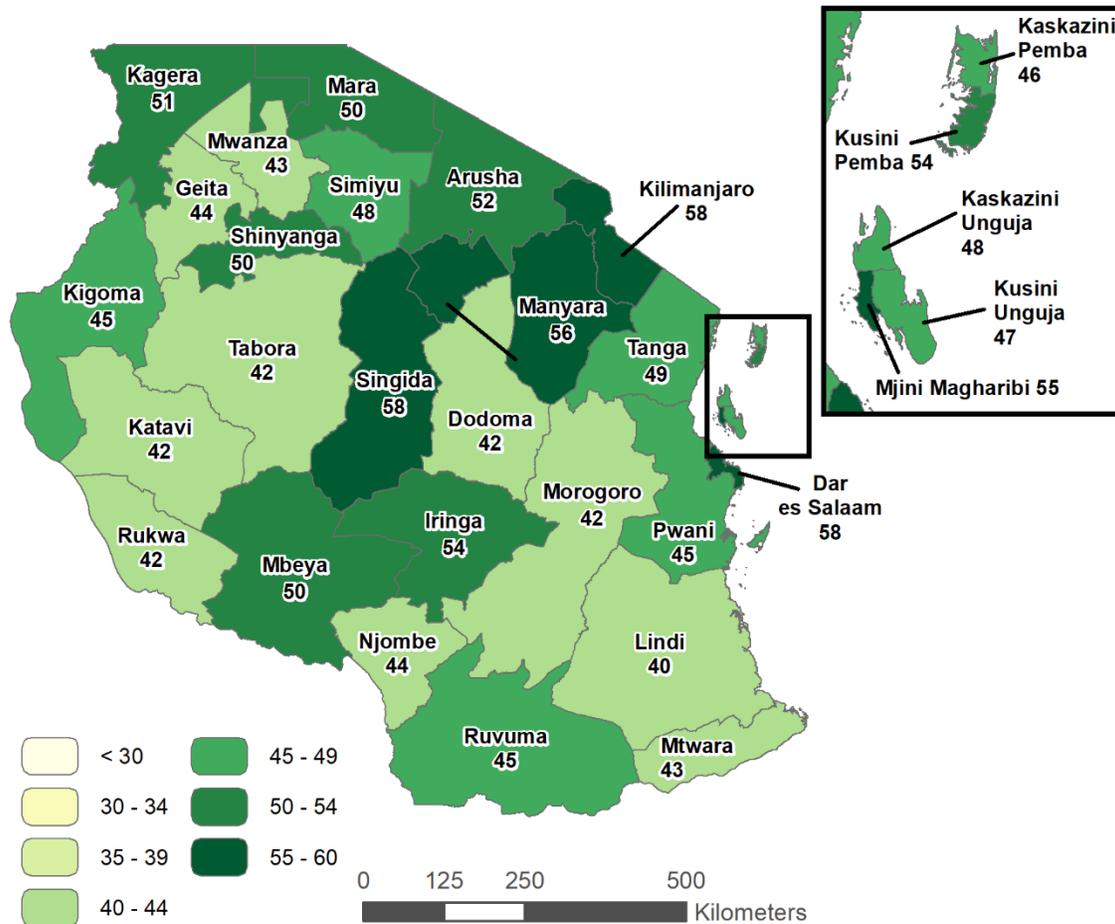
ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

4.7 Tanzania

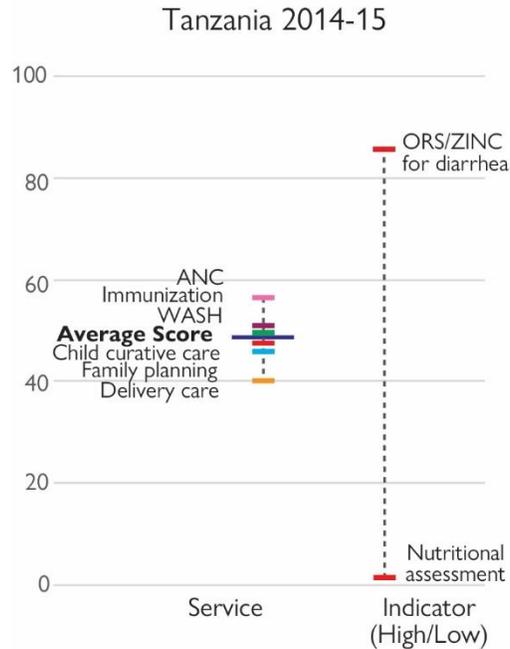
Altogether, Tanzania received a score of 48. Despite being the country in this study with the most administrative divisions, Figure 16 shows that Tanzania's regions did not have a large range of composite results. The quality scores for each region ranged by 18 points, from 40 in Lindi to 58 in the Kilimanjaro, Dar es Salaam, and Singida regions.

Figure 16 QOCI results in the regions of Tanzania



On the national level in Tanzania, all services received scores in either the 40s or 50s (Figure 17). Family planning, delivery care, child curative care, and basic WASH services all scored between 40 and 49. ANC and immunization scored 57 and 52, respectively. Table 9 shows the greatest variation in service scores was in the immunization and WASH services. In terms of immunization, 88% of facilities in Simiyu had viable vaccines and syringes, compared with 0% and 16% of facilities in Kusini Unguja and Kaskazini Unguja, respectively. In Kusini Unguja, 94% of facilities had basic WASH services. However, the estimates in the Unguja region of Zanzibar were based on fewer than 20 facilities. In Dar es Salaam, the second highest-scoring region for WASH, 80% of facilities had basic WASH resources available. In Njombe, for comparison, only 20% of facilities were equipped.

Figure 17 National average score, service scores, and highest- and lowest-scoring indicators, Tanzania 2014-15



Results for individual indicators varied substantially at the national and subnational levels. There was a range of 85 points between the highest- and lowest-scoring indicators nationally and a 70-point difference across regions for several indicators. At the national level, only 2% of children had a nutritional status assessment and 5% of facilities reported performing BEmOC signal functions, whereas 84% and 86% of facilities, respectively, had antibiotics and diarrhea treatment available. Across regions, counseling on iron, neonatal resuscitation, and malaria diagnosis and treatment all had more than 70 points of variation in their regional results. Approximately 6% of clients in Mjini Magharibi and 90% in Katavi were counseled on iron; equipment for neonatal resuscitation was present in 14% of facilities in Kaskazini Pemba and in all facilities (> 99%) in Lindi, Singida, and Tanga. Malaria diagnosis and treatment capacity was lowest in Kigoma (9%), in Mjini Magharibi (11%) and Kaskazini Pemba (14%) in the Zanzibar Archipelago, and in Arusha (9%). On the other hand, 81% of facilities were equipped for malaria diagnosis and treatment in Tanga. Although malaria is nearly nonexistent in Arusha and Zanzibar, Kigoma has much higher endemicity (PMI 2014).

Table 9 Summary indicators of quality of care: subnational and national percentages and averages of facility availability of services and service provision among observed clients, Tanzania SPA 2014-15

Unit* Service or indicator	Dares Salaam										Average					
	Dodoma	Arusha	Kilimanjaro	Tanga	Morogoro	Pwani	Salaam	Lindi	Mtwara	Ruvuma		Iringa	Mbeya	Singida	Tabora	Rukwa
Family planning																
F Method availability	21.2	30.1	29.9	43.7	13.9	53.3	71.4	27.5	21.6	38.0	48.2	43.8	49.1	61.9	42.8	55.5
C Counseling on side effects	51.3	75.8	54.3	37.6	34.8	40.5	42.8	32.3	27.2	54.1	63.7	66.5	78.3	46.5	55.6	41.5
Family planning average	36.3	53.0	42.1	40.7	24.4	46.9	57.1	29.9	24.4	46.1	56.0	55.2	63.7	54.2	49.2	48.5
Antenatal care																
C Blood pressure measurement	88.5	97.9	93.4	93.3	80.5	75.3	82.1	61.4	48.3	70.3	78.8	54.5	90.7	74.2	72.5	55.2
C Counseling on iron	84.1	65.0	63.0	42.3	63.3	18.3	29.4	54.4	80.0	76.7	76.4	64.3	81.0	55.7	37.6	59.4
C Counseling on breastfeeding	27.0	35.6	61.2	56.1	50.8	48.8	49.9	33.6	38.4	37.0	60.5	19.0	41.9	27.2	47.6	18.8
Antenatal care average	66.5	66.2	72.5	63.9	64.9	47.5	53.8	49.8	55.6	61.3	71.9	45.9	71.2	52.4	52.6	44.5
Delivery care																
F BEmOC signal functions performed	4.7	3.2	2.3	4.8	1.7	2.5	3.9	2.9	2.6	3.4	2.2	2.4	8.4	22.3	3.4	3.5
F Essential drugs	11.6	18.2	50.2	41.4	30.4	49.4	69.2	46.9	47.6	32.3	36.6	46.6	32.8	46.2	66.5	19.9
F Neonatal resuscitation	69.3	98.4	89.2	100.0	87.5	89.1	96.2	100.0	68.2	94.3	94.3	91.7	100.0	75.2	75.4	89.2
Delivery care average	28.5	39.9	47.2	48.7	39.9	47.0	66.4	49.9	39.5	43.3	44.4	46.9	47.1	47.9	48.4	37.5
Immunization																
F Availability of viable vaccines and syringes	34.9	73.1	73.2	35.2	36.8	56.6	53.2	35.8	59.6	39.0	51.5	65.4	61.9	16.8	40.9	49.8
Child curative care																
F Antibiotics for children	86.3	76.0	89.9	88.5	88.8	81.6	77.4	77.9	77.4	74.6	78.3	94.0	88.1	77.6	84.7	71.8
F ORS/Zinc for diarrhea	91.5	76.5	88.9	92.5	78.1	78.7	83.1	72.0	73.0	79.0	84.1	88.7	94.3	73.3	90.7	94.8
F Malaria diagnosis and treatment capacity	54.7	15.1	38.8	81.4	55.4	30.3	42.9	64.2	39.3	58.0	53.7	54.8	46.7	31.0	48.7	9.3
C ARI assessment	14.8	37.6	32.0	31.6	16.7	10.7	14.8	2.6	34.4	6.8	18.2	23.7	43.2	8.6	10.7	5.9
C Diarrhea assessment	28.0	52.0	65.9	53.0	28.5	26.4	24.7	20.8	32.8	79.7	65.7	50.1	64.9	29.3	28.2	45.8
C Anemia assessment	34.0	39.9	30.5	26.0	46.7	43.8	29.4	27.3	55.8	52.9	52.6	34.9	43.4	38.1	18.9	56.8
C Nutritional status assessment	0.0	6.8	4.5	1.8	3.1	3.3	0.6	0.0	0.0	0.5	0.7	0.3	4.1	2.6	4.6	0.0
Child curative care average	44.2	43.4	50.1	53.5	45.3	39.3	39.0	37.8	44.7	50.2	50.5	49.5	55.0	37.2	40.9	40.6
WASH																
F Basic services for WASH	43.6	37.3	63.4	53.7	47.1	36.0	80.4	40.1	40.5	35.1	56.0	39.8	49.9	46.2	23.9	50.9
Total	42.3	52.1	58.1	49.3	43.1	45.5	58.3	40.6	44.0	45.8	55.0	50.4	58.1	42.4	42.7	45.3

Notes:

*Unit of analysis: F = facility; C = client.

ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

Continues...

Table 9—Continued

Unit* Service or indicator	Kagera	Mwanza	Mara	Manyara	Njombe	Katavi	Simiyu	Geita	Kaskazini Unguja	Kusini Unguja	Mjini Magharibi	Kaskazini Pemba	Kusini Pemba	National
Family planning														
F Method availability	27.6	37.7	33.9	78.2	18.1	30.5	45.1	33.6	70.0	38.8	36.8	65.3	69.9	40.6
C Counseling on side effects	46.7	55.2	28.9	70.2	48.8	55.6	47.1	65.7	47.8	55.1	65.7	59.8	64.5	49.4
Family planning average	37.2	46.5	31.4	74.2	33.5	43.1	46.1	49.7	58.9	47.0	51.3	62.6	67.2	45.0
Antenatal care														
C Blood pressure measurement	74.5	65.4	61.7	74.7	68.3	55.9	58.4	62.7	93.2	100.0	85.9	79.6	61.2	72.4
C Counseling on iron	88.6	55.7	63.7	80.9	75.3	90.0	88.7	87.2	20.7	42.9	6.2	47.6	20.6	64.5
C Counseling on breastfeeding	36.7	41.1	27.4	44.0	73.2	35.8	9.7	16.4	34.5	56.4	36.2	28.1	64.6	34.6
Antenatal care average	66.6	54.1	50.9	66.5	72.3	60.6	52.3	55.4	49.5	66.4	42.8	51.8	48.8	57.2
Delivery care														
F BEmOC signal functions performed	1.6	3.9	1.3	15.2	3.4	5.4	1.8	5.7	0.0	0.0	50.0	0.0	10.7	5.3
F Essential drugs	11.3	30.6	40.1	23.4	34.8	41.3	26.4	15.7	53.8	60.9	####	89.8	46.4	36.7
F Neonatal resuscitation	34.0	55.7	34.7	97.1	93.8	15.9	31.2	71.3	64.5	45.7	75.0	13.6	71.4	77.3
Delivery care average	15.6	30.1	25.4	45.2	44.0	20.9	19.8	30.9	39.4	35.5	75.0	34.5	42.8	39.8
Immunization														
F Availability of viable vaccines and syringes	70.1	51.4	80.7	70.8	43.5	24.0	88.4	35.3	15.7	0.0	46.4	52.4	77.2	51.6
Child curative care														
F Antibiotics for children	80.8	93.6	100.0	91.6	81.3	96.3	76.6	92.0	77.8	81.6	82.2	69.9	77.4	83.7
F ORS/Zinc for diarrhea	99.1	87.3	98.5	90.9	99.2	96.3	90.2	93.6	66.7	68.4	59.8	83.9	100.0	86.3
F Malaria diagnosis and treatment capacity	64.3	28.4	39.4	37.9	68.0	70.5	51.3	36.0	74.4	52.4	11.4	14.0	36.9	45.8
C ARI assessment	29.5	16.2	18.0	54.1	33.2	5.3	30.2	7.6	33.2	46.4	19.9	11.9	20.7	22.5
C Diarrhea assessment	37.9	43.5	32.8	75.0	59.9	22.1	46.2	54.4	50.9	21.3	64.3	36.6	18.1	46.0
C Anemia assessment	43.8	48.2	46.9	39.4	29.2	33.2	61.1	56.9	25.2	20.0	24.4	12.9	10.1	41.7
C Nutritional status assessment	2.5	2.2	1.0	6.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	1.7
Child curative care average	51.1	45.6	48.1	56.5	53.0	46.2	50.8	48.7	46.9	41.4	37.4	32.7	37.6	46.8
WASH														
F Basic services for WASH	67.1	36.8	68.2	26.9	20.0	60.5	33.6	48.0	80.0	93.9	80.2	41.6	53.2	48.8
Total	51.3	44.1	50.8	56.7	44.4	42.5	48.5	44.7	48.4	47.4	55.5	45.9	54.5	48.2

Notes:

*Unit of analysis: F = facility, C = client.

ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Scale: 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

5 DISCUSSION

Using RMNCHN and WASH data from the SPA surveys, we constructed a composite QOCI using a mix of structural and process indicators. Overall, the proposed index is easy to interpret and can help countries assess performance on RMNCHN quality of care at the national and subnational levels to identify geographic inequalities as well as service areas in need of further investigation of supply chains or service delivery. This measure provides a glimpse into the readiness of facilities and provision of care for individuals using formal health services among a nationally representative sample or census of health facilities.

Like the CCI (Wehrmeister et al. 2016), the QOCI can be used to benchmark quality and examine changes over time. Using clearly defined indicators described in this report, countries are also encouraged to calculate their own scores with context-specific modifications. Although future endeavors could examine the scores by facility characteristics (e.g., facility type, managing authority), we recommend examining the index in aggregate only. In this report, we applied the index to existing data to illustrate its ability to demonstrate service gaps or regional disparities within countries. Although the index is not without limitations, this analysis represented a first step in identifying a core set of health system indicators that can be used to report and track country performance on RMNCHN quality of care.

5.1 Overview of Findings

Although quality could not be directly compared across countries given differences in indicators and timing of the surveys, we can draw some conclusions from this analysis. As expected, quality of care varied not only from country to country but, in some cases, from region to region within a country. Regional variation was most prominent in the DRC, with 48 points between the highest- and lowest-scoring regions. The three countries with the lowest variation among regions were those with the fewest regions: Bangladesh, Malawi, and Nepal. These three had fewer than eight points of variation across fewer than nine subnational divisions. This was in sharp contrast to the country with the most geographically varied results, the DRC, which also has the second-highest number of administrative level 1 units. As Malawi uses a census survey, further analysis could examine scores across districts rather than regions for a more granular understanding of within-country differences in quality of care.

The indices revealed not only national and regional differences but also differences in and among the services themselves. Such patterns emerged for the WASH and immunization services in particular. In Bangladesh, Haiti, Malawi, Nepal, and Senegal, WASH was the highest-scoring service (ranging from 66% to 81% of facilities with basic WASH services). On the other end of the quality index, the immunization service was the lowest-scoring of all services measured in Bangladesh, Malawi, and Nepal, and the second lowest-scoring domain in the DRC. Although immunization was the second highest-scoring service in Tanzania, the availability of immunizations at facilities ranged by 88 percentage points between its highest- and lowest-scoring regions.

Excluding the services composed of only one indicator (WASH and immunization), three additional indicators displayed patterns of note. Within ANC, the blood pressure indicator scored high across most countries. In five out of the six countries in which it was measured, more than 70% of clients had their

blood pressure measured. Across all countries in this study, the percentage of facilities with ORS or zinc in stock for diarrhea was also high; it was often the highest-scoring individual indicator within the child curative care service area or among all indicators. In five of this study’s seven countries, more than 80% of facilities provided ORS or zinc for diarrhea. In contrast, few clients had a full nutritional status assessment. Of the facilities in the DRC, Haiti, Malawi, Nepal, and Tanzania, 2% or fewer included a nutritional status assessment during child curative care.

5.2 Limitations of the Index and Broad Recommendations

Both the index and, more broadly, the SPA surveys have some important limitations in terms of measuring quality of care. These are summarized in Table 10.

Table 10 Limitations and broad recommendations to improve the index and SPA surveys

Limitations	Recommendations
<ul style="list-style-type: none"> The QOCI is not a comprehensive measure of quality across all RMNCHN and WASH services; however, it does highlight key indicators across the continuum of care. The index includes structural and process domains of quality of care but does not include client experience of care. Assessment of availability of medications is cross-sectional; medications may have varying degrees of stock outs. Client variables may be biased by sample design, limited sample size, and the Hawthorne effect. There is a gap in information about the role of community health workers. 	<ul style="list-style-type: none"> The selected indicators should be reviewed by a larger body of quality of care experts in tandem with SPA revisions. Future revisions to the SPA survey should align with recommendations such that the core set of RMNCHN and WASH indicators are accurately captured and information about user experience is more robustly collected. Client sample size should be carefully considered when conducting a SPA survey. A community health worker or community-based program module could be developed to better meet the information needs of countries.

First, broadly speaking, our index is not a comprehensive measure of quality. In fact, it is quite the opposite. Although the intent was to provide a simple summary of key indicators of quality of care within health areas, the index only scratches the surface of quality within and across these areas. Although the index includes indicators from each health area of RMNCHN and WASH, it does not include indicators reflecting service provision for labor and delivery, or structural or process information on adolescent health, HIV, sexually transmitted infections, tuberculosis, chronic diseases, and other conditions. Some health areas have only structural indicators, as observation of related services was not part of the SPA survey (e.g., labor and delivery); the lack of data prohibited inclusion of process indicators for those areas. Existing literature shows that structural indicators cannot be used as proxies for process indicators, as the two indicators are not consistently correlated (Leslie, Sun, and Kruk 2017). In addition, the indicators that we included in the index reflect the structural or process components but omit indicators from client experience, which others have cited in frameworks related to quality of care (Kruk et al. 2018; WHO 2016b). Selection of the RMNCHN indicators was restricted to those that met our selection criteria and were prioritized by content experts. Given that the purpose of the analysis was to create a summary index to complement the CCI and highlight key indicators in the SPA surveys, and that the index includes only 17 indicators, we have likely omitted some important indicators.

Further, within each health area, quality encompasses several domains within each structural and process component, as well as a multitude of indicators within each service. For example, the design of a summary index of quality of care for family planning conceptually drew from eight domains with 53 indicators (Mallick, Temsah, and Wang 2019)—only two of which are included in our index. Even the Jain et al. (2019) shortened, validated, family planning process quality of care index comprised 10 items. As the

structural domains include equipment, medication, infrastructure, and staffing and the process domains include appropriate assessment, accurate diagnosis, treatment, counseling, and respectful care, our index cannot fully capture quality with only 17 indicators across six health areas. However, many indicators, such as malaria diagnostic and treatment capacity, are themselves composite indicators comprising several indicators on their own. Although the composite indicators conceal issues with their individual pieces, they can point to the cascade of care needed to provide adequate care and uncover areas where stakeholders can delve further.

There are some limitations regarding the SPA instruments. First, for medication availability, it is important to note that the SPA survey is a cross-sectional tool. Commodities may have temporary stockouts or chronic shortages, indicating true supply-chain issues. However, SPA surveys do not distinguish between these issues. Logistics management information systems can help inform understanding about commodity availability. Further, visits are observed during interviews, and providers may conduct their observed visits differently than their unobserved visits—a phenomenon known as the Hawthorne effect (Leonard and Masatu 2006). Although observers use a checklist to indicate whether care, counseling, and assessments are given, they do not verify whether practices are appropriate or whether assessments are accurate and complete (Taylor, Ahmed, and Wang 2019). Exit interview responses are subject to courtesy bias—the client’s desire to represent the provider and their interactions favorably (Hameed et al. 2017). Exit interviews also pose a question-order bias in which caregivers’ experience with the provider may bias their answers. For example, a caregiver may not cite a child’s symptom if it was never addressed by the provider (Taylor, Ahmed, and Wang 2019).

In addition, client-based samples may be biased by the types of facilities from which they are drawn (e.g., facilities that have higher client volume and provide the service more frequently). Although interviewer teams and team leaders attempt to arrange visits around the facilities’ schedules, clients are not always observed at all facilities providing services. That is, facilities that provide care less frequently (e.g., on select days of the week or month) but do not provide care on the day(s) of the interview (or on a subsequent follow-up visit) are not represented in the client variables. Because these facilities are typically lower-level, smaller facilities (e.g., clinics or dispensaries), the sample of clients may not reflect the quality of care they provide. Applying sample weights would reduce the influence of clients at higher-level facilities (e.g., hospitals), thus restoring representativeness. However, clients attending higher-level facilities may be different in that they may be seeking care for more severe conditions. Accordingly, previous analyses have excluded clients seeking care at hospitals (Taylor et al. 2019). Further, it can be difficult to obtain a reliable sample of clients for some indicators. In some facilities, very few clients are observed, particularly if the service is not highly utilized, such as family planning in the DRC. In several provinces in the DRC in our study, there were very few family planning clients observed in total, so the indicator was omitted from the index entirely. For this same reason, SPA surveys do not typically observe labor and delivery services, as they may be unpredictable, making it difficult to obtain an adequate sample.

Recommendations

This index, specifically the indicators within it, could be strengthened by undergoing a thorough review by a larger body of quality of care experts, complemented by a more robust literature review. Harmonization with other complementary tools would also help ensure that measurement of quality of care is as universal and optimal as possible. The index could also be improved with a better balance of the components of

care—structure, process, and outcomes—although outcomes may be limited given the cross-sectional nature of studies. Although the index includes nine indicators reflecting the structural component and eight indicators reflecting process, some health areas are based only on process indicators (e.g., ANC) or only on structural indicators (e.g., delivery care). The omission of user experience from our index is a serious limitation, but since SPA surveys collect some information on this area, it is possible to include indicators from this domain in subsequent iterations of the index. Future revisions of the SPA survey could also include more and better questions that capture user experience by drawing from international guidelines and standards reviewed in this report. Developing a module to collect more information about the responsibility of community health workers or community-based programs that are managed through interviewed facilities could also be considered.

For user experience, observations, and client exit interviews, larger sample sizes would provide more reliable information; however, increasing sample sizes raises the cost and thus decreases the acceptability of the survey. In the interim, sampling statisticians should develop concrete cutoffs to reliably capture and describe indicators. In the DHS household surveys, a cutoff of 25 cases is imposed, and indicators based on a denominator of less than 25 are suppressed. There is no parallel for SPA surveys; however, we recommended exploring this as a guide for future SPA surveys.

5.3 Limitations of the Indicators and Related Recommendations

This section details the limitations of specific indicators in capturing their related aspects of quality of care. Table 11 summarizes the limitations and recommendations, with a detailed discussion to follow.

Table 11 Summary of limitations and recommendations

Limitations	Recommendations
Family planning	
<ul style="list-style-type: none"> ➤ During observation, counseling is only recorded for clients who leave with a method (or prescription) and is specific to that method. ➤ The sample size was small in some countries, and too small for evaluating new contraceptive users. 	<ul style="list-style-type: none"> △ Revise the observation protocol to capture validated measures. △ Observation should include recording counseling regardless of whether a method is prescribed. △ Increase the sample size when possible.
Antenatal care	
<ul style="list-style-type: none"> ➤ All indicators are client-based. ➤ Breastfeeding counseling is based on client exit interviews to capture group counseling, but this may be biased. 	<ul style="list-style-type: none"> ◆ For key indicators and QOCI revisions, consider including a structural component. △ Content of group counseling could be captured in the SPA survey; observation and exit interview questions should be aligned to better capture counseling.
Delivery care	
<ul style="list-style-type: none"> ➤ Observation of deliveries is not feasible in SPA surveys. ➤ Facility inventories have insufficient information about small and sick newborns. 	<ul style="list-style-type: none"> △ For future SPA surveys, consider record reviews or postpartum exit interviews. △ Include more information about interventions for small and sick newborns.
Immunization	
<ul style="list-style-type: none"> ➤ This indicator includes only four basic vaccines. 	<ul style="list-style-type: none"> ◆ This indicator could include country-specific vaccines in future iterations of the QOCI or for country dissemination purposes.

Continues...

Table 11—Continued

Limitations	Recommendations
Child curative care	
<ul style="list-style-type: none"> ➤ The malaria indicator does not include provider training on administration of RDT or microscopy. ➤ Little information is collected on what assessments or symptoms lead to diagnoses; testing for malaria is captured only among those with a diagnosis. ➤ Observation does not capture height or mid-upper arm circumference, so nutritional assessment may be incomplete. 	<ul style="list-style-type: none"> △ The provider training questions could be expanded to include supervisory training. △ Refine the observation protocol to better define the denominator (i.e., children with suspected illness) so that the SPA survey can assess appropriate diagnosis and treatment of sick children. △ The observation protocol could include recording height or mid-upper arm circumference. △ Consider developing a module for growth monitoring and immunizations during well-child visits. ◆ Modify ORS/zinc to include both elements (not one or the other).
Water, sanitation, and hygiene	
<ul style="list-style-type: none"> ➤ The items used in the WASH composite indicator are outdated and may not capture the ability to meet the WASH needs of a facility. 	<ul style="list-style-type: none"> △ Revise the inventory to align with current recommendations to measure universal standards for WASH.
Notes:	
<ul style="list-style-type: none"> △ Indicates recommendations that require a change to the data collection. ◆ Indicates recommendations that focus on a change to indicator inclusion and calculation. 	

For many indicators, the captured information only approximates the sought-after information. The following sections explain these indicators in detail and provide concrete recommendations for revising SPA surveys to better capture information.

5.3.1 Family planning

Counseling about family planning may not be well captured using the current observation protocol. Provider interactions related to specific methods are captured only among clients who leave with a method or a prescription. As method choice and information exchange are critical to the framework of quality of care for family planning, it is imperative to understand whether a client receives counseling related to a wider range of methods. For instance, if a returning client discusses a different method but ultimately decides to continue with the previous method, those discussions aren't recorded. Further, if a client does not leave with a method despite attending a family planning service, the current structure of the protocol does not allow the researcher to understand the nature of the client-provider interactions because the counseling would not have been recorded. In addition, counseling may not be expected if returning users attend the service only for a refill. However, as it stands, the sample size in some countries is not large enough to study only new users. Also, although SPA surveys capture private facilities, which is an advantage over routine health management information systems (Mallick et al. 2020), family planning users (especially users of short-term methods) may obtain their methods from pharmacies; accordingly, this sample of clients is not representative of all family planning users. Finally, the indicators used in this study were only a proxy for the primary factor of the validated index developed by Jain et al. (2019); elements of that factor are omitted from this index because of lack of data.

Recommendations

We have several concrete suggestions based on these limitations. Additional questions could be added to assess frequency or duration of contraceptive stockouts. Counseling should be recorded for all clients and all methods, regardless of whether the client leaves with a particular method. The protocol can be improved by aligning with the validated measured described by Jain et al. (2019). Within budget constraints, a larger sample of clients is often warranted to better study critical clients.

5.3.2 Antenatal care

For ANC, all indicators were client-based, describing the process of care. The counseling indicator for iron supplementation reflects counseling that was received during the consultation with the provider and was limited to women attending their first ANC visit. Although iron counseling can occur during group sessions, the 2016 WHO ANC guidelines recommend that the first visit be an individual consultation (WHO 2016c). Therefore, we expect minimal impact of group iron counseling on our indicator. Although the interviewer notes whether group counseling is provided, the content of group counseling is not recorded.

In contrast, the breastfeeding counseling indicator reflects the clients' self-report of receipt of counseling regardless of timing of visit. This means that breastfeeding counseling could have occurred during the consultation or prior to the consultation, during group health education sessions. In addition, the exit interviewer queries about counseling on exclusive breastfeeding, while the observation captures counseling related to early, prolonged, and exclusive breastfeeding. These two instruments should also align to better understand true counseling and successful knowledge transfer. It is possible that our indicator is biased since it is based solely on client self-report with no corresponding observations of either group or individual consultations (Assaf, Wang, and Mallick 2016; Bessinger and Bertrand 2001; Hameed et al. 2017).

Recommendations

Considering the 2016 ANC WHO guidelines, the ANC indicators could be strengthened by first collecting information on the content covered during group education sessions, as implementation of the guidelines may vary in different countries and types of facilities. Second, in addition to observing individual consultations, which provide useful information around meeting standards of care, it is important to incorporate observations of group education sessions, especially around counseling. This could be captured in the facility inventory as well as client exit interview, with additional detail about the content of group counseling. Further, the client exit interview questions could be aligned with the observation protocol to better understand effective counseling (such as successfully conveying information to clients as tested through the exit interview) and to better capture client biases.

5.3.3 Delivery care

Observing labor and delivery has many challenges. First, labor and delivery services are unpredictable. The volume of clients is much smaller than for other services; thus, it is difficult to acquire an adequate sample size for observations, especially in lower-level facilities. In addition, the extremely detailed observation protocol coupled with the time needed to fully observe this service can be prohibitive at scale. As a result of having no observation of delivery, the composite indicator reflecting whether the facility reports having performed six signal functions of BEmOC in the past three months is used as a proxy process indicator. However, in our report we defined it as a structural indicator, as it is based only on facility report.

This BEmOC signal function indicator is additionally limited by the nature of the report of the interviewee. A previous examination of SPA data found that facilities report services that are not actually observed in practice (Mallick, Benedict, and Wang 2020). In the case of signal functions, performance of some procedures (e.g., parenteral administration of anticonvulsants for hypertensive disorders of pregnancy) also depends on having emergency cases requiring each signal function, although facility inventories do not

explicitly inquire about this. Facilities may also report the procedure even if it was performed more than three months ago.

In addition, the SPA instrument does not robustly assess care for small and sick newborns who require interventions to survive, such as support for thermoregulation, breathing, infections, or other life-threatening conditions (Moxon et al. 2018). Prematurity, infections, and complications at birth cause the majority of neonatal deaths (Hug et al. 2019); 80% of neonatal mortality is attributable to small size at birth (Lawn et al. 2014). Thus, monitoring health care for small and sick newborns is vital for identifying areas that can improve mortality outcomes.

Recommendations

As approximately half of all maternal deaths happen around the time of labor and delivery, observation of these services could provide important information about the health system at a critical juncture along the continuum of care. Although some countries have included a module for observing labor and delivery in their SPA survey—namely, Malawi (MoH Malawi and ICF International 2014) and Kenya (NCAPD/Kenya et al. 2011), this is not standard. Future SPA survey revisions could, however, include a short module such as the validated short assessment of the quality of the process of intrapartum and immediate postpartum care, developed by Tripathi and colleagues (Tripathi et al. 2019), with the option of a full module (Tripathi et al. 2015). This short assessment includes newborn care; however, more is needed to assess care for small and sick newborns, as proposed by Moxon et al. (2018). For example, SPA surveys could assess whether KMC is delivered on site or if mothers and babies are referred to a specialty facility; if delivery and postpartum care are observed, the surveys could also assess whether there is adherence to KMC guidelines. Several other recommendations are detailed by Moxon et al. (2018), for example harmonizing with other tools, querying facilities about complex interventions for small and sick newborns, and including more detailed questions about specialist health workers. Finally, in lieu of the gold standard of observation, which is ideal but cost-prohibitive, SPA revisions could consider adapting postpartum interviews of providers and clients, for example as was included in the Nepal 2015 SPA survey. Although this would be subject to recall bias (Molina et al. 2019), it could alleviate the burden on the interviewer (and the cost). Similarly, reviews of delivery records could be adapted as part of SPA surveys (Leslie and Gage, 2020).

5.3.4 Immunization

One limitation that is easily resolvable is that the immunization indicator we used included only basic vaccinations against polio, measles, tuberculosis, diphtheria, pertussis, and tetanus. Country-specific analysis should be encouraged to include all recommended vaccinations administered within the country. For this analysis, however, we limited the indicator to basic vaccines with well-established recommendations and administration. This exercise identified no recommendations for improving data collection around immunization.

5.3.5 Child curative care

The health indicator that reflects readiness to treat and diagnose malaria does not include whether facilities have trained providers who can administer RDT or an appropriate microscopy test. This element is traditionally incorporated into indicator definitions that reflect facility capacity to diagnose and treat malaria. However, it was omitted from our index because the provider training information collected is

limited to in-service training (Taylor et al. 2018); it does not include whether a provider received training from a supervisor, which can be a valid method of training. In fact, the U.S. President’s Malaria Initiative conducts a small proportion of its training in classroom settings, while most training occurs on the job or through supervision (USAID and CDC 2019). Thus, inclusion of this limited indicator could have inaccurately punished facilities where training may not have been technically considered in-service. Regardless, omitting provider training means that this indicator cannot be directly compared to the global definition of malaria diagnostic capacity. It also means that the indicator used in this report may overestimate true diagnostic capacity, considering that facilities may have diagnostic equipment without trained providers to administer them. Similarly, omitting provider training in other service areas may also overestimate a facility’s true capacity to administer high-quality care, diagnostic tools, or treatment. Additionally, the “Test, Treat, and Track” initiative is aimed at training providers to treat after accurate testing, in hopes of eliminating presumptive treatment of malaria (WHO 2012).

Observation data from child curative care visits may represent a limited view of what occurs during the visit. Some important elements may be missed during observation, such as children’s temperatures being taken during triage or intake, or in a waiting room before the observation begins. In addition, accounting for the true denominator for indicators to reflect appropriate diagnoses is difficult. To assess diarrhea appropriately, all children presenting with diarrhea must be checked for dehydration. This symptom, like difficulty breathing for ARI assessments, must be mentioned during the visit by the caretaker or the provider *and* in the exit interview. It is difficult to know if this denominator excludes children who should be assessed for one of these diagnoses; this calculation can be assumed to be only a proxy for suspected cases. Finally, during the visit, some treatment and diagnostic questions are asked of the provider only if a diagnosis is made. For example, our study did not include an indicator reflecting appropriate malaria diagnosis. Information on the use of lab tests (RDT and microscopy) is only collected if there is a malaria diagnosis; these data are not collected for those who do not receive a diagnosis (Leslie and Gage 2020; Taylor, Ahmed, and Wang 2019). In fact, although data are collected on assessments, little information is collected on what assessments or symptoms led to the diagnosis.

There are also some caveats for the nutritional status assessment indicator in the context of child curative care. In facilities, acute malnutrition in children can be assessed by weight-for-height or mid-upper arm circumference and bilateral pitting edema (WHO 2019b). Although SPA surveys capture structural indicators such as availability of weighing scales, height boards, and mid-upper arm circumference tape, the nutritional status assessment process indicator includes only measurements of weight, plotting of growth charts, and discussions of growth with the caregiver. This indicator does not include assessment of edema, which can be considered in future iterations of the index. Further, SPA surveys do not capture process information on measurements of height or mid-upper arm circumference. The SPA observation also does not indicate whether the provider plots weight for height or for age; plotting weight for height is important for determining whether the child is experiencing acute malnutrition (wasting), whereas plotting weight for age is not recommended. Thus, the information currently collected does not allow for determination of whether the provider adhered to the WHO standards for nutritional assessment (WHO 2018).

Recommendations

We suggest several areas for SPA revisions to better capture data on key indicators. First, relevant to provider training, the health worker questionnaire can be adapted to include supervisory training as a form

of training. Next, in line with an in-depth review of the SPA protocol conducted by Leslie and Gage (2020), we suggest refining data collection to capture appropriate assessment and treatment, which would facilitate research to look beyond basic care and explore further components of quality such as provider capacity to treat and diagnose. Refining these data could involve observers recording the results of certain assessments, such as temperature or number of respirations (Leslie and Gage 2020). To better understand appropriate malaria treatment for children, the protocol should be expanded to record RDT for all children presenting with appropriate symptoms, not just those who receive a malaria diagnosis (Leslie and Gage 2020; Taylor, Ahmed, and Wang 2019). In addition, to align with the WHO standards on quality of care for children in facilities, the nutritional status assessment indicator could be strengthened by revising SPA surveys and incorporating the measurement of height and mid-upper arm circumference as well as plotting weight for height. Although the nutrition status indicator is collected in the context of child curative care, routine growth monitoring is also a core nutrition intervention provided in health facilities. We recommend that SPA surveys also potentially include a module to assess routine growth monitoring and other services such as immunizations during well-child visits. SPA inventories could also collect more detailed information about community-based nutrition programs, as there is a gap in data on these programs in the health system (Mallick et al. 2020).

5.3.6 Water, sanitation, and hygiene

We used one indicator to summarize a facility’s improved WASH amenities. This indicator is indicative of the minimum necessities for hygiene, but it is only a crude indicator of the hygiene clients experience during care visits, procedures, and treatment. Although WASH amenities may be available in general facilities, SPA data do not capture whether these facilities are accessible or clean. The indicator also does not capture hand hygiene within close proximity to toilets, and the indicator for improved toilet does not provide sufficient information to measure WHO Standard 8.1, input measure 6 (WHO 2016b), or the Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene indicator 2.1.2, which seeks to capture the *proportion of health care facilities with improved and usable sanitation facilities, with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for users with limited mobility* (WHO and UNICEF 2018). In addition, an improved water source includes any source that is onsite or within 500 meters—a distance that may impede its accessibility and belie the appearance of available amenities. Previous reporting by the Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene has noted that improved water that is not on the premises but is within 500 meters is considered “limited availability”; higher tiers of availability require that an improved water source be located on the facility premises (WHO and UNICEF 2018).

Using an indicator that measures the presence of running water and hand soap or alcohol-based hand rubs in client examination rooms may more accurately reflect facility hygiene. WASH resources are especially critical for services such as delivery or surgery. However, examining this would limit the sample (denominator) for this indicator to only those facilities that provide that specific service; the indicator is calculated based on availability of WASH resources in general, or in outpatient areas. The existing observation protocol for ANC, family planning, or curative care for children could be expanded to include WASH-related provider behaviors. We encourage continued investigation on this WASH topic, specifically when examining facilities providing this care.

Recommendations

SPA inventories, when updated, should align with current recommendations to measure universal standards. Inventories should also capture a more precise proximity to improved water source, as a binary measure of a water source within 500 meters does not provide sufficient information on whether this source meets the needs of the facility. Current observation protocols can also be adapted to include whether providers adhere to guidelines for hygiene and sanitation, such as handwashing.

5.4 Conclusion and Next Steps

The index proposed in this report was developed to serve as a quality of care complement to the CCI, which summarizes coverage of eight RMNCH interventions. This proposed QOCI reflects critical components of quality similarly across the RMNCH continuum, with additional indicators representing readiness or delivery of care for nutrition, malaria, and WASH-related services. The QOCI averages 17 indicators across six health service areas using a weighted additive approach. Using data from seven countries with recent SPA surveys, we illustrated the utility of the index in identifying subnational areas, health service areas, and specific aspects of health services that need improvement. In many ways, quality of care data may be inaccessible or difficult to comprehend, especially given the vast number of indicators we identified in our study. Our hope is that our index and short list of indicators may facilitate the communication of quality of care needs to a broader audience of stakeholders to garner support for the most impactful life-saving interventions.

The development of such an index is the first step in a series of endeavors that will include revising both the index and the SPA questionnaires. The proposed indicators, although already reviewed by a small set of content experts, should undergo additional scrutiny to ensure that they hold the highest construct validity (i.e., accurately capture what they are intended to capture). Efforts to refine these indicators should focus on building consensus so that the indicators ultimately chosen for the QOCI are not only valid but also best placed to capture quality most broadly, to the extent possible given the task of developing a concise and easily understandable index.

It is clear from this exercise that despite the strengths of SPA surveys in collecting an enormous amount of information and uniquely capturing observation of visits in some health areas, more information or revisions are needed in several areas. Notwithstanding our recommendations for improvements to the SPA and the QOCI, this index presents a new opportunity to more broadly monitor progress toward global goals for universal coverage of high-quality health care.

REFERENCES

- Akachi, Y., and M. E. Kruk. 2017. "Quality of Care: Measuring a Neglected Driver of Improved Health." *Bulletin of the World Health Organization* 95(6):465-472. <https://doi.org/10.2471/blt.16.180190>.
- Amouzou, A., H. H. Leslie, M. Ram, M. Fox, S. S. Jiwani, J. Requejo, T. Marchant, M. K. Munos, L. M. Vaz, and W. Weiss. 2019. "Advances in the Measurement of Coverage for RMNCH and Nutrition: From Contact to Effective Coverage." *BMJ Global Health* 4(Suppl 4):e001297. <https://doi.org/10.1136/bmjgh-2018-001297>.
- Assaf, S., W. Wang, and L. Mallick. 2015. *Quality of Care in Family Planning Services at Health Facilities in Senegal*. DHS Analytical Studies No. 55. Rockville, Maryland, USA: ICF International. <http://dhsprogram.com/pubs/pdf/AS55/AS55.pdf>.
- Assaf, S., W. Wang, and L. Mallick. 2016. *Provider Counseling and Knowledge Transfer in Health Facilities of Haiti, Malawi, and Senegal*. DHS Analytical Studies No. 60. Rockville, Maryland, USA: ICF International. <http://dhsprogram.com/pubs/pdf/AS60/AS60.pdf>.
- Bedoya, G., A. Dolinger, K. Rogo, N. Mwaura, F. Wafula, J. Coarasa, A. Goicoechea, and J. Das. 2017. "Observations of Infection Prevention and Control Practices in Primary Health Care, Kenya." *Bulletin of the World Health Organization* 95(7):503. <https://doi.org/10.2471/blt.16.179499>.
- Bellows, B., R. Behl, T. Abuya, A. Muriuki, A. Bajracharya, and Y. Choi. 2016. "Benchmarking to Assess Quality of Family Planning Services: Construction and Use of Indices for Family Planning Readiness in Kenya with Data from 2010 and 2014." In *Quality Measurement in Family Planning: Past, Present, Future: Papers from the Bellagio Meeting on Family Planning Quality, October 2015*, edited by Sprockett A Leisher SH, Longfield K, and Montagu D. Oakland, C.A.: Metrics for Measurement.
- Bessinger, R. E., and J. T. Bertrand. 2001. "Monitoring Quality of Care in Family Planning Programs: A Comparison of Observations and Client Exit Interviews." *International Family Planning Perspectives* 27(2):63-70. <https://doi.org/10.2307/2673816>.
- Black, R. E., C. Levin, N. Walker, D. Chou, L. Liu, M. Temmerman, and D. R. A. Group. 2016. "Reproductive, Maternal, Newborn, and Child Health: Key Messages from Disease Control Priorities 3rd Edition." *The Lancet* 388(10061):2811-2824. [https://doi.org/10.1016/s0140-6736\(16\)00738-8](https://doi.org/10.1016/s0140-6736(16)00738-8).
- Black, R. E., C. G. Victora, S. P. Walker, Z. A. Bhutta, P. Christian, M. de Onis, M. Ezzati, S. Grantham-McGregor, J. Katz, R. Martorell, and R. Uauy. 2013. "Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries." *The Lancet* 382(9890):427-451. [https://doi.org/10.1016/s0140-6736\(13\)60937-x](https://doi.org/10.1016/s0140-6736(13)60937-x).
- Bouزيد, M., O. Cumming, and P. R. Hunter. 2018. "What Is the Impact of Water Sanitation and Hygiene in Healthcare Facilities on Care Seeking Behaviour and Patient Satisfaction? A Systematic Review of the Evidence from Low-Income and Middle-Income Countries." *BMJ Global Health* 3(3). <https://doi.org/10.1136/bmjgh-2017-000648>.

- Bradley, S. E. K., H. M. Schwandt, and S. Khan. 2009. *Levels, Trends, and Reasons for Contraceptive Discontinuation*. DHS Analytical Studies No. 20. Calverton, Maryland, USA: ICF Macro. <http://dhsprogram.com/pubs/pdf/AS20/AS20.pdf>.
- Brizuela, V., H. H. Leslie, J. Sharma, A. Langer, and Ö. Tunçalp. 2019. “Measuring Quality of Care for All Women and Newborns: How Do We Know If We Are Doing It Right? A Review of Facility Assessment Tools.” *The Lancet Global Health* 7(5):e624-e632. [https://doi.org/10.1016/S2214-109X\(19\)30033-6](https://doi.org/10.1016/S2214-109X(19)30033-6).
- Bruce, J. 1990. “Fundamental Elements of the Quality of Care: A Simple Framework.” *Studies in Family Planning* 21(2):61-91. <https://doi.org/10.2307/1966669>.
- Candrinho, B., M. M. Plucinski, J. M. Colborn, M. da Silva, G. Mathe, M. Dimene, A. R. Chico, A. C. Castel-Branco, F. Brito, and M. Andela. 2019. “Quality of Malaria Services Offered in Public Health Facilities in Three Provinces of Mozambique: A Cross-Sectional Study.” *Malaria Journal* 18(1):162. <https://doi.org/10.1186/s12936-019-2796-9>.
- Chavane, L., M. Dgedge, P. Bailey, O. Loquiha, M. Aerts, and M. Temmerman. 2017. “Assessing Women's Satisfaction with Family Planning Services in Mozambique.” *Journal of Family Planning and Reproductive Health Care* 43(3):222. <https://doi.org/10.1136/jfprhc-2015-101190>.
- Choi, Y. 2018. “Estimates of Side Effects Counseling in Family Planning Using Three Data Sources: Implications for Monitoring and Survey Design.” *Studies in Family Planning* 49(1):23-39. <https://doi.org/10.1111/sifp.12044>.
- Davlanges, E., A. Camara, T. Guilavogui, A. Fofana, M. Balde, T. Diallo, I. Bah, L. Florey, A. Sarr, and J. Butts. 2019. “Quality of Malaria Case Management and Reporting at Public Health Facilities in Six Health Districts in Guinea, 2018.” *The American Journal of Tropical Medicine and Hygiene* 101(1):148-156. <https://doi.org/10.4269/ajtmh.19-0150>.
- Do, M. P., and M. A. Koenig. 2007. “Effect of Family Planning Services on Modern Contraceptive Method Continuation in Vietnam.” *Journal of Biosocial Science* 39(2):201-220. <https://doi.org/10.1017/s0021932006001453>.
- Donabedian, A. 1988. “The Quality of Care: How Can It Be Assessed?” *JAMA* 260(12):1743-1748. <https://doi.org/10.1001/jama.1988.03410120089033>.
- Fink, G., V. D'Acremont, H. H. Leslie, and J. Cohen. 2020. “Antibiotic Exposure among Children Younger Than 5 Years in Low-Income and Middle-Income Countries: A Cross-Sectional Study of Nationally Representative Facility-Based and Household-Based Surveys.” *The Lancet Infectious Diseases* 20(2):179-187. [https://doi.org/10.1016/s1473-3099\(19\)30572-9](https://doi.org/10.1016/s1473-3099(19)30572-9).
- Gabrysch, S., G. Civitelli, K. M. Edmond, M. Mathai, M. Ali, Z. A. Bhutta, and O. M. Campbell. 2012. “New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care.” *PLoS Med* 9(11):e1001340. <https://doi.org/10.1371/journal.pmed.1001340>.

- Gage, A. D., H. H. Leslie, A. Bitton, J. G. Jerome, J. P. Joseph, R. Thermidor, and M. E. Kruk. 2018. "Does Quality Influence Utilization of Primary Health Care? Evidence from Haiti." *Globalization and Health* 14(1):1-9. <https://doi.org/10.1186/s12992-018-0379-0>.
- Galle, A., H. Vermandere, S. Griffin, M. de Melo, L. Machaieie, D. Van Braeckel, and O. Degomme. 2018. "Quality of Care in Family Planning Services in Rural Mozambique with a Focus on Long Acting Reversible Contraceptives: A Cross-Sectional Survey." *BMC Women's Health* 18(1):201. <https://doi.org/10.1186/s12905-018-0692-z>.
- Gargamo, D. B., A. Fantahun, and T. L. Abiso. 2019. "Assessment of Quality of Pediatric Emergency Triage and Its Associated Factors in Wolaita Zone, Ethiopia." *Science* 7(4):123-133. <https://doi.org/10.11648/j.sjph.20190704.13>.
- Ginsburg, A. S., and K. P. Klugman. 2017. "Vaccination to Reduce Antimicrobial Resistance." *The Lancet Global Health* 5(12):e1176-e1177. [https://doi.org/10.1016/s2214-109x\(18\)30043-3](https://doi.org/10.1016/s2214-109x(18)30043-3).
- Hameed, W., M. Ishaque, X. Gul, J.-u.-R. Siddiqui, S. Hussain, W. Hussain, A. Ahmed, and A. Balal. 2017. "Does Courtesy Bias Affect How Clients Report on Objective and Subjective Measures of Family Planning Service Quality? A Comparison between Facility- and Home-Based Interviews." *Open Access Journal of Contraception* 9:33. <https://doi.org/10.2147/oajc.s153443>.
- Hategekimana, C., J. Shoveller, L. Tuyisenge, C. Kenyon, D. F. Cechetto, and L. D. Lynd. 2016. "Correlates of Performance of Healthcare Workers in Emergency, Triage, Assessment and Treatment Plus Admission Care (Etat+) Course in Rwanda: Context Matters." *PLOS One* 11(3):e0152882. <https://doi.org/10.1371/journal.pone.0152882>.
- Hong, R., L. Montana, and V. Mishra. 2006. "Family Planning Services Quality as a Determinant of Use of IUD in Egypt." *BMC Health Services Research* 6(1):79. <https://doi.org/10.1186/1472-6963-6-79>.
- Hug, L., D. Sharrow, D. You, and on behalf of the UN Inter-agency Group for Child Mortality Estimation (UN IGME). 2019. *Levels and Trends in Child Mortality: Report 2019*. New York, NY, USA: UNICEF.
- Jain, A., K. Aruldas, A. Mozumdar, E. Tobey, and R. Acharya. 2019. "Validation of Two Quality of Care Measures: Results from a Longitudinal Study of Reversible Contraceptive Users in India." *Studies in Family Planning* 50(2):179-193. <https://doi.org/10.1111/sifp.12093>.
- Jain, A. K., J. Townsend, and S. RamaRao. 2018. *Proposed Metrics to Measure Quality: Overview*. New York, New York: Population Council.
- Jayachandran, V., G. Chapotera, and W. Stones. 2016. "Quality of Facility-Based Family Planning Services for Adolescents in Malawi: Findings from a National Census of Health Facilities." *Malawi Medical Journal* 28(2):48-52. <https://doi.org/10.4314/mmj.v28i2.4>.
- Joseph, N. T., E. Piwoz, D. Lee, A. Malata, and H. H. Leslie. 2020. "Examining Coverage, Content, and Impact of Maternal Nutrition Interventions: The Case for Quality-Adjusted Coverage Measurement." *Journal of Global Health* 10(1), 010501. <https://doi.org/10.7189/jogh.10.010501>.

- Kahabuka, C., G. Kväle, K. M. Moland, and S. G. Hinderaker. 2011. "Why Caretakers Bypass Primary Health Care Facilities for Child Care-a Case from Rural Tanzania." *BMC Health Services Research* 11(1):315. <https://doi.org/10.1186/1472-6963-11-315>.
- Kanyangarara, M., M. K. Munos, and N. Walker. 2017. "Quality of Antenatal Care Service Provision in Health Facilities across Sub-Saharan Africa: Evidence from Nationally Representative Health Facility Assessments." *Journal of Global Health* 7(2):021101. <https://doi.org/10.7189/jogh.07.021101>.
- Kogan, R., M. A. Martínez, L. Rubilar, E. Payá, I. Quevedo, H. Puppo, G. Girardi, and J. A. Castro-Rodriguez. 2003. "Comparative Randomized Trial of Azithromycin Versus Erythromycin and Amoxicillin for Treatment of Community-Acquired Pneumonia in Children." *Pediatric Pulmonology* 35(2):91-98. <https://doi.org/10.1002/ppul.10180>.
- Krüger, C., M. Heinzl-Gutenbrunner, and M. Ali. 2017. "Adherence to the Integrated Management of Childhood Illness Guidelines in Namibia, Kenya, Tanzania and Uganda: Evidence from the National Service Provision Assessment Surveys." *BMC Health Services Research* 17(1):822. <https://dx.doi.org/10.1186%2Fs12913-017-2781-3>.
- Kruk, M. E., A. D. Gage, C. Arsenault, K. Jordan, H. H. Leslie, S. Roder-DeWan, O. Adeyi, et al. 2018. "High-Quality Health Systems in the Sustainable Development Goals Era: Time for a Revolution." *The Lancet Global Health* 6(11):e1196-e1252. [https://doi.org/10.1016/S2214-109X\(18\)30386-3](https://doi.org/10.1016/S2214-109X(18)30386-3).
- Larson, E., H. H. Leslie, and M. E. Kruk. 2017. "The Determinants and Outcomes of Good Provider Communication: A Cross-Sectional Study in Seven African Countries." *BMJ Open* 7(6):e014888. <https://doi.org/10.1136/bmjopen-2016-014888>.
- Lawn, J. E., H. Blencowe, S. Oza, D. You, A. C. Lee, P. Waiswa, M. Lalli, Z. Bhutta, A. J. Barros, and P. Christian. 2014. "Every Newborn: Progress, Priorities, and Potential Beyond Survival." *The Lancet* 384(9938):189-205. [https://doi.org/10.1016/S0140-6736\(14\)60496-7](https://doi.org/10.1016/S0140-6736(14)60496-7).
- Lazzerini, M., and H. Wanzira. 2016. "Oral Zinc for Treating Diarrhoea in Children." *Cochrane Database of Systematic Reviews*(12). <https://doi.org/10.1002/14651858.cd005436>.
- Leonard, K., and M. C. Masatu. 2006. "Outpatient Process Quality Evaluation and the Hawthorne Effect." *Social Science & Medicine* 63(9):2330-2340. <https://doi.org/10.1016/j.socscimed.2006.06.003>.
- Leslie, H. H., and A. D. Gage. 2020. *[Forthcoming] Service Provision Assessment Review*. DHS Working Paper. Rockville, Maryland, USA: ICF.
- Leslie, H. H., A. Malata, Y. Ndiaye, and M. E. Kruk. 2017. "Effective Coverage of Primary Care Services in Eight High-Mortality Countries." *BMJ Global Health* 2(3). <https://doi.org/10.1136/bmjgh-2017-000424>.
- Leslie, H. H., Z. Sun, and M. E. Kruk. 2017. "Association between Infrastructure and Observed Quality of Care in 4 Healthcare Services: A Cross-Sectional Study of 4,300 Facilities in 8 Countries." *PLOS Medicine* 14(12):e1002464. <https://doi.org/10.1371/journal.pmed.1002464>.

- Liu, L., H. H. Leslie, M. Joshua, and M. E. Kruk. 2019. "Exploring the Association between Sick Child Healthcare Utilisation and Health Facility Quality in Malawi: A Cross-Sectional Study." *BMJ Open* 9(7):e029631. <https://doi.org/10.1136/bmjopen-2019-029631>.
- Low, D. E., M. E. Pichichero, and U. B. Schaad. 2004. "Optimizing Antibacterial Therapy for Community-Acquired Respiratory Tract Infections in Children in an Era of Bacterial Resistance." *Clinical Pediatrics* 43(2):135-151. <https://doi.org/10.1177/000992280404300203>.
- Macarayan, E., I. Papanicolas, and A. Jha. 2020. "The Quality of Malaria Care in 25 Low-Income and Middle-Income Countries." *BMJ Global Health* 5(2):e002023. <https://doi.org/10.1136/bmjgh-2019-002023>.
- Maina, M., O. Tosas-Auguet, J. McKnight, M. Zosi, G. Kimemia, P. Mwaniki, C. Schultsz, and M. English. 2019. "Evaluating the Foundations That Help Avert Antimicrobial Resistance: Performance of Essential Water Sanitation and Hygiene Functions in Hospitals and Requirements for Action in Kenya." *PLOS One* 14(10):e0222922. <https://dx.doi.org/10.1371/journal.pone.0222922>.
- Mallick, L., R. K. Benedict, and W. Wang. 2020. "Facility Readiness and Counseling During Antenatal Care and the Relationship with Early Breastfeeding in Haiti and Malawi." *BMC Pregnancy and Childbirth* 20(1):325. <https://doi.org/10.1186/s12884-020-02919-7>.
- Mallick, L., G. Temsah, and R. K. Benedict. 2018. *Facility-Based Nutrition Readiness and Delivery of Maternal and Child Nutrition Services Using Service Provision Assessment Surveys*. DHS Comparative Reports No. 49. Rockville, Maryland, USA: ICF. <http://dhsprogram.com/pubs/pdf/CR49/CR49.pdf>.
- Mallick, L., G. Temsah, S. Namaste, T. Dontamsetti, and W. Wang. 2020. *Using Health Management Information Systems Data to Contextualize Survey-Based Estimates of Fertility, Mortality, and Wasting*. DHS Occasional Paper No. 12. Rockville, Maryland, USA: ICF. <https://www.dhsprogram.com/pubs/pdf/OP12/OP12.pdf>.
- Mallick, L., G. Temsah, and W. Wang. 2019. "Comparing Summary Measures of Quality of Care for Family Planning in Haiti, Malawi, and Tanzania." *PLOS One* 14(6):e0217547. <https://doi.org/10.1371/journal.pone.0217547>.
- Marchant, T., J. Bryce, C. Victora, A. C. Moran, M. Claeson, J. Requejo, A. Amouzou, et al. 2016. "Improved Measurement for Mothers, Newborns and Children in the Era of the Sustainable Development Goals." *Journal of Global Health* 6(1):010506-010506. <https://doi.org/10.7189/jogh.06.010506>.
- Marsh, A. D., M. Muzigaba, T. Diaz, J. Requejo, D. Jackson, D. Chou, J. A. Cresswell, R., et al. 2020. "Effective Coverage Measurement in Maternal, Newborn, Child, and Adolescent Health and Nutrition: Progress, Future Prospects, and Implications for Quality Health Systems." *The Lancet Global Health* 8(5):e730-e736. [https://doi.org/10.1016/S2214-109X\(20\)30104-2](https://doi.org/10.1016/S2214-109X(20)30104-2).
- McGovern, M. E., and D. Canning. 2015. "Vaccination and All-Cause Child Mortality from 1985 to 2011: Global Evidence from the Demographic and Health Surveys." *American Journal of Epidemiology* 182(9):791-798. <https://doi.org/10.1093/aje/kwv125>.

- MCSP. 2018. *What Data on Maternal and Newborn Health Do National Health Management Information Systems Include? A Review of Data Elements for 24 Low and Lower Middle-Income Countries*. Baltimore, Maryland: Maternal and Child Survival Program (MCSP) and United States Agency for International Development. <http://www.mcsp.org/resource/hmis-review>.
- Mensch, B., M. Arends-Kuenning, and A. Jain. 1996. "The Impact of the Quality of Family Planning Services on Contraceptive Use in Peru." *Studies in Family Planning* 27(2):59-75.
- Millar, K. R., J. McCutcheon, E. H. Coakley, W. Brieger, M. A. Ibrahim, Z. Mohammed, A. Bassi, and W. Sambisa. 2014. "Patterns and Predictors of Malaria Care-Seeking, Diagnostic Testing, and Artemisinin-Based Combination Therapy for Children under Five with Fever in Northern Nigeria: A Cross-Sectional Study." *Malaria Journal* 13(1):447.
- MoH Malawi, and ICF International. 2014. *Malawi Service Provision Assessment 2013-14*. Lilongwe, Malawi: Ministry of Health - MoH/Malawi and ICF International. <http://dhsprogram.com/pubs/pdf/SPA20/SPA20.pdf>.
- Molina, R. L., J. Villar, A. Reyes, J. Elliott, M. Begley, M. Johnson, L. Palazuelos, et al. 2019. "Delivery Practices and Care Experience During Implementation of an Adapted Safe Childbirth Checklist and Respectful Care Program in Chiapas, Mexico." *International Journal of Gynecology & Obstetrics* 145(1):101-109. <https://doi.org/10.1002/ijgo.12771>.
- Molyneux, E., S. Ahmad, and A. Robertson. 2006. "Improved Triage and Emergency Care for Children Reduces Inpatient Mortality in a Resource-Constrained Setting." *Bulletin of the World Health Organization* 84:314-319.
- Moxon, S. G., T. Guenther, S. Gabrysch, C. Enweronu-Laryea, P. K. Ram, S. Niermeyer, K. Kerber, et al. 2018. "Service Readiness for Inpatient Care of Small and Sick Newborns: What Do We Need and What Can We Measure Now?" *Journal of Global Health* 8(1):010702-010702. <https://doi.org/10.7189/jogh.08.010702>.
- Mpunga, D., J. Lumbayi, N. Dikamba, A. Mwembo, M. A. Mapatano, and G. Wembodinga. 2017. "Availability and Quality of Family Planning Services in the Democratic Republic of the Congo: High Potential for Improvement." *Global Health: Science and Practice* 5(2):274-285. <https://dx.doi.org/10.9745%2FGHSP-D-16-00205>.
- Munos, M. K., C. K. Stanton, J. Bryce, and the Core Group for Improving Coverage Measurement for MNCH. 2017. "Improving Coverage Measurement for Reproductive, Maternal, Neonatal and Child Health: Gaps and Opportunities." *Journal of Global Health* 7(1):010801. <https://doi.org/10.7189/jogh.07.010801>.
- NCAPD/Kenya, MOMS/Kenya, MOPHS/Kenya, KNBS, and ICF Macro. 2011. *Kenya Service Provision Assessment Survey 2010*. Nairobi, Kenya: National Coordinating Agency for Population Development - /Kenya, Ministry of Medical Services/Kenya, Ministry of Public Health.
- Sanitation/Kenya, Kenya National Bureau of Statistics, ICF Macro. <http://dhsprogram.com/pubs/pdf/SPA17/SPA17.pdf>.

- Newborn Indicators Technical Working Group. 2012. *Newborn Services Rapid Health Facility Assessment*. http://www.healthynewbornnetwork.org/hnn-content/uploads/Newborn-Services-Rapid-HFA_HNN_25June2012.pdf.
- Ng, M., N. Fullman, J. L. Dieleman, A. D. Flaxman, C. J. L. Murray, and S. S. Lim. 2014. “Effective Coverage: A Metric for Monitoring Universal Health Coverage.” *PLOS Medicine* 11(9):e1001730-e1001730. <https://doi.org/10.1371/journal.pmed.1001730>.
- Nguhiu, P. K., E. W. Barasa, and J. Chuma. 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.” *Tropical Medicine & International Health* 22(4):442-453. <https://doi.org/10.1111/tmi.12841>.
- Pollard, S. L., M. Mathai, and N. Walker. 2013. “Estimating the Impact of Interventions on Cause-Specific Maternal Mortality: A Delphi Approach.” *BMC Public Health* 13(S3):S12. <https://doi.org/10.1186/1471-2458-13-S3-S12>.
- Ralston, M. E., L. T. Day, T. M. Slusher, N. L. Musa, and H. S. Doss. 2013. “Global Paediatric Advanced Life Support: Improving Child Survival in Limited-Resource Settings.” *The Lancet* 381(9862):256-265. [https://doi.org/10.1016/s0140-6736\(12\)61191-x](https://doi.org/10.1016/s0140-6736(12)61191-x).
- RamaRao, S., M. Lacuesta, M. Costello, B. Pangolibay, and H. Jones. 2003. “The Link between Quality of Care and Contraceptive Use.” *International Family Planning Perspectives* 29(2):76-83. <http://doi.org/10.1363/ifpp.29.076.03>.
- Robison, J. A., Z. P. Ahmad, C. A. Nosek, C. Durand, A. Namathanga, R. Milazi, A. Thomas, et al. 2012. “Decreased Pediatric Hospital Mortality after an Intervention to Improve Emergency Care in Lilongwe, Malawi.” *Pediatrics* 130(3):e676-e682. <https://doi.org/10.1542/peds.2012-0026>.
- Ross, J., K. Hardee, E. Mumford, and S. Eid. 2002. “Contraceptive Method Choice in Developing Countries.” *International Family Planning Perspectives* 28(1):32-40. <https://doi.org/10.2307/3088273>.
- Ross, J., and J. Stover. 2013. “Use of Modern Contraception Increases When More Methods Become Available: Analysis of Evidence from 1982–2009.” *Global Health: Science and Practice* 1(2):203-212. <https://dx.doi.org/10.1017%2FS0021932012000715>.
- Rowe, A. K., G. F. P. de León, J. Mihigo, A. C. F. Santelli, N. P. Miller, and P. Van-Dúnem. 2009. “Quality of Malaria Case Management at Outpatient Health Facilities in Angola.” *Malaria Journal* 8(1):275.
- Seward, N., A. Prost, A. Copas, M. Corbin, L. Li, T. Colbourn, D. Osrin, M. Neuman, K. Azad, and A. Kuddus. 2015. “Using Observational Data to Estimate the Effect of Hand Washing and Clean Delivery Kit Use by Birth Attendants on Maternal Deaths after Home Deliveries in Rural Bangladesh, India and Nepal.” *PLOS One* 10(8):e0136152. <https://doi.org/10.1371/journal.pone.0136152>.

- Sheffel, A., S. Zeger, R. Heidkamp, and M. K. Munos. 2019. "Development of Summary Indices of Antenatal Care Service Quality in Haiti, Malawi and Tanzania." *BMJ Open* 9(12):e032558. <https://doi.org/10.1136/bmjopen-2019-032558>.
- Shwartz, M., E. A. Peköz, C. L. Christiansen, J. F. Burgess Jr, and D. Berlowitz. 2013. "Shrinkage Estimators for a Composite Measure of Quality Conceptualized as a Formative Construct." *Health Services Research* 48(1):271-289. <https://doi.org/10.1111/j.1475-6773.2012.01437.x>.
- Slater, A. M., F. Estrada, L. Suarez-Lopez, E. de la Vara-Salazar, and L. Campero. 2018. "Overall User Satisfaction with Family Planning Services and Associated Quality Care Factors: A Cross-Sectional Analysis." *Reproductive Health* 15(1):172. <https://doi.org/10.1186/s12978-018-0615-3>.
- Ssempiira, J., I. Kasirye, J. Kissa, B. Nambuusi, E. Mukooyo, J. Opigo, F. Makumbi, S. Kasasa, and P. Vounatsou. 2018. "Measuring Health Facility Readiness and Its Effects on Severe Malaria Outcomes in Uganda." *Scientific Reports* 8(1):1-11. <https://doi.org/10.1038/s41598-018-36249-8>.
- Steinhardt, L. C., F. Onikpo, J. Kouamé, E. Piercefield, M. Lama, M. S. Deming, and A. K. Rowe. 2015. "Predictors of Health Worker Performance after Integrated Management of Childhood Illness Training in Benin: A Cohort Study." *BMC Health Services Research* 15(1):276. <https://doi.org/10.1186/s12913-015-0910-4>.
- Taylor, C., J. Ahmed, and W. Wang. 2019. *Quality of Diagnostic Services for Non-Severe Suspected Malaria Cases: An Analysis of National Health Facility Surveys from Malawi and Tanzania*. DHS Analytical Studies No. 70. Rockville, Maryland, USA: ICF. <http://dhsprogram.com/pubs/pdf/AS70/AS70.pdf>.
- Taylor, C., A. Linn, W. Wang, and H. Moussa. 2018. *Gaps in Service Utilization and Service Provision: An Analysis of DHS and SPA Malaria Data from Malawi, Senegal, and Tanzania*. DHS Analytical Studies No. 67. Rockville, Maryland, USA: ICF. <http://dhsprogram.com/pubs/pdf/AS67/AS67.pdf>.
- Tessema, G. A., C. O. Laurence, M. A. Mahmood, and J. S. Gomersall. 2016. "Factors Determining Quality of Care in Family Planning Services in Africa: A Systematic Review Protocol." *JBI Database of Systematic Reviews and Implementation Reports* 14(8):103-114. <https://doi.org/10.11124/jbisrir-2016-003056>.
- Tripathi, V., C. Stanton, D. Strobino, and L. Bartlett. 2015. "Development and Validation of an Index to Measure the Quality of Facility-Based Labor and Delivery Care Processes in Sub-Saharan Africa." *PLOS One* 10(6):e0129491-e0129491. <https://doi.org/10.1371/journal.pone.0129491>.
- Tripathi, V., C. Stanton, D. Strobino, and L. Bartlett. 2019. "Measuring the Quality of Maternal and Care Processes at the Time of Delivery in Sub-Saharan Africa: Development and Validation of a Short Index." *BMC Pregnancy and Childbirth* 19(1):133. <https://doi.org/10.1186/s12884-019-2281-z>.
- Tumlinson, K., B. W. Pence, S. L. Curtis, S. W. Marshall, and I. S. Speizer. 2015. "Quality of Care and Contraceptive Use in Urban Kenya." *International Perspectives on Sexual and Reproductive Health* 41(2):69. <https://dx.doi.org/10.1363%2F4106915>.

UNICEF. 2015. *UNICEF's Approach to Scaling up Nutrition for Mothers and Their Children. Discussion Paper*. New York, NY: Programme Division, United Nations Children's Fund.

United Nations. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*. General Assembly 70 session. United Nations: New York, New York.

USAID, and CDC. 2019. *U.S. President's Malaria Initiative FY 2020 Guidance* Washington, D.C.: United States Agency for International Development and the Centers for Disease Control.

Uwemedimo, O. T., T. P. Lewis, E. A. Essien, G. J. Chan, H. Nsona, M. E. Kruk, and H. H. Leslie. 2018. "Distribution and Determinants of Pneumonia Diagnosis Using Integrated Management of Childhood Illness Guidelines: A Nationally Representative Study in Malawi." *BMJ Global Health* 3(2). <https://doi.org/10.1136/bmjgh-2017-000506>.

Wang, W., R. K. Benedict, and L. Mallick. 2019. *The Role of Health Facilities in Supporting Adherence to Iron-Folic Acid Supplementation During Pregnancy: A Case Study Using DHS and SPA Data in Haiti and Malawi*. DHS Working Paper No. 160. Rockville, Maryland, USA: ICF. <http://dhsprogram.com/pubs/pdf/WP160/WP160.pdf>.

Wang, W., and L. Mallick. 2019. "Understanding the Relationship between Family Planning Method Choices and Modern Contraceptive Use: An Analysis of Geographically Linked Population and Health Facilities Data in Haiti." *BMJ Global Health* 4(Suppl 5):e000765. <https://dx.doi.org/10.1136%2Fbmjgh-2018-000765>.

Wang, W., L. Mallick, C. Allen, and T. Pullum. 2019. "Effective Coverage of Facility Delivery in Bangladesh, Haiti, Malawi, Nepal, Senegal, and Tanzania." *PLOS One* 14(6):e0217853. <https://doi.org/10.1371/journal.pone.0217853>.

Wang, W., S. Wang, T. Pullum, and P. Ametepi. 2012. *How Family Planning Supply and the Service Environment Affect Contraceptive Use: Findings from Four East African Countries*. DHS Analytical Studies No. 26. Calverton, Maryland, USA: ICF International. <http://dhsprogram.com/pubs/pdf/AS26/AS26.pdf>.

Wehrmeister, F. C., M.-C. Restrepo-Mendez, G. V. Franca, C. G. Victora, and A. J. Barros. 2016. "Summary Indices for Monitoring Universal Coverage in Maternal and Child Health Care." *Bulletin of the World Health Organization* 94(12):903. <https://doi.org/10.2471/blt.16.173138>.

WHO. 2012. *T3: Test. Treat. Track. Scaling up Diagnostic Testing, Treatment and Surveillance for Malaria*. Geneva, Switzerland: World Health Organization.

WHO. 2014a. *Consultation on Improving Measurement of the Quality of Maternal, Newborn and Child Care in Health Facilities*. Geneva, Switzerland: World Health Organization.

WHO. 2014b. *Integrated Management of Childhood Illness: Distance Learning Course*. Geneva, Switzerland: World Health Organization.

WHO. 2015a. *Service Availability and Readiness Assessment (Sara): An Annual Monitoring System for Service Delivery Reference Manual*. http://www.who.int/healthinfo/systems/sara_reference_manual/en/.

WHO. 2015b. *Service Availability and Readiness Assessment (Sara): An Annual Monitoring System for Service Delivery, Reference Manual*. Geneva, Switzerland: World Health Organization.

WHO. 2016a. “Guideline Updates on Paediatric Emergency Triage, Assessment and Treatment: Care of Critically-Ill Children.” *Geneva, Switzerland: World Health Organization*.

WHO. 2016b. *Standards for Improving Quality of Maternal and Newborn Care in Health Facilities*. Geneva, Switzerland: World Health Organization.

WHO. 2016c. *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*. Geneva, Switzerland: World Health Organization.
http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/.

WHO. 2017a. *Guideline: Protecting, Promoting and Supporting Breastfeeding in Facilities Providing Maternity and Newborn Services*. Geneva, Switzerland: World Health Organization.
<https://www.who.int/nutrition/publications/guidelines/breastfeeding-facilities-maternity-newborn/en/>.

WHO. 2018. *Standards for Improving the Quality of Care for Children and Young Adolescents in Health Facilities*. Geneva, Switzerland: World Health Organization.

WHO. 2019a. *Analysis and Use of Health Facility Data: Guidance for RMNCAH Programme Managers*. Geneva, Switzerland: World Health Organization.
https://www.who.int/healthinfo/FacilityAnalysisGuidance_RMNCAH.pdf?ua=1.

WHO. 2019b. *Essential Nutrition Actions: Mainstreaming Nutrition through the Life-Course*. Geneva, Switzerland: World Health Organization.

WHO. 2019c. *Quality of Care for Maternal and Newborn Health: A Monitoring Framework for Network Countries*. Geneva, Switzerland: World Health Organization.

WHO, and UNICEF. 2018. *Core Questions and Indicators for Monitoring Wash in Health Care Facilities in the Sustainable Development Goals*. Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva, Switzerland: World Health Organization.
https://www.who.int/water_sanitation_health/publications/monitoring-wash-in-health-care-facilities-aug-2018.pdf?ua=1.

WHO, and UNICEF. 2019. *WASH in Health Care Facilities: Global Baseline Report 2019*. Geneva, Switzerland: World Health Organization and the United Nations Children’s Fund.

WHO, UNICEF. 2017b. *Tracking Progress Towards Universal Coverage for Women’s, Children’s and Adolescents’ Health: The 2017 Report*. Washington, DC: United Nations Children’s Fund (UNICEF) and the World Health Organization (WHO).

Wilhelm, D., J. Lohmann, M. De Allegri, J. Chinkhumba, A. S. Muula, and S. Brenner. 2019. "Quality of Maternal Obstetric and Neonatal Care in Low-Income Countries: Development of a Composite Index." *BMC Medical Research Methodology* 19(1):154-154. <https://doi.org/10.1186/s12874-019-0790-0>.

Winter, R., J. Yourkavitch, W. Wang, and L. Mallick. 2017. "Assessment of Health Facility Capacity to Provide Newborn Care in Bangladesh, Haiti, Malawi, Senegal, and Tanzania." *Journal of Global Health* 7(2):020509. <https://doi.org/10.7189/jogh.07.020509>.

Zurovac, D., S. Githinji, D. Memusi, S. Kigen, B. Machini, A. Muturi, G. Otieno, R. W. Snow, and A. Nyandigisi. 2014. "Major Improvements in the Quality of Malaria Case-Management under the "Test and Treat" Policy in Kenya." *PLOS One* 9(3):e92782. <https://doi.org/10.1371/journal.pone.0092782>.

APPENDIX

Appendix Table 1 Original set of indicators for consideration for inclusion in the quality of care index

Health area	Indicator	Definition	Quality of care component
Family planning (FP)	Contraceptive method choice	Percentage of FP facilities that provide at least one short-acting, one long-acting, and one barrier method	Structure
	Counseling on method side effects	Percentage of FP clients who are counseled about side effects and health concerns about the method chosen/provided	Process
	Constellation of services	Percentage of health facilities that offer FP and maternal and child health services on the same day (e.g., at least 20 days per month for both services)	Structure
Maternal and newborn health	Basic emergency obstetric care (BEmOC)	Percentage of facilities that performed the BEmOC signal functions at least once during the past 3 months	Structure
	Comprehensive emergency obstetric care (CEmOC)	Percentage of facilities that performed the CEmOC signal functions at least once during past 3 months *Note: Not all facilities are expected to provide this service.	Structure
	Blood pressure measurement during ANC visits	Percentage of antenatal clients whose blood pressure is measured	Process
	Newborn resuscitation equipment	Percentage of facilities with functional bags and masks (two neonatal mask sizes) in the delivery areas	Structure
	Injectable antibiotics for neonatal sepsis	Percentage of facilities with injectable antibiotics for neonatal sepsis	Structure
	Kangaroo mother care	Percentage of facilities that provide kangaroo mother care	Structure
Child health	Availability of vaccines	Percentage of facilities that have all age-appropriate primary vaccines available	Structure
	Antibiotics for severe pneumonia	Percentage of health facilities that have first-line antibiotics (i.e., amoxicillin)	Structure
	Provider adherence to IMCI diagnostic guidelines	Percentage of sick-child visits in which the child is checked for all the following: 1) Three danger signs (inability to eat/drink, vomiting everything, history of febrile convulsions) 2) Three main symptoms (cough/difficulty breathing, diarrhea, fever) 3) Basic physical examination (counting respiration rate, assessing dehydration, measuring temperature)	Process
	Counseling on childhood illnesses	Percentage of sick-child visits in which the provider tells the caregiver about the child illness, the symptoms that require immediate return, a scheduled or discussed return visit, and feeding practices	Process
Malaria	Malaria service readiness	Percentage of facilities that are malaria-service ready (with diagnostic capacity for malaria and with drugs available for artemisinin-based combination therapy)	Structure
	Management of suspected malaria cases	Percentage of suspected malaria cases that receive the following services: 1) Provider asked about fever 2) Child was felt for temperature, had temperature taken with a thermometer, or was checked for pallor by looking at palms 3) Provider instructed child to see another provider or laboratory for a finger or heel stick for blood testing *Note: SPA data currently collected are not suitable for measuring quality of clinical management of suspected malaria cases.	Process
Nutrition	Availability of iron-containing supplements for women	Percentage of facilities with iron-containing supplements	Structure
	Iron-containing supplements provided/prescribed to client	Percentage of clients who are observed and reported to receive iron-containing supplements	Process
	Counseling on use or side effects of iron supplementation	Percentage of clients who are observed and reported to receive counseling on use or side effects of iron-containing supplements	Process
	Counseling on maternal nutrition	Percentage of clients who receive advice on nutrition during pregnancy	Process
	Provider training on breastfeeding	Percentage of health providers providing antenatal care who have received training on breastfeeding or infant and young child feeding	Structure
	Breastfeeding counseling Malnutrition assessment for sick children	Percentage of clients who receive breastfeeding counseling during antenatal care Percentage of sick-child visits in which the child's weight is taken, the weight is plotted on a growth chart, and the child's growth is discussed	Process Process

Appendix Table 2 Facility categories by country

Country	Facility categories
Bangladesh	District hospital General hospital Mother and child welfare center Upazila health complex Upazila hospital Union hospital Union subcenter Union health and family welfare center Community clinic
The Democratic Republic of the Congo	Hospital Health center Referral health center Clinic
Haiti	Hospital Health center with beds Health center without beds Dispensary Community health center
Malawi	Hospital Health center Dispensary Clinic Health post
Nepal	Central hospital Regional hospital Zonal hospital District hospital Urban health center Primary health care center Health post Stand-alone HIV testing center Primary health care outreach clinic Expanded Program on Immunization clinic Community health unit
Senegal	Hospital Health center Health post Health hut
Tanzania	Hospital Health center Dispensary Clinic

Appendix Table 3 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Bangladesh SPA 2017

Service or indicator	Barishal	Chattogram	Dhaka	Khulna	Rajshahi	Rangpur	Sylhet	Mymensingh	National
Family planning									
Method availability	109(239)	262(264)	267(164)	175(145)	201(146)	158(129)	93(151)	113(115)	1,377(1353)
Counseling on side effects	na	na	na	na	na	na	na	na	na
Antenatal care									
Blood pressure measurement	na	na	na	na	na	na	na	na	na
Counseling on iron	na	na	na	na	na	na	na	na	na
Counseling on breastfeeding	na	na	na	na	na	na	na	na	na
Delivery care									
BEmOC signal functions performed	33(150)	80(178)	78(105)	36(76)	54(91)	38(74)	19(84)	21(60)	358(818)
Essential drugs	33(150)	80(178)	78(105)	36(76)	54(91)	38(74)	19(84)	21(60)	358(818)
Neonatal resuscitation	33(150)	80(178)	78(105)	36(76)	54(91)	38(74)	19(84)	21(60)	358(818)
Immunization									
Availability of viable vaccines and syringes	101(201)	257(232)	269(154)	165(129)	186(124)	176(122)	85(136)	115(108)	1354(1206)
Child curative care									
Antibiotics for children	112(253)	277(296)	298(183)	185(160)	212(153)	193(155)	96(162)	122(125)	1,495(1,487)
ORS/Zinc for diarrhea	112(253)	277(296)	298(183)	185(160)	212(153)	193(155)	96(162)	122(125)	1,495(1,487)
Malaria diagnosis and treatment capacity	112(253)	277(296)	298(183)	185(160)	212(153)	193(155)	96(162)	122(125)	1,495(1,487)
ARI assessment	na	na	na	na	na	na	na	na	na
Diarrhea assessment	na	na	na	na	na	na	na	na	na
Anemia assessment	na	na	na	na	na	na	na	na	na
Nutritional assessment	na	na	na	na	na	na	na	na	na
WASH									
Basic services for WASH	113(260)	288(302)	304(188)	187(164)	220(161)	193(158)	96(163)	123(128)	1,524(1,524)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 4 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Democratic Republic of the Congo SPA 2017-18

Service or indicator	Sud-Kivu	Kinshasa	Kongo-Central	Mai-Ndombe	Kwilu	Kwango	Equateur	Sud-Ubangi	Nord-Ubangi	Mongala	Tshuapa	Tshopo	Bas-Uélé	Haut-Uélé
Family planning														
Method availability	75(57)	62(55)	58(65)	19(28)	57(60)	27(35)	35(39)	29(39)	21(41)	30(33)	9(25)	29(32)	3(11)	26(38)
Counseling on side effects	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Antenatal care														
Blood pressure measurement	885(221)	352(368)	119(244)	65(65)	227(292)	43(100)	57(80)	313(184)	104(193)	70(130)	151(264)	143(142)	126(176)	46(87)
Counseling on iron	513(119)	150(168)	48(104)	18(31)	106(151)	26(57)	27(40)	190(110)	67(130)	47(88)	105(166)	74(76)	74(103)	36(69)
Counseling on breastfeeding	885(221)	352(368)	119(244)	65(65)	227(292)	43(100)	57(80)	313(184)	104(193)	70(130)	151(264)	143(142)	126(176)	46(87)
Delivery care														
BErmoC signal functions performed	76(59)	103(71)	85(78)	38(48)	75(69)	32(42)	37(41)	32(41)	21(41)	35(40)	29(41)	56(54)	20(41)	32(44)
Essential drugs	76(59)	103(71)	85(78)	38(48)	75(69)	32(42)	37(41)	32(41)	21(41)	35(40)	29(41)	56(54)	20(41)	32(44)
Neonatal resuscitation	76(59)	103(71)	85(78)	38(48)	75(69)	32(42)	37(41)	32(41)	21(41)	35(40)	29(41)	56(54)	20(41)	32(44)
Immunization														
Availability of viable vaccines and syringes	74(33)	97(63)	74(63)	36(31)	69(36)	32(33)	35(27)	30(26)	20(32)	36(33)	27(28)	51(36)	20(35)	27(30)
Child curative care														
Antibiotics for children	86(62)	106(73)	88(80)	38(50)	77(70)	33(43)	37(41)	32(41)	21(41)	37(41)	29(41)	56(54)	20(41)	32(44)
ORS/Zinc for diarrhea	86(62)	106(73)	88(80)	38(50)	77(70)	33(43)	37(41)	32(41)	21(41)	37(41)	29(41)	56(54)	20(41)	32(44)
Malaria diagnosis and treatment capacity	86(62)	106(73)	88(80)	38(50)	77(70)	33(43)	37(41)	32(41)	21(41)	37(41)	29(41)	56(54)	20(41)	32(44)
ARI assessment	203(117)	76(78)	93(115)	12(24)	41(52)	13(29)	15(23)	115(73)	61(107)	55(42)	50(75)	68(63)	20(47)	26(47)
Diarrhea assessment	102(56)	43(35)	45(56)	17(22)	16(23)	6(20)	19(21)	87(57)	74(127)	41(38)	26(47)	48(36)	24(47)	20(38)
Anemia assessment	269(142)	112(117)	141(165)	31(47)	69(73)	19(44)	42(51)	179(108)	114(190)	132(97)	101(138)	157(111)	50(94)	48(74)
Nutritional assessment	269(142)	112(117)	141(165)	31(47)	69(73)	19(44)	42(51)	179(108)	114(190)	132(97)	101(138)	157(111)	50(94)	48(74)
WASH														
Basic services for WASH	86(62)	106(73)	88(80)	38(50)	77(70)	33(43)	37(41)	32(41)	21(41)	37(41)	29(41)	56(54)	20(41)	32(44)

Continues...

Appendix Table 4—Continued

Service or indicator	Ituri	Nord-Kivu	Haut-Katanga	Lualaba	Haut-Lomami	Tanganyika	Kasai-Oriental	Sankuru	Lomami	Kasai	Kasai-Central	Maniema	National
Family planning													
Method availability	35(44)	77(78)	78(62)	41(37)	38(36)	9(11)	15(24)	31(39)	20(24)	44(45)	49(52)	37(55)	954(1,065)
Counseling on side effects	na	na	na	na	na	na	na	na	na	na	na	na	na
Antenatal care													
Blood pressure measurement	105(120)	447(361)	283(377)	80(123)	256(167)	107(154)	148(102)	69(127)	40(64)	30(78)	153(139)	92(134)	4,512(4,512)
Counseling on iron	48(68)	223(169)	112(163)	19(27)	90(68)	88(115)	101(61)	47(96)	14(32)	24(60)	92(77)	41(65)	2,379(2,433)
Counseling on breastfeeding	105(120)	447(361)	283(377)	80(123)	256(167)	107(154)	148(102)	69(127)	40(64)	30(78)	153(139)	92(134)	4,512(4,512)
Delivery care													
BEmOC signal functions performed	68(71)	94(90)	100(69)	42(40)	41(40)	32(41)	42(43)	33(41)	42(41)	71(53)	56(57)	37(56)	1,328(1,352)
Essential drugs	68(71)	94(90)	100(69)	42(40)	41(40)	32(41)	42(43)	33(41)	42(41)	71(53)	56(57)	37(56)	1,328(1,352)
Neonatal resuscitation	68(71)	94(90)	100(69)	42(40)	41(40)	32(41)	42(43)	33(41)	42(41)	71(53)	56(57)	37(56)	1,328(1,352)
Immunization													
Availability of viable vaccines and syringes	65(47)	91(54)	99(64)	40(32)	39(28)	33(36)	42(29)	30(25)	39(27)	66(37)	55(37)	31(36)	1,259(958)
Child curative care													
Antibiotics for children	71(73)	107(94)	104(72)	44(41)	42(41)	34(42)	44(44)	33(41)	42(42)	71(53)	58(58)	37(56)	1,380(1,379)
ORS/Zinc for diarrhea	71(73)	107(94)	104(72)	44(41)	42(41)	34(42)	44(44)	33(41)	42(42)	71(53)	58(58)	37(56)	1,380(1,379)
Malaria diagnosis and treatment capacity	71(73)	107(94)	104(72)	44(41)	42(41)	34(42)	44(44)	33(41)	42(42)	71(53)	58(58)	37(56)	1,380(1,379)
ARI assessment	26(46)	165(119)	103(93)	58(61)	44(55)	49(67)	48(25)	63(70)	19(25)	73(60)	73(81)	51(82)	1,619(1,676)
Diarrhea assessment	21(32)	131(85)	34(41)	39(47)	14(27)	27(39)	26(10)	36(41)	15(18)	29(28)	41(43)	31(47)	1,013(1,081)
Anemia assessment	45(73)	264(178)	123(123)	66(78)	69(84)	116(153)	56(34)	96(101)	29(33)	137(104)	125(126)	72(122)	2,660(2,660)
Nutritional assessment	45(73)	264(178)	123(123)	66(78)	69(84)	116(153)	56(34)	96(101)	29(33)	137(104)	125(126)	72(122)	2,660(2,660)
WASH													
Basic services for WASH	71(73)	107(94)	104(72)	44(41)	42(41)	34(42)	44(44)	33(41)	42(42)	71(53)	58(59)	37(56)	1,380(1,380)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 5 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Haiti SPA 2017-18

Service or indicator	Aire Metropo- litaine	Ouest	Sud'Est	Nord	Nord'Est	Artibonite	Centre	Sud	Grand' Anse	Nord'Ouest	Nippes	National
Family planning												
Method availability	139(139)	117(116)	50(50)	62(62)	36(36)	102(102)	38(38)	64(64)	47(47)	75(74)	28(28)	756(756)
Counseling on side effects	310(249)	115(118)	59(74)	97(94)	28(37)	149(147)	110(108)	72(83)	59(69)	76(83)	31(42)	1,107(1,104)
Antenatal care												
Blood pressure measurement	366(377)	225(228)	86(111)	151(161)	115(72)	184(173)	172(119)	64(82)	37(49)	91(109)	35(45)	1,526(1,526)
Counseling on iron	139(137)	123(124)	42(54)	57(62)	67(38)	105(101)	94(62)	42(54)	22(31)	46(55)	17(23)	754(741)
Counseling on breastfeeding	366(377)	225(228)	86(111)	151(161)	115(72)	184(173)	172(119)	64(82)	37(49)	91(109)	35(45)	1,526(1,526)
Delivery care												
BEmOC signal functions performed	63(63)	49(49)	35(35)	36(36)	21(21)	34(34)	24(24)	25(25)	20(20)	43(42)	12(12)	361(361)
Essential drugs	63(63)	49(49)	35(35)	36(36)	21(21)	34(34)	24(24)	25(25)	20(20)	43(42)	12(12)	361(361)
Neonatal resuscitation	63(63)	49(49)	35(35)	36(36)	21(21)	34(34)	24(24)	25(25)	20(20)	43(42)	12(12)	361(361)
Immunization												
Availability of viable vaccines and syringes	122(122)	107(106)	45(45)	53(53)	32(32)	94(94)	38(38)	61(61)	45(45)	79(78)	27(27)	701(701)
Child curative care												
Antibiotics for children	190(190)	145(144)	67(67)	103(103)	41(41)	120(120)	51(51)	73(73)	52(52)	85(83)	34(34)	958(958)
ORS/Zinc for diarrhea	190(190)	145(144)	67(67)	103(103)	41(41)	120(120)	51(51)	73(73)	52(52)	85(83)	34(34)	958(958)
Malaria diagnosis and treatment capacity	190(190)	145(144)	67(67)	103(103)	41(41)	120(120)	51(51)	73(73)	52(52)	85(83)	34(34)	958(958)
ARI assessment	363(331)	232(216)	59(72)	150(158)	25(31)	182(163)	126(100)	88(105)	33(52)	44(61)	33(39)	1,334(1,328)
Diarrhea assessment	167(155)	73(68)	14(18)	44(46)	8(9)	56(56)	62(50)	29(35)	9(15)	19(25)	15(17)	496(494)
Anemia assessment	605(551)	340(318)	92(112)	238(254)	48(59)	287(263)	226(176)	128(155)	48(74)	101(139)	54(65)	2,166(2,166)
Nutritional assessment	605(551)	340(318)	92(112)	238(254)	48(59)	287(263)	226(176)	128(155)	48(74)	101(139)	54(65)	2,166(2,166)
WASH												
Basic services for WASH	221(222)	150(149)	68(68)	105(105)	41(41)	121(121)	52(52)	78(78)	53(53)	86(84)	34(34)	1,007(1,007)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 6 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Malawi SPA 2013-14

Service or indicator	North	Central	South	National
Family planning				
Method availability	140(142)	307(310)	361(358)	809(810)
Counseling on side effects	131(196)	754(668)	597(614)	1,482(1,478)
Antenatal care				
Blood pressure measurement	232(318)	884(851)	952(899)	2068(2,068)
Counseling on iron	90(134)	370(348)	410(377)	871(859)
Counseling on breastfeeding	232(318)	884(851)	952(899)	2068(2,068)
Delivery care				
BEmOC signal functions performed	102(103)	198(203)	227(234)	528(540)
Essential drugs	102(103)	198(203)	227(234)	528(540)
Neonatal resuscitation	102(103)	198(203)	227(234)	528(540)
Immunization				
Availability of viable vaccines and syringes	129(131)	255(260)	314(315)	698(706)
Child curative care				
Antibiotics for children	158(160)	338(342)	418(416)	915(918)
ORS/Zinc for diarrhea	158(160)	338(342)	418(416)	915(918)
Malaria diagnosis and treatment capacity	158(160)	338(342)	418(416)	915(918)
ARI assessment	318(412)	1,170(950)	653(715)	2,141(2,077)
Diarrhea assessment	121(151)	395(342)	294(319)	809(812)
Anemia assessment	488(629)	1,680(1,400)	1,161(1,300)	3,329(3,329)
Nutritional assessment	488(629)	1,680(1,400)	1,161(1,300)	3,329(3,329)
WASH				
Basic services for WASH	165(167)	362(364)	450(446)	977(977)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 7 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Nepal SPA 2015

Service or indicator	Eastern	Central	Western	Mid-Western	Far-Western	National
Family planning						
Method availability	204(196)	298(273)	201(165)	127(136)	89(106)	919(876)
Counseling on side effects	186(186)	332(296)	104(82)	64(76)	68(100)	754(740)
Antenatal care						
Blood pressure measurement	385(350)	661(563)	232(241)	135(167)	96(188)	1,509(1,509)
Counseling on iron	147(144)	212(194)	77(82)	52(74)	35(79)	524(573)
Counseling on breastfeeding	385(350)	661(563)	232(241)	135(167)	96(188)	1,509(1,509)
Delivery care						
BEmOC signal functions performed	86(134)	113(174)	85(112)	105(114)	67(87)	457(621)
Essential drugs	86(134)	113(174)	85(112)	105(114)	67(87)	457(621)
Neonatal resuscitation	86(134)	113(174)	85(112)	105(114)	67(87)	457(621)
Immunization						
Availability of viable vaccines and syringes	192(178)	279(246)	190(151)	123(125)	86(95)	870(795)
Child curative care						
Antibiotics for children	208(201)	307(291)	201(165)	129(139)	89(107)	934(903)
ORS/Zinc for diarrhea	208(201)	307(291)	201(165)	129(139)	89(107)	934(903)
Malaria diagnosis and treatment capacity	na	na	na	na	na	na
ARI assessment	190(219)	380(357)	128(144)	164(166)	86(127)	948(1,013)
Diarrhea assessment	108(86)	150(115)	55(60)	90(104)	73(102)	476(467)
Anemia assessment	495(485)	896(780)	285(312)	313(338)	197(271)	2,186(2,186)
Nutritional assessment	495(485)	896(780)	285(312)	313(338)	197(271)	2,186(2,186)
WASH						
Basic services for WASH	211(205)	308(294)	202(166)	130(141)	89(109)	940(915)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; na = not applicable; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 8 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Senegal SPA 2016 and 2017

Service or indicator	Dakar	Diourbel	Fatick	Kaffrine	Kaolack	Kedougou	Kolda	Louga	Matam	Saint-Louis	Sédhiou	Tamba-counda	Thiès	Ziguinchor	National
Family planning															
Method availability	101(90)	57(78)	74(70)	59(61)	83(68)	27(57)	94(62)	85(83)	46(65)	93(88)	41(69)	68(83)	155(98)	75(75)	1,058(1,047)
Counseling on side effects	116(92)	86(68)	51(53)	21(30)	24(26)	5(15)	15(17)	41(47)	22(32)	65(63)	34(49)	25(31)	83(62)	52(50)	639(635)
Antenatal care															
Blood pressure measurement	223(138)	77(64)	66(57)	38(61)	39(44)	8(22)	18(25)	57(65)	39(52)	66(72)	33(57)	26(31)	110(104)	48(57)	849(849)
Counseling on iron	91(58)	30(25)	29(25)	11(20)	16(18)	2(5)	5(6)	14(17)	18(22)	28(30)	14(24)	8(10)	32(29)	15(18)	313(307)
Counseling on breastfeeding	223(138)	77(64)	66(57)	38(61)	39(44)	8(22)	18(25)	57(65)	39(52)	66(72)	33(57)	26(31)	110(104)	48(57)	849(849)
Delivery care															
BEmOC signal functions performed	60(65)	55(70)	62(60)	38(43)	59(52)	23(52)	79(55)	74(70)	45(62)	62(58)	35(58)	57(67)	113(79)	70(70)	831(861)
Essential drugs	60(65)	55(70)	62(60)	38(43)	59(52)	23(52)	79(55)	74(70)	45(62)	62(58)	35(58)	57(67)	113(79)	70(70)	831(861)
Neonatal resuscitation	60(65)	55(70)	62(60)	38(43)	59(52)	23(52)	79(55)	74(70)	45(62)	62(58)	35(58)	57(67)	113(79)	70(70)	831(861)
Immunization															
Availability of viable vaccines and syringes	82(76)	51(57)	66(62)	64(64)	82(67)	34(70)	98(64)	78(74)	47(66)	81(75)	43(74)	67(80)	152(98)	76(75)	1,022(1,002)
Child curative care															
Antibiotics for children	109(102)	63(85)	85(82)	70(71)	98(81)	36(74)	107(74)	94(91)	46(64)	91(89)	45(78)	74(90)	167(109)	89(93)	1,174(1,183)
ORS/Zinc for diarrhea	109(102)	63(85)	85(82)	70(71)	98(81)	36(74)	107(74)	94(91)	46(64)	91(89)	45(78)	74(90)	167(109)	89(93)	1,174(1,183)
Malaria diagnosis and treatment capacity	109(102)	63(85)	85(82)	70(71)	98(81)	36(74)	107(74)	94(91)	46(64)	91(89)	45(78)	74(90)	167(109)	89(93)	1,174(1,183)
ARI assessment	91(80)	125(95)	60(53)	41(61)	51(62)	7(23)	21(28)	65(55)	19(30)	56(55)	27(45)	23(30)	115(78)	44(46)	746(741)
Diarrhea assessment	38(33)	43(35)	16(16)	15(25)	21(24)	2(8)	14(18)	28(21)	8(10)	34(31)	13(22)	11(14)	29(22)	13(12)	285(291)
Anemia assessment	146(125)	149(112)	87(78)	51(79)	57(72)	8(28)	33(45)	91(74)	50(63)	100(94)	43(72)	42(54)	142(102)	64(66)	1,064(1,064)
Nutritional assessment	146(125)	149(112)	87(78)	51(79)	57(72)	8(28)	33(45)	91(74)	50(63)	100(94)	43(72)	42(54)	142(102)	64(66)	1,064(1,064)
WASH															
Basic services for WASH	144(123)	63(85)	85(82)	72(74)	101(85)	37(76)	111(79)	96(94)	51(77)	96(92)	45(78)	75(91)	178(116)	93(97)	1,249(1,249)

Notes: ARI = acute respiratory infection; BEmOC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.

Appendix Table 9 Subnational and national weighted (and unweighted) samples of facilities and clients analyzed for each indicator, Tanzania SPA 2014-15

Service or indicator	Dar es															
	Dodoma	Arusha	Kili- manjaro	Tanga	Moro- goro	Pwani	Salaam	Lindi	Mtwara	Ruvuma	Iringa	Mbeya	Singida	Tabora	Rukwa	Kigoma
Family planning																
Method availability	51(41)	37(35)	42(35)	49(39)	44(38)	38(34)	43(41)	35(33)	31(30)	39(32)	30(31)	67(48)	30(31)	46(40)	30(29)	39(37)
Counseling on side effects	136(61)	40(44)	58(56)	109(74)	48(46)	21(24)	51(47)	109(81)	120(86)	112(100)	29(51)	67(83)	70(81)	68(59)	28(37)	87(88)
Antenatal care																
Blood pressure measurement	139(125)	104(147)	64(116)	148(92)	136(107)	56(69)	167(218)	74(88)	115(124)	188(236)	78(140)	151(164)	104(159)	342(159)	104(129)	363(217)
Counseling on iron	74(61)	48(63)	27(46)	60(42)	60(47)	24(27)	75(70)	27(32)	38(45)	92(101)	26(41)	60(51)	47(64)	158(70)	38(54)	173(107)
Counseling on breastfeeding	139(125)	104(147)	64(116)	148(92)	136(107)	56(69)	167(218)	74(88)	115(124)	188(236)	78(140)	151(164)	104(159)	342(159)	104(129)	363(217)
Delivery care																
BE mOC signal functions performed	47(40)	26(33)	36(37)	47(40)	54(45)	38(35)	22(41)	32(35)	35(35)	40(38)	37(36)	64(49)	32(35)	46(41)	30(33)	39(39)
Essential drugs	47(40)	26(33)	36(37)	47(40)	54(45)	38(35)	22(41)	32(35)	35(35)	40(38)	37(36)	64(49)	32(35)	46(41)	30(33)	39(39)
Neonatal resuscitation	47(40)	26(33)	36(37)	47(40)	54(45)	38(35)	22(41)	32(35)	35(35)	40(38)	37(36)	64(49)	32(35)	46(41)	30(33)	39(39)
Immunization																
Availability of viable vaccines and syringes	55(44)	39(38)	50(42)	49(39)	51(44)	36(33)	44(44)	35(37)	33(33)	43(40)	37(36)	64(50)	28(31)	48(41)	32(34)	39(37)
Child curative care																
Antibiotics for children	60(48)	52(45)	64(51)	55(43)	58(47)	45(40)	90(74)	35(37)	35(37)	47(42)	39(39)	72(52)	34(37)	48(43)	34(37)	43(41)
ORS/Zinc for diarrhea	60(48)	52(45)	64(51)	55(43)	58(47)	45(40)	90(74)	35(37)	35(37)	47(42)	39(39)	72(52)	34(37)	48(43)	34(37)	43(41)
Malaria diagnosis and treatment capacity	60(48)	52(45)	64(51)	55(43)	58(47)	45(40)	90(74)	35(37)	35(37)	47(42)	39(39)	72(52)	34(37)	48(43)	34(37)	43(41)
ARI assessment	85(86)	122(122)	126(109)	164(133)	169(103)	54(62)	66(101)	109(88)	133(89)	89(111)	67(104)	103(93)	113(150)	145(95)	52(70)	195(129)
Diarrhea assessment	47(52)	76(85)	63(56)	75(58)	95(69)	20(27)	34(51)	37(34)	61(37)	69(117)	39(65)	55(72)	82(84)	143(77)	28(41)	155(106)
Anemia assessment	145(147)	202(199)	210(184)	279(200)	339(185)	122(134)	190(238)	190(169)	246(167)	218(264)	106(150)	170(183)	167(204)	302(190)	91(130)	354(242)
Nutritional assessment	145(147)	202(199)	210(184)	279(200)	339(185)	122(134)	190(238)	190(169)	246(167)	218(264)	106(150)	170(183)	167(204)	302(190)	91(130)	354(242)
WASH																
Basic services for WASH	60(48)	52(45)	67(52)	59(47)	61(49)	45(41)	96(87)	35(37)	35(37)	47(42)	39(39)	72(53)	34(37)	50(44)	34(37)	43(41)

Continues...

Appendix Table 9—Continued

Service or indicator	Shinyanga	Kagera	Mwanza	Mara	Manyara	Njombe	Katavi	Simiyu	Geita	Kaskazini Unguja	Kusini Unguja	Mjini Magharibi	Kaskazini Pemba	Kusini Pemba	National	
Family planning																
Method availability	26(29)	41(32)	45(33)	38(34)	22(28)	34(29)	10(31)	28(32)	21(32)	5(18)	6(18)	6(10)	7(16)	6(17)	947(933)	
Counseling on side effects	38(57)	103(103)	80(63)	51(27)	55(69)	46(48)	29(70)	19(31)	36(63)	5(18)	10(27)	49(57)	9(15)	4(10)	1,689(1,676)	
Antenatal care																
Blood pressure measurement	125(132)	277(190)	155(196)	184(147)	97(145)	75(100)	35(127)	162(133)	184(181)	17(63)	13(49)	86(93)	216(74)	51(87)	4,007(4,007)	
Counseling on iron	61(59)	157(111)	99(98)	89(76)	52(76)	23(33)	20(70)	81(75)	92(88)	9(29)	4(14)	39(30)	76(29)	26(45)	1,853(1,754)	
Counseling on breastfeeding	125(132)	277(190)	155(196)	184(147)	97(145)	75(100)	35(127)	162(133)	184(181)	17(63)	13(49)	86(93)	216(74)	51(87)	4,007(4,007)	
Delivery care																
BErmoC signal functions performed	28(31)	43(41)	41(34)	40(39)	25(31)	38(38)	9(30)	29(33)	19(29)	2(8)	1(5)	1(4)	2(8)	2(8)	905(951)	
Essential drugs	28(31)	43(41)	41(34)	40(39)	25(31)	38(38)	9(30)	29(33)	19(29)	2(8)	1(5)	1(4)	2(8)	2(8)	905(951)	
Neonatal resuscitation	28(31)	43(41)	41(34)	40(39)	25(31)	38(38)	9(30)	29(33)	19(29)	2(8)	1(5)	1(4)	2(8)	2(8)	905(951)	
Immunization																
Availability of viable vaccines and syringes	26(28)	43(40)	46(36)	36(35)	23(28)	34(36)	11(33)	27(31)	19(30)	5(17)	6(18)	6(10)	7(16)	6(17)	974(998)	
Child curative care																
Antibiotics for children	32(35)	49(44)	58(43)	40(39)	27(32)	36(38)	11(35)	30(34)	23(35)	5(18)	7(20)	16(28)	8(20)	7(20)	1,160(1,154)	
ORS/Zinc for diarrhea	32(35)	49(44)	58(43)	40(39)	27(32)	36(38)	11(35)	30(34)	23(35)	5(18)	7(20)	16(28)	8(20)	7(20)	1,160(1,154)	
Malaria diagnosis and treatment capacity	32(35)	49(44)	58(43)	40(39)	27(32)	36(38)	11(35)	30(34)	23(35)	5(18)	7(20)	16(28)	8(20)	7(20)	1,160(1,154)	
ARI assessment	78(69)	236(160)	94(137)	67(63)	65(97)	44(66)	25(80)	92(99)	90(114)	34(66)	26(61)	41(36)	37(63)	38(72)	2,758(2,828)	
Diarrhea assessment	57(56)	111(101)	82(93)	32(38)	32(58)	18(40)	14(47)	60(61)	72(84)	5(11)	6(15)	17(15)	16(29)	6(13)	1,609(1,682)	
Anemia assessment	136(133)	380(260)	182(225)	143(116)	93(149)	81(121)	48(160)	129(140)	141(172)	50(101)	37(84)	83(76)	65(116)	64(122)	4,961(4,961)	
Nutritional assessment	136(133)	380(260)	182(225)	143(116)	93(149)	81(121)	48(160)	129(140)	141(172)	50(101)	37(84)	83(76)	65(116)	64(122)	4,961(4,961)	
WASH																
Basic services for WASH	32(35)	49(44)	59(46)	45(41)	27(33)	38(39)	11(35)	30(34)	23(35)	6(20)	7(20)	17(30)	8(20)	7(20)	1,188(1,188)	

Notes: ARI = acute respiratory infection; BErmoC = basic emergency obstetric care; ORS = oral rehydration salts; WASH = water, sanitation, and hygiene.