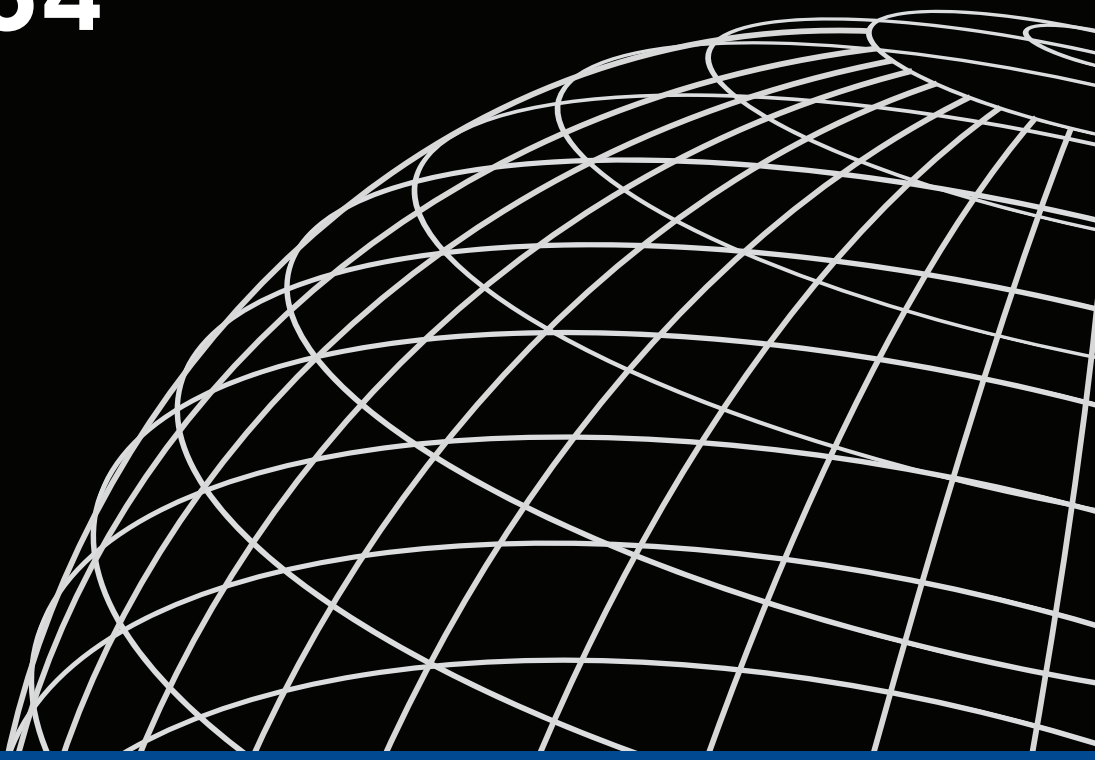
USAID
FROM THE AMERICAN PEOPLE

EQUITY IN EFFECTIVE COVERAGE OF ANTENATAL AND SICK CHILD CARE

DHS ANALYTICAL STUDIES 84



September 2022

This publication was produced for review by the United States Agency for International Development. It was prepared by Sara Riese, Shireen Assaf, and Thomas W. Pullum.

DHS Analytical Studies No. 84

Equity in Effective Coverage of Antenatal and Sick Child Care

Sara Riese[1,2]
Shireen Assaf[1,2]
Thomas W. Pullum[1,2]

ICF
Rockville, Maryland, USA

September 2022

[1] ICF
[2] The DHS Program

Corresponding author: Sara Riese, International Health and Development, ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; phone: +1 301-407-6500; fax: +1 301-407-6501; email: sara.riese@icf.com

Acknowledgments: The authors wish to thank Hannah Leslie and Lindsay Mallick for their helpful review and feedback on this paper.

Editor: Diane Stoy
Document Production: Joan Wardell and Chris Gramer

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.

Recommended citation:

Riese, Sara, Shireen Assaf, and Thomas W. Pullum. 2022. *Equity in Effective Coverage of Antenatal and Sick Child Care*. DHS Analytical Reports No. 84. Rockville, Maryland, USA: ICF.

CONTENTS

TABLES

FIGURES

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 analyze DHS data and provide findings that will be useful to policymakers and program managers in low- and middle-income countries. DHS Analytical Studies serve this objective by providing in-depth research on a wide range of topics, typically including several countries and applying multivariate statistical tools and models. These reports are also intended to illustrate research methods and applications of DHS data that may build the capacity of other researchers.

The topics 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 Analytical Studies will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries.

Sunita Kishor
Director, The DHS Program

ABSTRACT

Countries are increasingly using measures of effective coverage to evaluate the performance of their health care system. Examining inequities in effective coverage can unmask hidden variations within effective coverage estimates. This study looks at inequities in antenatal care and sick child effective coverage by place of residence, wealth quintile, and region in five countries—Haiti, Malawi, Nepal, Senegal, and Tanzania—using previously developed measures that combine data from the Demographic and Health Surveys and the Service Provision Assessment.

We first describe the components of the effective coverage cascade. We found that for antenatal care, disparities were most common in receipt of complete intervention (4+ antenatal care visits). This measure varied significantly by place of residence, wealth quintile, and region in all five countries. There was no consistent pattern to the disparities in measures of the components of sick child effective coverage. Senegal had the largest number of significant inequities in components of the antenatal care effective coverage cascade, while Haiti had the largest number of significant inequities in components of the sick child effective coverage cascade. Along the cascade, we see the largest absolute difference in intervention-adjusted coverage for antenatal care. For sick child care, no effective coverage estimate consistently had the largest absolute difference, and most differences were not statistically significant. Results show that there are greater and more frequent disparities in antenatal care quality-adjusted coverage when compared to the disparities in sick child quality-adjusted coverage.

This study demonstrates that national-level estimates of antenatal and sick child effective coverage hide some significant intra-national inequalities. Policymakers and program managers should consider approaches to disaggregating effective coverage measures whenever possible in order to identify populations most at risk and target them for interventions that increase their effective coverage and improve maternal and child health outcomes.

Key words: antenatal care, sick child care, effective coverage, quality of care, measurement, SPA, DHS, Haiti, Malawi, Nepal, Senegal, Tanzania

ACRONYMS AND ABBREVIATIONS

ANC	antenatal care
ARI	acute respiratory infection
DHS	Demographic and Health Survey Program
MCH	maternal and child health
SC	sick child
SDG	Sustainable Development Goals
SPA	Service Provision Assessment
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

1 BACKGROUND

Inequities in coverage of antenatal (ANC) and sick child care have been well established. Many studies have explored differences in ANC and sick child coverage or quality of care, and have found significant inequities by place of residence (rural/urban), socioeconomic status, maternal education, and region for ANC (Arsenault et al. 2018; Hategeka, Arsenault, and Kruk 2020; Nwosu and Ataguba 2019; Victora et al. 2010) and sick child coverage (Bradley, Rosapep, and Shiras 2020; Hategeka, Arsenault, and Kruk 2020; Koulidiati et al. 2018b; Mulholland et al. 2008). Many inequities persist when examining levels of quality of care received by clients when they access care (Sharma et al. 2017; Uwemedimo et al. 2018). Where quality has differed by wealth, these gradients show that the rich receive better quality of care (Arsenault et al. 2018; Sharma et al. 2017).

The inequities have a multiplicative effect on measures of effective coverage, which is defined as the "fraction of potential health gain that is actually delivered to the population through the health system, given its capacity" (Ng et al. 2014). In more simple terms, it is a way to measure coverage while accounting for the performance of the health system and the complete receipt of the intervention by the client. Effective coverage measurement has been recommended by WHO and UNICEF for health system performance measurement (Marsh et al. 2020; WHO 2016).

Despite the value of assessing effective coverage, there have been a limited number of studies that have examined equity in effective coverage. Of those, many rely on only Demographic Health Survey (DHS) or other household survey data to calculate effective coverage (Anindya et al. 2021; Hategeka, Arsenault, and Kruk 2020; Serván-Mori et al. 2022). This approach to estimating effective coverage has been shown to result in biased effective coverage estimates, while incorporating data from health facility surveys such as the Service Provision Assessment (SPA) results in more valid estimates of effective coverage (Riese, Assaf, and Pullum 2021). The DHS data, which rely on women's recall of the content of ANC and/or sick child care visits, have resulted in overestimates of quality (Blanc, Diaz, et al. 2016; Liu et al. 2013). One study that used a combination of household and health facility data found no differences in equity in sick child effective coverage by wealth quintile, although this study was limited to six regions in Burkina Faso (Koulidiati et al. 2018a). Another study, which used a mix of DHS-only and DHS and SPA data from Kenya to calculate effective coverage measures for multiple maternal and child health (MCH) interventions, found higher inequality for ANC and delivery services compared to management of diarrhea and management of acute respiratory infections for sick children (Nguhiu, Barasa, and Chuma 2017). Two studies that have combined DHS and SPA data examined regional disparities in effective coverage of facility delivery in Malawi, Nepal, Senegal, and Tanzania (Wang et al. 2019) and in ANC effective coverage in Senegal (Sauer et al. 2020). There are no identified studies that compared inequity in effective coverage measures across countries and interventions by place of residence, wealth status, and region.

Both pregnancy-related and under-5 mortality rates have been shown to be higher in rural settings compared to urban settings, and higher among households in lower wealth quintiles (Anyamele, Ukawuilulu, and Akanegbu 2017; Banda, Fylkesnes, and Sandøy 2015; Yaya, Bishwajit, and Shah 2016). Simply examining effective coverage at the national level will mask intra-national inequalities by place of residence, wealth, and region. Disaggregated effective coverage estimates will allow policy makers and program managers to identify the populations in the greatest need for interventions that can improve their health outcomes. Reaching the Sustainable Development Goal (SDG) of equitable distribution of health gains will require a

better understanding of the current distribution of effective coverage over wealth quintiles and urban/rural areas for key primary care services such as ANC and sick child care.

The present study sought to build upon previous work on the development of methodologies for effective coverage measurement, and to use those measures to assess inequities by place of residence, wealth quintile, and region in ANC and sick child effective coverage in five countries with available recent DHS and SPA data. Findings from this study will provide a better understanding of how disparities in coverage and quality translate into disparities in effective coverage measures of antenatal care and sick child care. Ministries of Health and other partners in the five countries in this study will be able to use the results to target populations in need of improved access to and quality of care as they work toward the ultimate goal of improving maternal and child health outcomes.

2 DATA AND METHODS

2.1 Data

The analysis is based on data from the DHS and SPA surveys in five countries—Haiti, Malawi, Nepal, Senegal, and Tanzania. These countries were selected because they had a recent DHS survey and a recent SPA survey completed within 2 years of each other. The Haiti and Malawi SPA surveys were census surveys that included all formal sector facilities in the country (public and private hospitals, health centers, and health posts). The remaining SPA surveys were based on a sample of facilities in the country. The list of surveys and the year they were conducted is provided in Table 1. For more detail on the SPA and DHS sampling procedure for each survey, please check the final reports available on The DHS Program website.

Table 1 Surveys in the analysis

Country	DHS survey	SPA survey
Haiti	2016–17	2017–18
Malawi	2015–16	2013–14
Nepal	2016	2015
Senegal	2018	2018
Tanzania	2015–16	2014–15

2.2 Components of Effective Coverage Estimates

Effective coverage is the level of coverage of a service adjusted for different aspects of its quality. In 2020, Marsh and colleagues described four measures that are required to calculate the effective coverage cascade—service contact, service readiness, receipt of the complete intervention, and process quality (Figure 1). The definitions of each measure are shown in Table 2 and the specific items in each measure are included in Appendix Table 1. These measures were developed as a part of earlier work on effective coverage measurement. Further details on the process of selection of the specific items for service readiness and process quality indices are detailed in earlier DHS publications (Riese, Assaf, and Pullum 2021). In that earlier work, we developed and compared multiple measures of the effective coverage components. The basic measures of service readiness and process quality were selected because they have results that are very similar to the expanded measures, although they are simpler to calculate and may be easier for countries and programs to replicate.

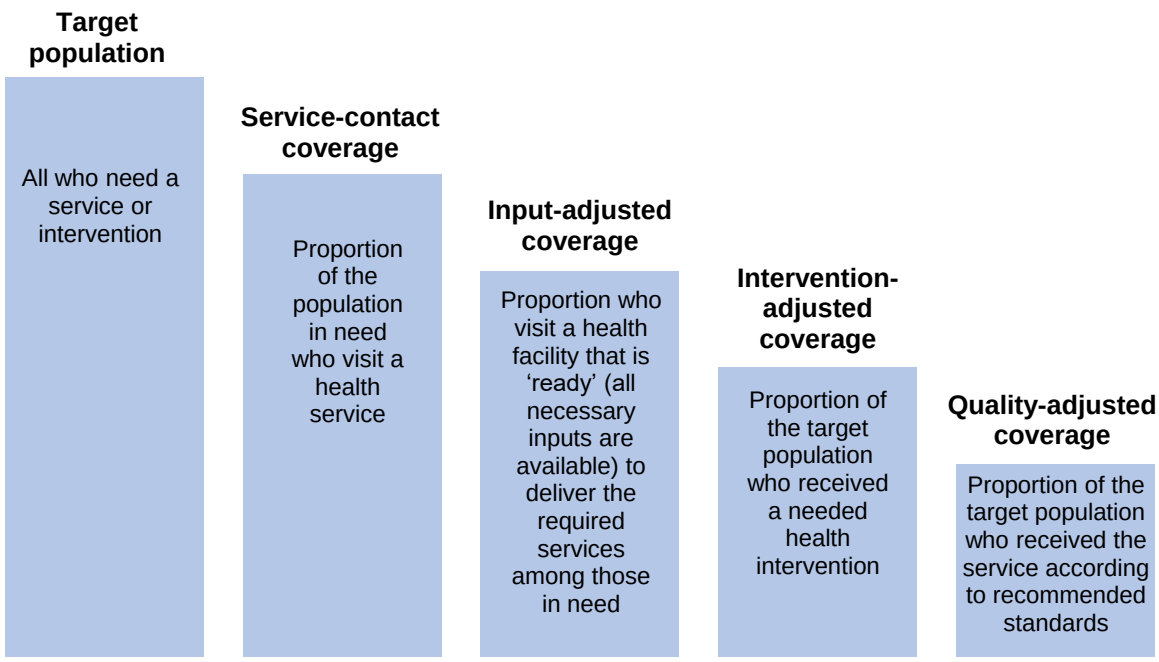
Table 2 Measures included in the components of the effective coverage cascade

Service contact	Service readiness	Receipt of complete intervention	Process quality
ANC: Women with at least one ANC visit with a skilled provider for the most recent birth among women who gave birth at least once in the last 5 years. A skilled provider was defined as a doctor, nurse, midwife, or other health worker.[a]	ANC: A composite index of basic readiness for ANC (3 items).	ANC: Women with a birth in the last 5 years who attended at least four ANC visits for the most recent birth.	ANC: A composite index of basic process quality for ANC (3 items).
Source: DHS	Source: SPA	Source: DHS	Source: SPA
Sick child care: Children who sought care at a health facility among children under age 5 who had diarrhea or ARI symptoms in the last 2 weeks.	Sick child care: A composite index of basic readiness for sick child care (4 items).	Sick child care: Children under age 5 who received appropriate treatment among children under age 5 who were diagnosed with diarrhea or pneumonia at a facility.[b]	Sick child care: A composite index of basic process quality for sick child care (6 items).
Source: DHS	Source: SPA	Source: SPA	Source: SPA

[a] Source of ANC is not asked—women who receive ANC from a skilled provider will be assumed to have received care in a health facility.
[b] Sick child complete intervention coverage measured with SPA.

With the measures described in Table 2 we calculated the effective coverage cascade, as shown in Figure 1. The first bar in the cascade is the target population, or all those who need the service or intervention, and each subsequent bar adjusts for an additional aspect of service delivery.

Figure 1 The effective coverage cascade



Source: Adapted from Amouzou et al. 2019

2.3 Calculating the Effective Coverage Cascade

To calculate each estimate in the cascade, each component shown in Table 2 (except for the first) is multiplied by the previous measure. The target population for ANC is all women who have been pregnant at least once in the previous 5 years, and for sick child care, all children under age 5 who had acute respiratory infection (ARI) symptoms or diarrhea in the past 2 weeks. Children under age 5 are defined as sick if they had symptoms of ARI or diarrhea in the 2 weeks before the survey. Symptoms of ARI were defined as short, rapid breaths and a problem in the chest. The measure of service-contact coverage is therefore the product of the target population and service contact. Input-adjusted coverage is the product of service-contact coverage and the service readiness component, and so forth. Calculations of the antenatal care effective coverage cascade are shown in Table 3 and calculations of the sick child effective coverage cascade are shown in Table 4.

Table 3 Calculation of antenatal care effective coverage cascade

	Measures			
Steps in effective coverage cascade	**Service Contact**	**Service Readiness**	**Receipt of complete intervention**	**Process quality**
Service-contact	Women with at least one ANC visit with a skilled provider for the most recent birth among women who gave birth at least once in the previous 5 years			
Input-adjusted	Women with at least one ANC visit with a skilled provider for the most recent birth among women who gave birth at least once in the last 5 years **X**	Average readiness across ANC facilities using the basic facility readiness index		
Intervention-adjusted	Women with at least one ANC visit with a skilled provider for the most recent birth among women who gave birth at least once in the last 5 years **X**	Average readiness across ANC facilities using the basic facility readiness index **X**	Women with 4+ ANC visits at a health facility among women who gave birth at least once in the last 5 years	
Quality-adjusted	Women with at least one ANC visit with a skilled provider for the most recent birth among women who gave birth at least once in the last 5 years **X**	Average readiness across ANC facilities using the basic facility readiness index **X**	Women with 4+ ANC visits at a health facility among women who gave birth at least once in the last 5 years **X**	Average process quality across ANC facilities using the basic process quality index

Note: Each coverage measure is the product of the previous measures, except for the service-contact coverage. Reference to “basic” facility readiness and process quality indices indicate that the basic readiness and process quality measures from Riese, Assaf, and Pullum 2021 were used in this analysis.

Table 4 Calculation of sick child care effective coverage cascade

Steps in effective coverage cascade	Measures							
	Service Contact		Service Readiness		Receipt of complete intervention		Process quality	
Service-contact	Children who sought care at a health facility among children under age 5 who had diarrhea or ARI symptoms in the last 2 weeks							
Input-adjusted	Children who sought care at a health facility among children under age 5 who had diarrhea or ARI symptoms in the last 2 weeks	X	Average readiness across sick child care facilities using the basic facility readiness index					
Intervention-adjusted	Children who sought care at a health facility among children under age 5 who had diarrhea or ARI symptoms in the last 2 weeks	X	Average readiness across sick child care facilities using the basic facility readiness index	X	Children under age 5 who received appropriate treatment among children under age 5 who were diagnosed with diarrhea or pneumonia at a facility			
Quality-adjusted	Children who sought care at a health facility among children under age 5 who had diarrhea or ARI symptoms in the last 2 weeks	X	Average readiness across sick child care facilities using the basic facility readiness index	X	Children under age 5 who received appropriate treatment among children under age 5 who were diagnosed with diarrhea or pneumonia at a facility	X	Average process quality across sick child care facilities using the basic process quality index	

Note: Each coverage measure is the product of the previous measures except for the service-contact coverage. Reference to "basic" facility readiness and process quality indices indicate that the basic readiness and process quality measures from Riese, Assaf, and Pullum 2021 were used in this analysis.

The characteristics on which the data were disaggregated for assessment of inequalities were measured with three variables:

- **Place of residence (urban/rural).** Country census definitions were used to characterize rural and urban residence or locations of health facilities.
- **Wealth quintiles.** In the DHS, each household is asked about ownership of a range of assets and housing materials. Those responses are used to calculate a household wealth index. Wealth quintiles are then calculated based on the distribution of the index across the de jure population in the country. Additional details on the construction of the household wealth index and quintiles are available in previous DHS publications (Rutstein 2008; Rutstein and Johnson 2004).
- **Region.** For Haiti and Malawi, we used the first administrative-level designations. In Nepal, Senegal, and Tanzania, these first administrative-level designations were combined in some way to form a smaller number of geographic zones. These groupings were based on commonly used groupings in the country or groupings that had been used in previous DHS or SPA reports. The alignment of administrative levels across DHS and SPA in this analysis is shown in Appendix Table 2.

Place of residence and region were available in both DHS and SPA data, except for Nepal where place of residence is not available for the SPA data. This means that each component of the effective coverage

cascade was available for the disaggregated population. For example, input-adjusted coverage for the urban population in a country was calculated by multiplying the proportion of the target population who live in urban areas who sought care by the average readiness score among facilities in urban areas. Wealth index information was only available from the DHS data. This means that service-contact coverage was calculated for sick children in each of the five wealth quintiles. For the subsequent effective coverage estimates, the service-contact coverage measure for that quintile was multiplied by the national readiness score for all facilities to provide a quintile-specific input-adjusted coverage. Each quintile-specific input-adjusted coverage estimate was then multiplied by the national receipt of complete intervention measure to provide a quintile-specific complete intervention coverage. This was then multiplied by the national process quality score to provide a quintile-specific quality-adjusted coverage.

Confidence intervals were calculated for the cascaded effective coverage using the *nlcom* command in Stata. *nlcom* is a post-estimation command that uses a very general, automated application of the delta method described by Sauer et al. (2020) to estimate the standard errors. A 95% confidence interval is calculated by adding +/-1.96 * the standard error to the point estimate. Confidence intervals are then shifted slightly to account for the need to be entirely between 0 and 1. This is done by treating the effective coverage estimate as if it were a probability whose logit has a normal sampling distribution. Further details on the statistical approach to calculating the confidence intervals can be found in our earlier paper (Riese, Assaf, and Pullum 2021).

Significant differences were determined by nonoverlapping confidence intervals within at least two categories of disaggregation. All analyses were conducted using Stata 17. The analysis accounted for sampling design, and weights were included when calculating each step in the effective coverage cascade.

The main results are displayed by country. Within each country, the ANC results are presented first, and then we summarize the components of the effective coverage cascade. Those are followed by figures that show the effective coverage cascade by place of residence, wealth status, and region, and then by sick child care results. Following the within-country results are plots of differences by measures across countries within the service area.

3 RESULTS

The results section is organized by country. Within each country, results are presented by type of place of residence (urban/rural), and then by wealth quintile and region.

Tables 5–9 show the estimates for each measure used in the cascade calculations, for ANC and sick child care for each country, while Appendix Tables 3–7 summarize the effective coverage cascade estimates. Since the Haiti and Malawi SPA surveys were a census of health facilities, the readiness measure that only relies on the SPA health facility data does not have confidence intervals in Tables 5 and 6. The SPA data did not contain information on the wealth index for all countries. For Nepal, there was no information on place of residence. Therefore, for Tables 5–9, measures of readiness and process quality by wealth quintile are the same as the total for all countries, and in Nepal, this was the case for place as residence as well.

Following the tables, the figures summarize the effective coverage cascades for ANC and sick child for each country and by place of residence, wealth quintile, and region.

3.1 Haiti

There are ten regions, which are called départments, within Haiti. The six urban zones of the Ouest Region comprise the Aire Métropolitaine around the capital of Port-au-Prince to form an eleventh region for the purpose of this analysis. Just over 50% of the population lives in rural areas. Nearly 5,000 (4,890) women had at least one live birth in the 5 years before the DHS survey, and 5,867 children under age 5 were included in the sample (Institut Haïtien de l'Enfance–IHE/Haiti and ICF 2018).

Table 5 shows the estimates for each measure used in the cascade calculations for Haiti for both ANC and sick child care. Service-contact coverage is high with 91% of women who attended at least one ANC visit for their last pregnancy in the past 5 years. This ranged from 90% in rural areas to 94% in urban areas, but does not differ significantly. However, this differed significantly by wealth quintile with service-contact coverage that increased with increasing wealth quintile, with ranges from 83% for women in the lowest wealth quintile to 98% for women in the highest wealth quintile. This also differed slightly by regions with ranges from 88% in Sud-Est to 96% in Nippes.

Table 5 shows that the average level of ANC readiness among all health facilities in Haiti was 70%. This differed significantly from 64% for facilities in rural areas compared with 80% for facilities in the urban areas. Readiness also differed significantly by regions with the lowest level of readiness for ANC services found in health facilities in the Artibonite Region (59%) and the highest in Nippes (80%).

Approximately two-thirds of women (67%) had at least four ANC visits for their last birth in the previous 5 years. This differed significantly by place of residence, wealth quintile, and region. Rural women had a lower level of attendance for at least four ANC visits (61%) compared with urban women (76%). Attendance of at least four ANC visits increased with increasing wealth quintile from a low of 48% for women in the lowest wealth quintile to 87% in the highest. By region, attendance of at least four ANC visits ranged from 59% in Reste-Ouest and Sud regions to 75% in the Nord-Est Region.

The average ANC process quality level at facilities in Haiti was 59%. This was approximately the same for urban and rural areas. However, this differed by region with the lowest level of ANC process quality found in Aire Métropolitaine compared with 65% in Nippes.

Table 5 Estimates of each component of Haiti's effective coverage measurement, by residence, wealth quintile, and department. Proportions with 95% confidence intervals

	Coverage	Readiness	Receipt of complete intervention	Process quality
ANC				
Total	0.91 [0.90, 0.93]	0.70	0.67 [0.64, 0.69]	0.59 [0.57, 0.60]
Place of residence		*	*	
Urban	0.94 [0.92, 0.95]	0.80	0.76 [0.72, 0.79]	0.58 [0.56, 0.60]
Rural	0.90 [0.88, 0.92]	0.64	0.61 [0.58, 0.64]	0.59 [0.57, 0.62]
Wealth quintile	*	NA	*	NA
Lowest	0.83 [0.79, 0.85]		0.48 [0.44, 0.53]	
Second	0.91 [0.88, 0.93]		0.58 [0.54, 0.62]	
Middle	0.93 [0.90, 0.95]		0.69 [0.65, 0.74]	
Fourth	0.95 [0.93, 0.96]		0.76 [0.72, 0.80]	
Highest	0.98 [0.95, 0.99]		0.87 [0.83, 0.90]	
Region	*	*	*	*
Aire Métropolitaine	0.91 [0.88, 0.94]	0.78	0.71 [0.65, 0.75]	0.53 [0.49, 0.57]
Reste-Ouest	0.90 [0.84, 0.93]	0.72	0.59 [0.50, 0.67]	0.58 [0.55, 0.61]
Sud-Est	0.92 [0.85, 0.95]	0.62	0.63 [0.53, 0.71]	0.61 [0.54, 0.67]
Nord	0.93 [0.90, 0.96]	0.78	0.72 [0.64, 0.79]	0.59 [0.55, 0.62]
Nord-Est	0.95 [0.91, 0.97]	0.61	0.75 [0.69, 0.81]	0.63 [0.58, 0.68]
Artibonite	0.90 [0.87, 0.93]	0.59	0.66 [0.61, 0.72]	0.60 [0.55, 0.65]
Centre	0.93 [0.89, 0.96]	0.74	0.73 [0.65, 0.79]	0.58 [0.54, 0.62]
Sud	0.88 [0.83, 0.92]	0.69	0.59 [0.50, 0.67]	0.64 [0.56, 0.70]
Grand-Anse	0.91 [0.87, 0.94]	0.66	0.64 [0.56, 0.70]	0.59 [0.52, 0.66]
Nord-Ouest	0.96 [0.93, 0.97]	0.65	0.67 [0.62, 0.71]	0.63 [0.58, 0.67]
Nippes	0.94 [0.90, 0.96]	0.80	0.71 [0.62, 0.78]	0.65 [0.52, 0.76]
SICK CHILD CARE				
Total	0.26 [0.23, 0.29]	0.73	0.45	0.46 [0.43, 0.49]
Place of residence	*	*		
Urban	0.32 [0.27, 0.39]	0.69	0.42 [0.35, 0.50]	0.49 [0.44, 0.54]
Rural	0.22 [0.19, 0.25]	0.75	0.48 [0.41, 0.56]	0.43 [0.39, 0.47]
Wealth quintile	*	NA	NA	NA
Lowest	0.19 [0.16, 0.23]			
Second	0.24 [0.19, 0.30]			
Middle	0.29 [0.22, 0.37]			
Fourth	0.31 [0.25, 0.38]			
Highest	0.29 [0.22, 0.37]			
Region	*	*		
Aire Métropolitaine	0.37 [0.28, 0.48]	0.56	0.43 [0.32, 0.54]	0.53 [0.47, 0.60]
Reste-Ouest	0.13 [0.08, 0.22]	0.59	0.41 [0.31, 0.52]	0.46 [0.39, 0.53]
Sud-Est	0.20 [0.11, 0.33]	0.80	0.40 [0.23, 0.59]	0.46 [0.35, 0.57]
Nord	0.24 [0.18, 0.32]	0.81	0.43 [0.26, 0.61]	0.46 [0.40, 0.52]
Nord-Est	0.30 [0.22, 0.40]	0.79	0.28 [0.06, 0.68]	0.47 [0.34, 0.61]
Artibonite	0.27 [0.21, 0.33]	0.71	0.48 [0.34, 0.63]	0.41 [0.33, 0.48]
Centre	0.31 [0.23, 0.41]	0.83	0.56 [0.37, 0.74]	0.40 [0.33, 0.48]
Sud	0.27 [0.21, 0.34]	0.90	0.36 [0.17, 0.60]	0.45 [0.35, 0.56]
Grand-Anse	0.23 [0.17, 0.32]	0.84	0.68 [0.39, 0.87]	0.35 [0.25, 0.46]
Nord-Ouest	0.21 [0.14, 0.30]	0.83	0.32 [0.15, 0.56]	0.30 [0.22, 0.40]
Nippes	0.27 [0.17, 0.40]	0.91	0.59 [0.33, 0.81]	0.38 [0.24, 0.55]

* = non-overlapping confidence intervals.
ANC = antenatal care
NA = not applicable. Disaggregated data not available.
Note: Estimates that do not include a confidence interval indicate that the SPA data was a census at the facility level.

Table 5 also summarizes the measures for sick child care. Service-contact coverage for sick child care is lower when compared to ANC. Only 26% of children under age 5 with diarrhea or ARI symptoms in the last 2 weeks received care at a health facility. This differed significantly by place of residence with a lower level of care received among children living in rural areas (22%) compared with urban areas (32%). This also differed by wealth quintile with the lowest level of service-contact coverage among children in the lowest wealth quintile (19%) compared with the highest level (31%) among children in the fourth wealth quintile. There was little variability between the second, middle, fourth, and highest wealth quintiles. Larger disparities were observed by region with only 13% of children from the Reste-Ouest Region that sought care for their symptoms at a health facility compared with 31% in the Center Region.

The average readiness for sick child care in health facilities in Haiti was 73%. This was found to be higher in rural areas (75%) compared with urban areas (69%). There were also large disparities in this estimate by region with facilities in Aire Métropolitaine, having just over 50% readiness for sick child care (56%) compared with approximately 90% for facilities in Sud-Est and Nippes.

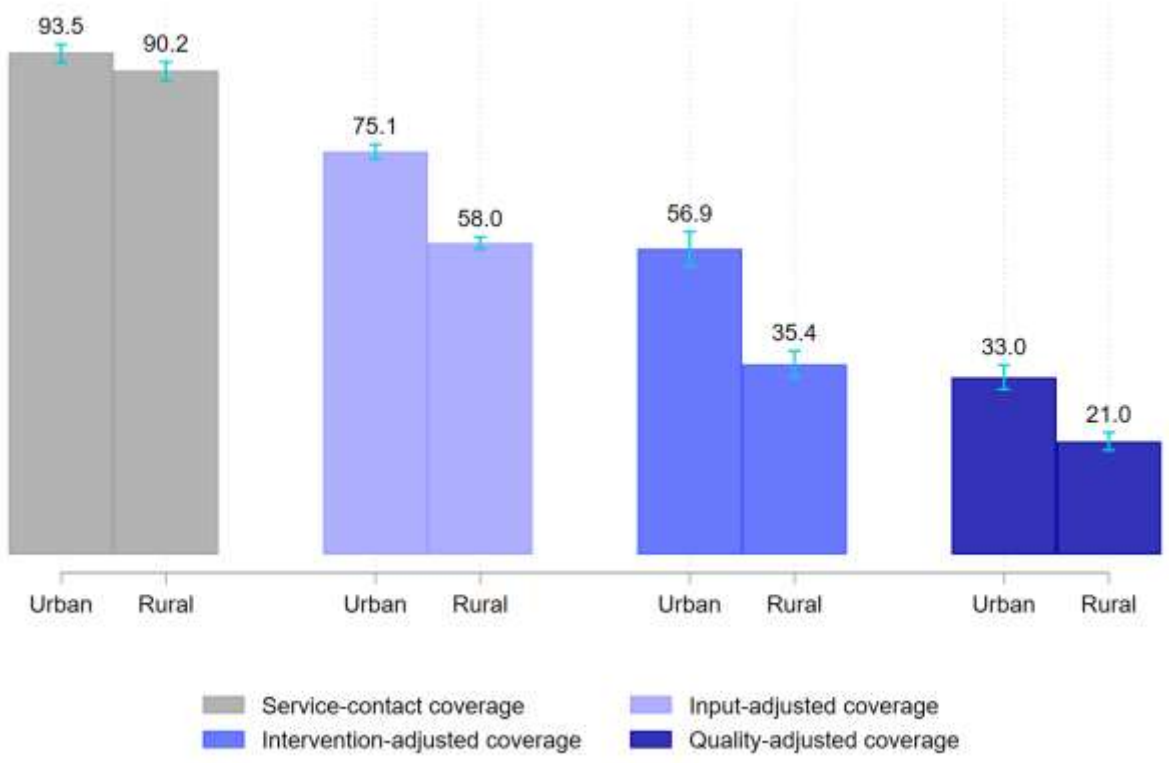
Fewer than half (45%) of children under age 5 diagnosed with diarrhea or pneumonia received appropriate treatment at a health facility. This did not differ significantly by place of residence or region due to the wide confidence intervals. Approximately 42% of children received appropriate care in urban areas compared with 48% in the rural areas. By region, this ranged from 28% in the Nord-Est Region to 68% in Grand-Anse.

Facilities had less than half (46%) average sick child care process quality scores in Haiti. Facilities in rural areas had sick child process quality scores of 43% compared with 49% in the urban areas. By region, this ranged from 30% in Nord-Ouest to 53% in Aire Métropolitaine. However, given the large uncertainty in the estimates, we were unable to detect significant differences by place of residence or region.

3.1.1 Place of residence

Figure 2 summarizes the effective coverage cascade for ANC in Haiti by place of residence. The ANC service-contact coverage is high and was similar in both the urban and rural areas—over 90%. However, there are large declines at each step of the effective coverage cascade and larger declines for rural compared to urban areas. We also observe significant disparities between urban and rural areas for the remaining cascades estimates. When readiness is considered, the resulting input-adjusted coverage is reduced to 75% in urban areas and 58% in the rural areas. After adjusting for attendance of at least four ANC visits, the intervention-adjusted coverage reduces to 57% in urban areas and 35% in the rural areas. Finally, when considering the process quality of care, the quality-adjusted coverage is 33% in urban areas and 21% in the rural areas.

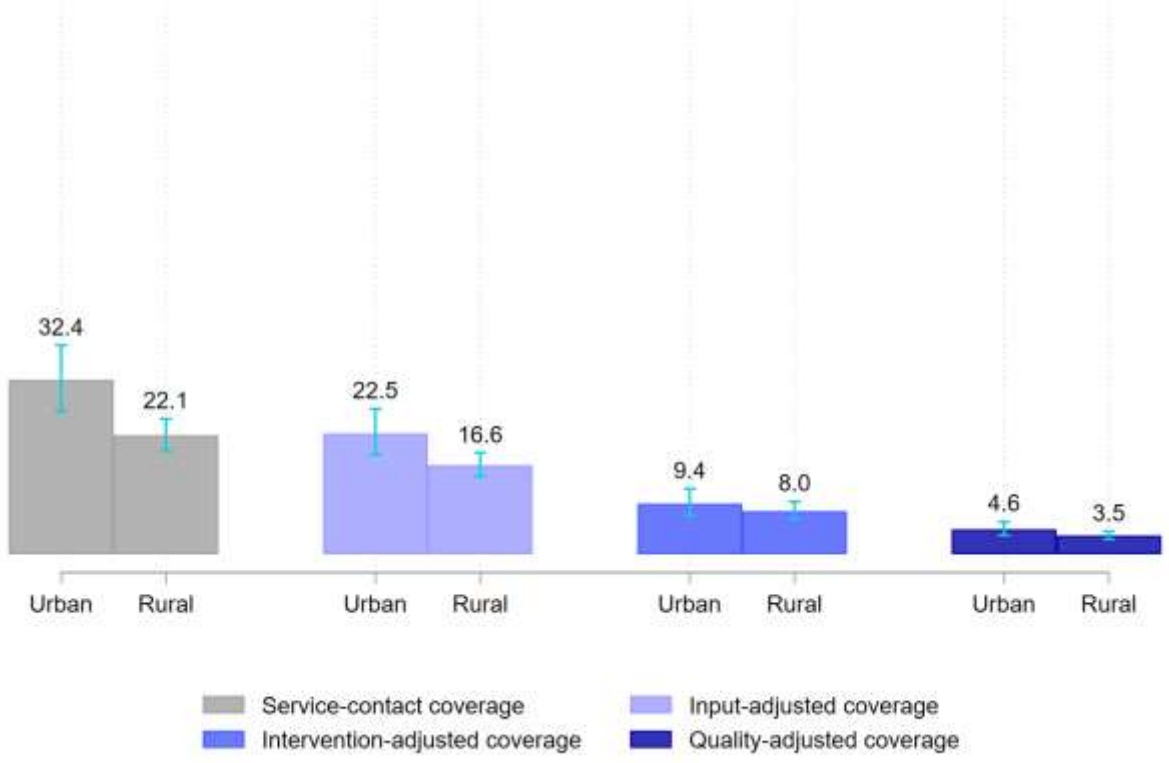
Figure 2 ANC effective coverage cascade, Haiti, by residence



ANC = antenatal care

Figure 3 shows much lower levels of coverage for sick child care compared to ANC. We also see reductions with each step in the cascade, although these were not as large as with ANC. There was a significant disparity between urban (32%) and rural (22%) areas in the percentage of children who sought care at a health facility for their diarrhea or ARI symptoms. The remaining cascade estimates by place of residence were similar and had overlapping confidence intervals. When readiness in sick child care was considered, the resulting input-adjusted coverage dropped to 23% in urban areas and 17% in rural areas. When adjusted for receiving appropriate care in health facilities, the intervention-adjusted coverage is reduced to 9% in urban areas and 8% in the rural areas. Finally, when the quality of care the child receives at the facility is considered, the quality-adjusted coverage is less than 5% for both the urban and rural areas.

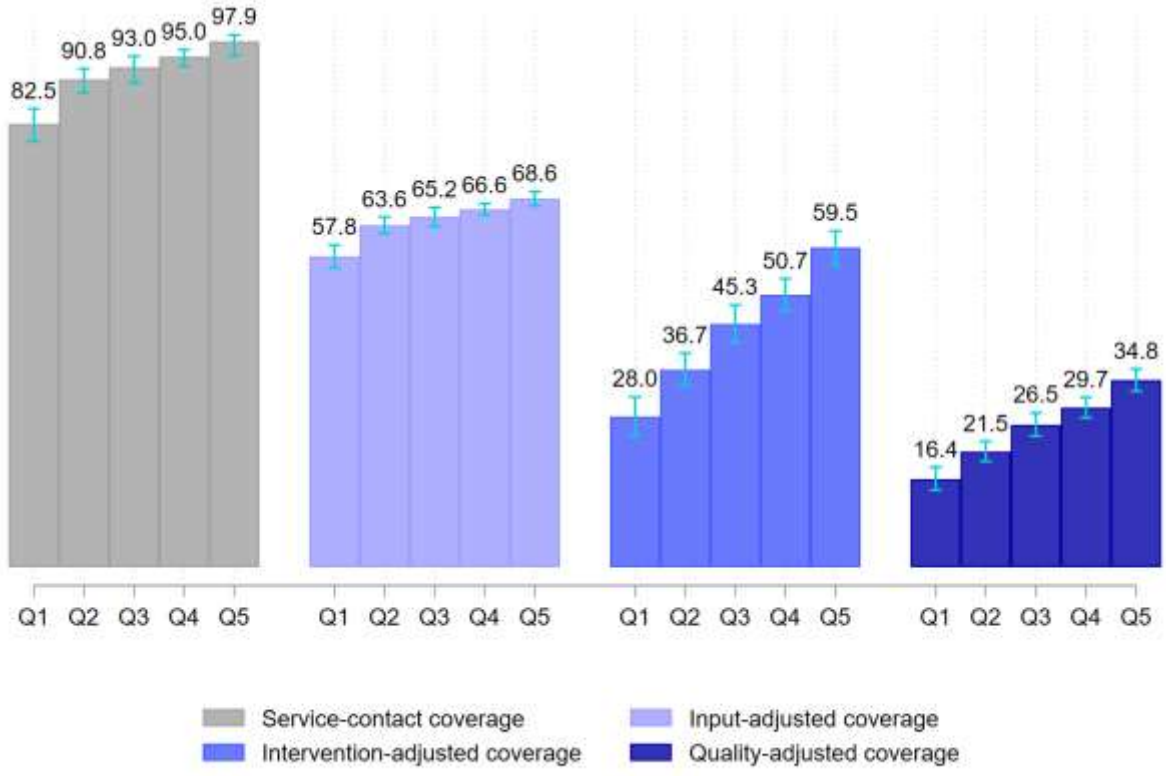
Figure 3 SC effective coverage cascade, Haiti, by residence



3.1.2 Wealth quintiles

Figure 4 shows the effective coverage cascade for ANC by wealth quintile. There are relatively high levels of service-contact coverage by wealth quintile, with more than 80% of women who have had at least one ANC visit for their last pregnancy for all quintiles. There was a large disparity in this estimate between women from the lowest wealth quintile (83%) compared with the highest (98%). We observe a large decrease in coverage when readiness of the facilities is considered. Input-adjusted coverage was similar in the second to highest wealth quintiles (64–69%), but was significantly lower for the lowest wealth quintile (58%). After adjusting for women who attend at least four ANC visits, there is a further drop in the resulting intervention-adjusted coverage; this decrease was considerably larger for the lowest wealth quintile that was reduced to 28% (by almost half from the previous cascade estimate). The intervention-adjusted coverage was 60% among women in the highest wealth quintile. The final step in the cascade further declines when we consider the quality of ANC care received at the facilities. We also observe significant differences by wealth quintile with this quality-adjusted coverage ranging from 16% for the lowest wealth quintile compared with 35% in the highest wealth quintile.

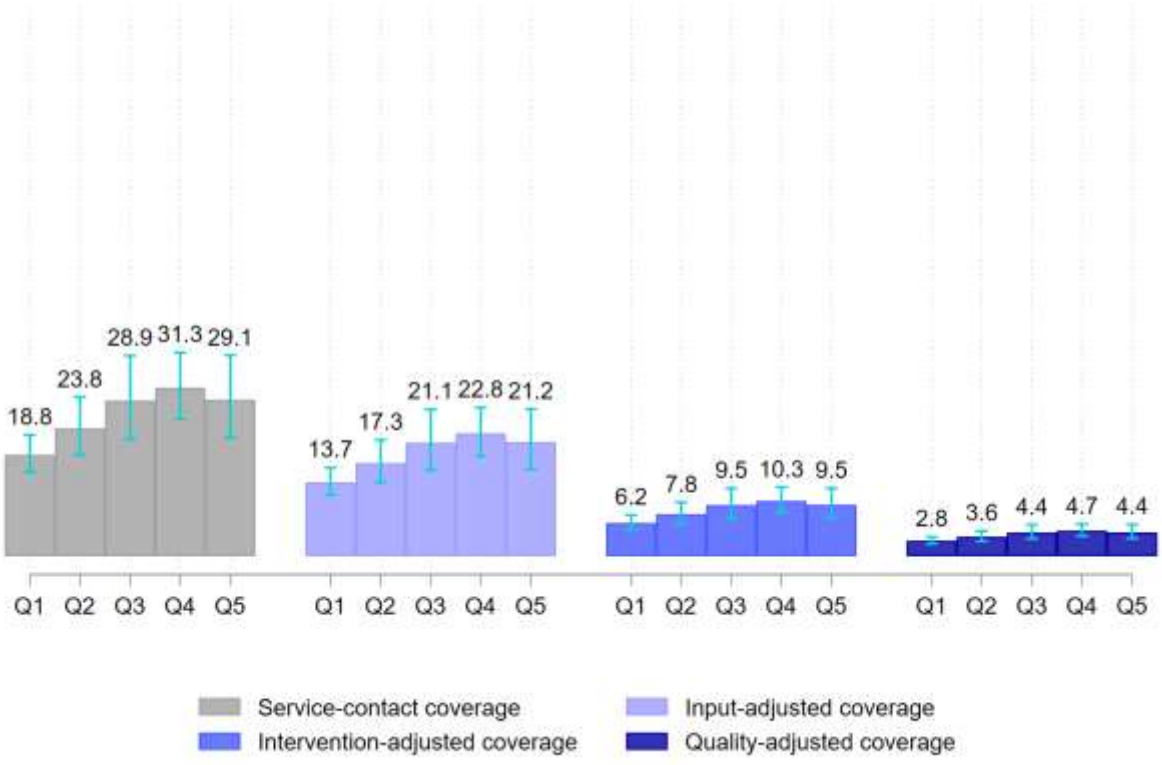
Figure 4 ANC effective coverage cascade, Haiti, by wealth quintile



ANC = antenatal care
Q = quintile

Figure 5 shows that less than one-third of children had service-contact coverage. This differed primarily between the first two wealth quintiles (19% and 24%, respectively) and the remaining quintiles (approximately 30% for the three quintiles). This pattern is also observed when we account for the facilities readiness for sick child care. The input-adjusted coverage is reduced to 14% in the lowest wealth quintile and 17% in the second quintile, and was similar for the middle to highest quintiles (between 21% to 23%). However, when we adjust for the quality of sick child care provided, the inequities by wealth quintile are smaller and range from 6% for the lowest wealth quintile to approximately 10% to 11% in the middle to highest quintiles. After adjusting for quality of sick child care received, there are even smaller disparities by wealth quintile, which range from 3% in the lowest quintile to 5% in the fourth quintile.

Figure 5 SC effective coverage cascade, Haiti, by wealth quintile



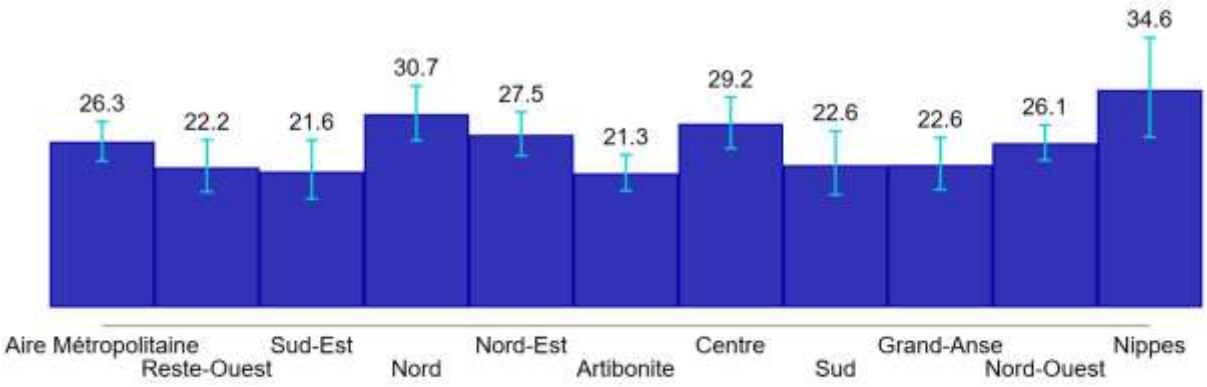
SC = sick child
Q = quintile

3.1.3 Regional disparities

Appendix Table 3 shows the effective coverage cascade estimates for ANC and sick child care by regions in Haiti. As with the cascades by residence and wealth quintile, we observe declines with every step in the cascade. The final step in the cascade is represented in Figure 6 for ANC and Figure 7 for sick child care.

Figure 6 shows that there is little variability in quality-adjusted coverage for ANC by region, although some regions differed significantly. The lowest was found in five regions with 21% to 22% in Reste-Ouest, Sud-Est, Artibonite, Sud, and Grand-Anse. The highest was found in Nippes (35%), followed by Nord (31%), and Centre (29%).

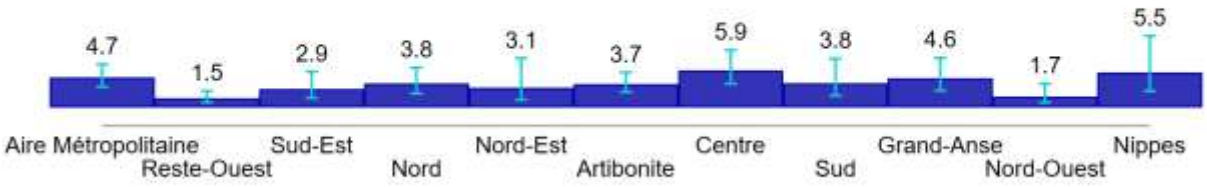
Figure 6 ANC quality-adjusted coverage, Haiti, by region



ANC = antenatal care

Figure 7 shows very little variability in quality-adjusted coverage for sick child care by region, although some regions differed significantly. This was less than 6% for all regions, and ranged from approximately 2% in Reste-Ouest and Nord-Ouest to 5% to 6% in the Aire Métropolitaine, Centre, and Nippes Regions.

Figure 7 SC quality-adjusted coverage, Haiti, by region



SC = sick child

3.2 Malawi

Malawi has three regions: North, Central, and South. In Malawi, 82% of the population lives in rural areas. A total of 13,515 women had at least one live birth in the 5 years before the DHS survey, and 16,548 children under age 5 were included in this analysis (National Statistical Office/Malawi and ICF 2017).

Table 6 summarizes the estimates used in the cascade calculations for Malawi. Table 6 shows that ANC service-contact coverage is almost universal, with 98% of women attending at least one ANC visit for their last pregnancy in the previous 5 years. Consistently high levels are seen by place of residence, wealth, or region with all estimates by categories ranging between 97% to 99%. The average level of ANC readiness among all facilities in Malawi was 50%. This differed significantly by place of residence and region. Rural facilities had an average level of readiness of 45% compared with 71% for urban facilities. By region, this ranged from 46% in the South to 53% in the Central Region.

Almost half of women (51%) had at least four ANC visits for their last birth in the previous 5 years. This differed significantly by place of residence, wealth quintile, and region. A little less than half of the rural women attended at least four ANC visits (49%), compared with 59% of the urban women. Attendance of at least four ANC visits was relatively similar between the lowest and fourth wealth quintile (48% to 50%), but then increased to 60% for the highest wealth quintile. The South Region had the lowest level of four ANC visits (48%) compared with 52% to 53% in the remaining two regions.

The average ANC process quality level at facilities in Malawi was 49%, and was similar in urban (50%) and rural (48%) areas. There was a relatively larger disparity by region with the lowest level of ANC process quality found in South (47%) compared with the North Region (58%).

Table 6 Estimates of each component of Malawi's effective coverage measurement, by residence, wealth quintile, and region. Proportions with 95% confidence intervals

	Coverage	Readiness	Receipt of complete intervention	Process quality
		ANC		
Total	0.98 [0.98, 0.99]	0.50	0.51 [0.49, 0.52]	0.49 [0.47, 0.51]
Place of residence		*	*	
Urban	0.99 [0.98, 0.99]	0.71	0.59 [0.55, 0.63]	0.50 [0.45, 0.55]
Rural	0.98 [0.98, 0.98]	0.45	0.49 [0.48, 0.51]	0.48 [0.46, 0.51]
Wealth quintile		NA	*	NA
Lowest	0.97 [0.96, 0.98]		0.48 [0.45, 0.50]	
Second	0.98 [0.98, 0.99]		0.49 [0.46, 0.51]	
Middle	0.98 [0.97, 0.98]		0.49 [0.46, 0.51]	
Fourth	0.99 [0.98, 0.99]		0.50 [0.47, 0.53]	
Highest	0.99 [0.98, 0.99]		0.60 [0.56, 0.63]	
Region		*	*	*
North	0.99 [0.99, 1.00]	0.51 [0.51, 0.51]	0.52 [0.49, 0.54]	0.58 [0.54, 0.63]
Central	0.99 [0.98, 0.99]	0.53 [0.53, 0.53]	0.53 [0.51, 0.55]	0.48 [0.45, 0.52]
South	0.97 [0.96, 0.98]	0.46 [0.46, 0.46]	0.48 [0.47, 0.50]	0.47 [0.44, 0.50]
		SICK CHILD CARE		
Total	0.53 [0.50, 0.55]	0.85	0.92	0.29 [0.27, 0.32]
Place of residence		*		
Urban	0.48 [0.42, 0.54]	0.88	0.92 [0.84, 0.96]	0.28 [0.23, 0.34]
Rural	0.54 [0.51, 0.56]	0.84	0.91 [0.89, 0.93]	0.29 [0.27, 0.32]
Wealth quintile	*	NA	NA	NA
Lowest	0.55 [0.51, 0.60]			
Second	0.50 [0.46, 0.55]			
Middle	0.54 [0.50, 0.58]			
Fourth	0.58 [0.53, 0.62]			
Highest	0.44 [0.39, 0.50]			
Region		*		
North	0.57 [0.51, 0.62]	0.87	0.89 [0.82, 0.94]	0.22 [0.17, 0.29]
Central	0.52 [0.49, 0.56]	0.88	0.93 [0.90, 0.96]	0.32 [0.29, 0.36]
South	0.52 [0.49, 0.55]	0.81	0.90 [0.84, 0.93]	0.27 [0.23, 0.32]

* = non-overlapping confidence intervals
ANC = antenatal care
NA = not applicable. Disaggregated data not available.
Note: Estimates that do not include a confidence interval indicate that the SPA data was a census at the facility level.

Table 6 shows that approximately half (53%) of children under age 5 with diarrhea or ARI symptoms in the last 2 weeks received care at a health facility. This did not differ greatly by place of residence, which ranged from 48% in urban areas to 54% in the rural areas. However, there was greater variability by wealth quintile. The lowest level of service-contact coverage was found for children in the highest (44%) and second wealth quintiles (50%), and was the highest in the fourth wealth quintile (58%). By region, approximately half of children under age 5 with symptoms from the Central and South regions sought care at a health facility, compared with 57% of children from the North Region.

There was a relatively high level of average readiness for sick child care in health facilities in Malawi at 85%. This was higher in urban areas (88%) compared with rural areas (84%). This also differed by region

with an average readiness for sick child care of 81% in health facilities in the South Region compared with 87% to 88% in the North and Central regions.

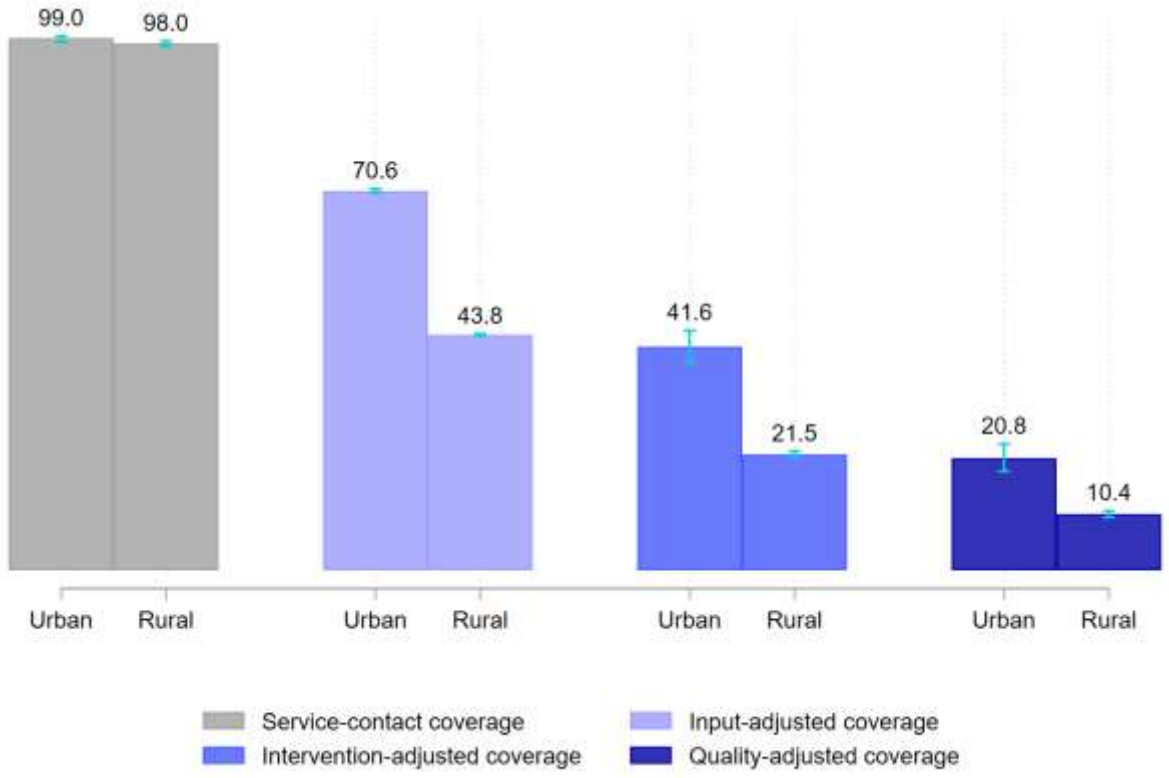
Almost all (92%) of children under age 5 diagnosed with diarrhea or pneumonia received appropriate treatment at a health facility. These high levels were seen across place of residence and region, with the estimates ranging from 89% in the North Region to 93% in the Central Region.

The average sick child care process quality scores in health facilities in Malawi was less than one-third (29%). This was very similar for the urban (28%) and rural (29%) facilities. By region, disparities were not statistically significant, and ranged from 22% in the North to 32% in the Central Region.

3.2.1 Place of residence

Figure 8 shows an almost universal level of ANC service-contact coverage in both urban and rural areas (over 98%). However, there are large decreases with each step in the cascade, and much larger decreases for rural compared to urban areas that resulted in significant differences for the three remaining coverage estimates. When readiness is considered, the input-adjusted coverage is reduced to 71% in urban areas and 44% in the rural areas. When we consider the attendance of at least four ANC visits, the resulting intervention-adjusted coverage drops to 42% in urban areas and 22% in the rural areas. Finally, when the process quality of care is considered, the quality-adjusted coverage is only 21% in urban areas and 10% in the rural areas.

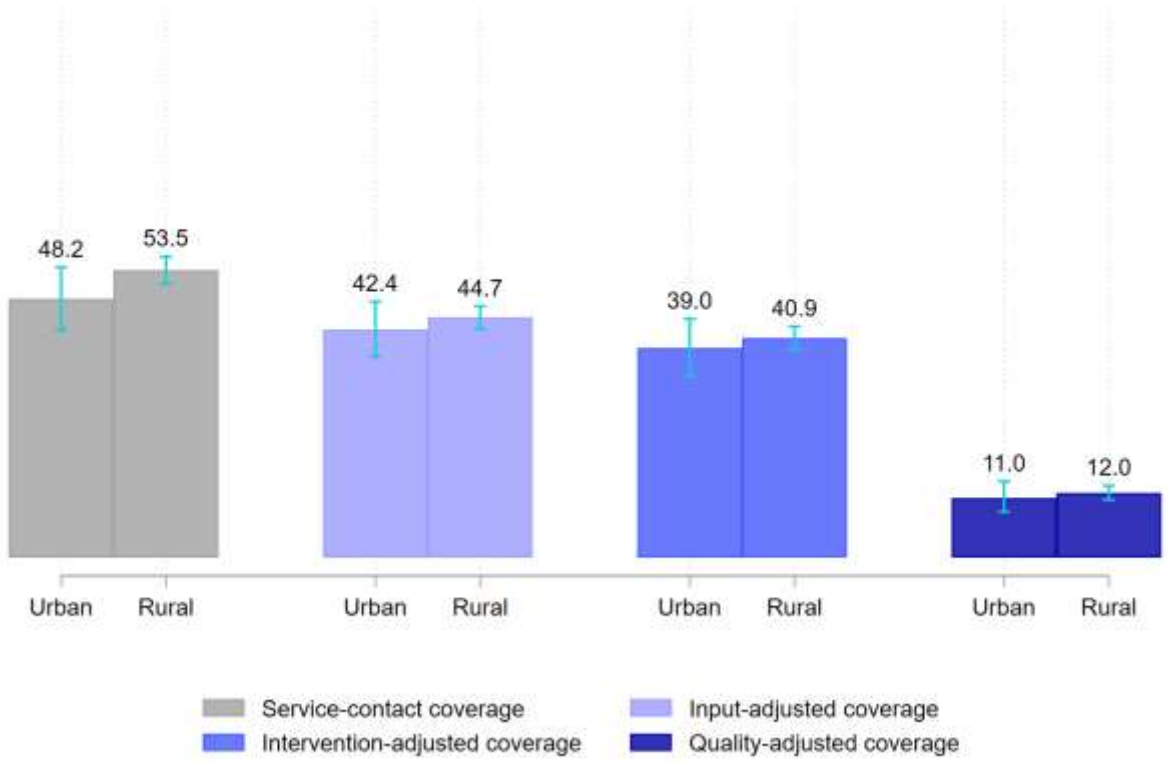
Figure 8 ANC effective coverage cascade, Malawi, by residence



ANC = antenatal care

As shown in Figure 9, approximately half of the children received care for symptoms. This was similar by place of residence. This was reduced slightly when sick child readiness was considered, with the resulting input-adjusted coverage reduced to 42% in urban areas and 45% in the rural areas, with no significant difference. There was also a minimal reduction after considering if the appropriate care was received. The largest decrease was in the last step of the cascade when the quality of care was considered. Rural and urban areas have nearly identical quality-adjusted coverage estimates with 11% of quality-adjusted coverage in urban areas compared with 12% in the rural areas.

Figure 9 SC effective coverage cascade, Malawi by residence



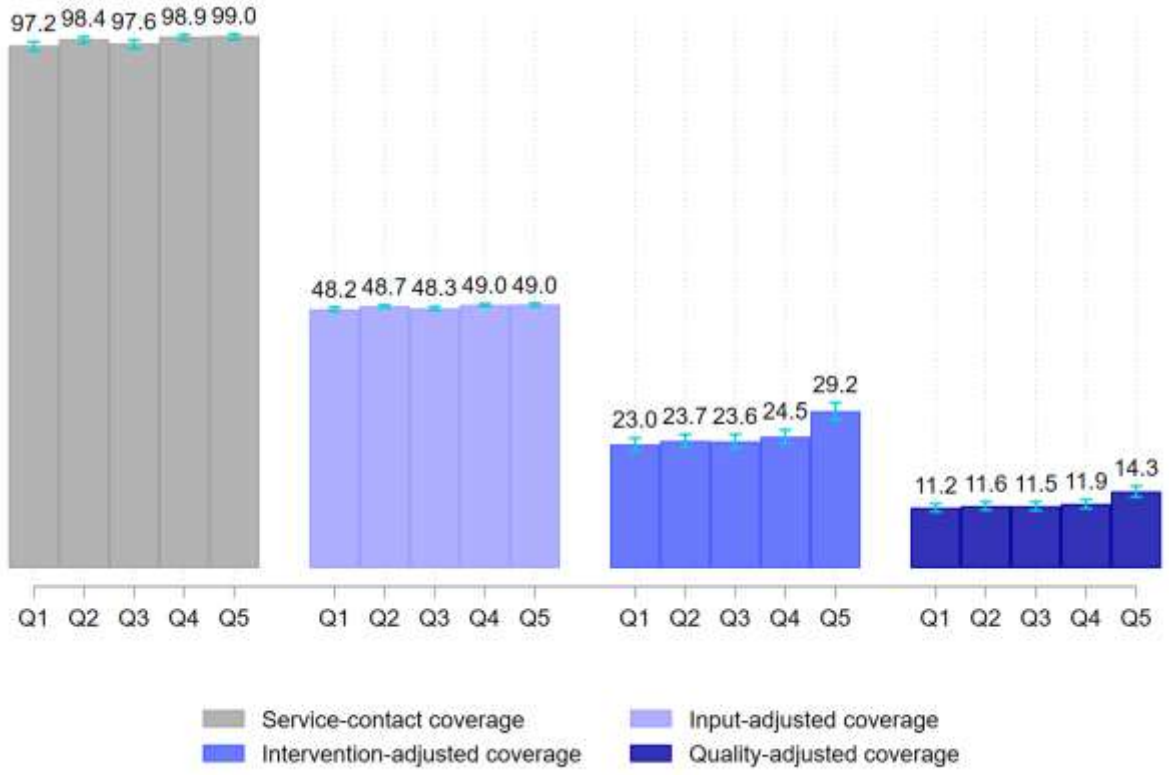
SC = sick child

3.2.2 Wealth quintiles

Figure 10 shows a much lower level of variability in the estimates for ANC service-contact coverage by wealth index compared to the large inequities observed by place of residence. From the almost complete service-contact coverage by all wealth quintiles (97% to 99%), this drops to approximately half when readiness is considered and with no significant differences between the wealth quintiles (48% to 49%). There is a further drop by approximately half when we account for women attending at least four ANC visits. Input-adjusted coverage is similar across the lowest to the fourth quintiles (23% to 25%), but there was a significantly higher intervention-adjusted coverage among women in the highest wealth quintile (29%). The last step in the cascade, after adjusting for quality of care received in facilities, resulted in another reduction by about half. A similar pattern to the previous cascade was observed, with similar

estimates from the lowest to the fourth quintiles (11% to 12%), but with significantly higher quality-adjusted coverage for women in the highest wealth quintile (14%), although the disparity is relatively small.

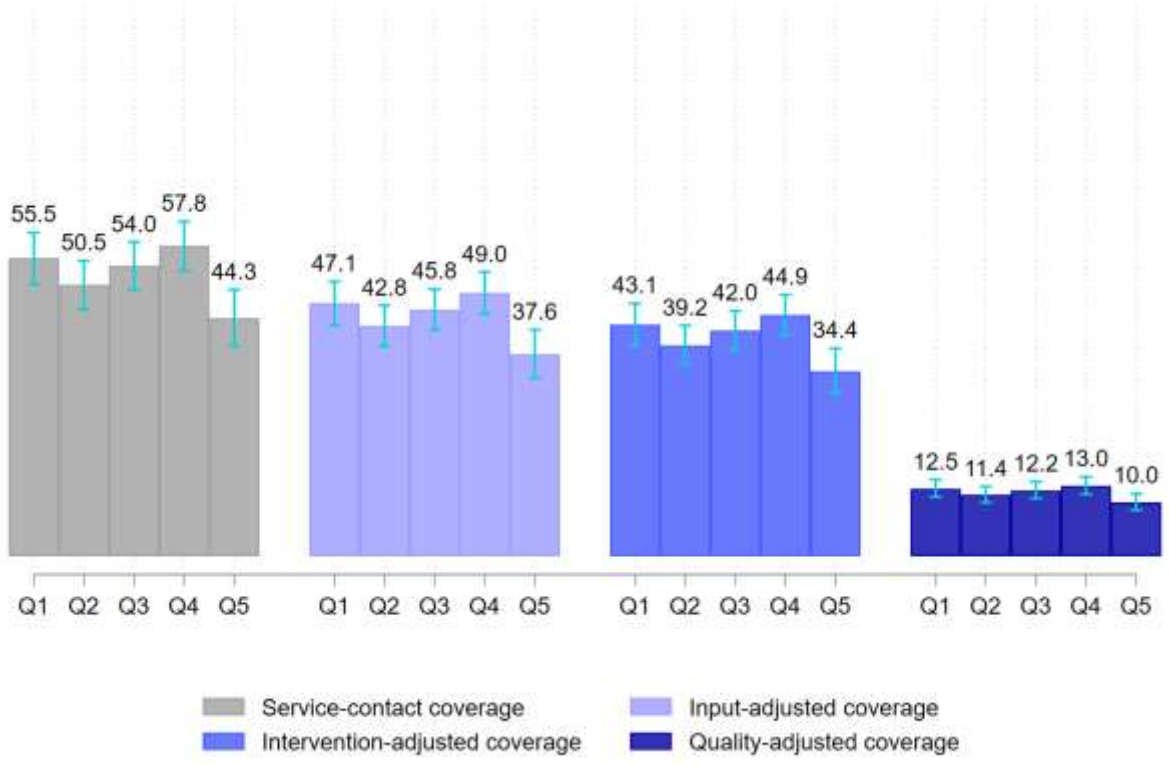
Figure 10 ANC effective coverage cascade, Malawi, by wealth quintile



ANC = antenatal care
Q = quintile

Figure 11 summarizes the sick child care effective coverage cascade in Malawi by wealth quintiles, where we observe similar patterns as with these estimates by place of residence. In general, we observe no significant differences in service-contact coverage in the first four wealth quintiles where approximately half of children with diarrhea or ARI symptoms sought care in a health facility. This was slightly lower for children in the highest wealth quintile at 44%. The reduction, after taking into account readiness of facilities in sick child care, was minimal and again with lower levels of coverage for children in the highest wealth quintile (38%) compared with the remaining quintiles (43% to 49%). We observe another minimal reduction after taking into account if children received appropriate care, with an intervention coverage that was the lowest for children in the highest wealth quintile (34%), compared with the remaining quintiles that have no significant variations (39% to 45%). However, after adjusting for quality of care received, there is a large decline, with very similar estimates for all wealth quintiles (10% to 13%) that did not differ significantly.

Figure 11 SC effective coverage cascade, Malawi, by wealth quintile

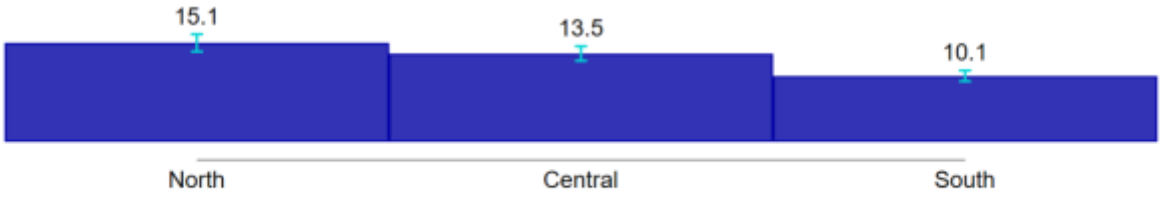


SC = sick child
Q = quintile

3.2.3 Regional disparities

In Appendix Table 4, we see the effective coverage cascade for ANC and sick child care by regions in Malawi. Similar patterns were observed by region as with place of residence and wealth quintile. For ANC, there were small but significant differences by region with lower coverage estimates in the South Region. The quality-adjusted coverage step represented in Figure 12 also shows small disparities between the regions, but with a significantly lower level in the South Region (10%) compared with the Central (14%) and North regions (15%).

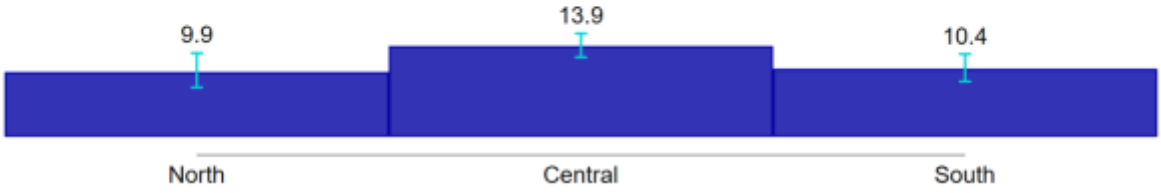
Figure 12 ANC quality-adjusted coverage, Malawi, by region



ANC = antenatal care

For sick child care, there are again minimal decreases at each step of the cascade until the final step (Appendix Table 4). We also observe few differences by region in each step of the cascade that did not differ significantly. In the final step, as shown in Figure 13, the quality-adjusted coverage ranged from 10% in the South Region to 14% in the North Region.

Figure 13 SC quality-adjusted coverage, Malawi, by region



SC = sick child

3.3 Nepal

Nepal has 75 districts distributed across the country. The districts are divided into five development regions. Sixty-three percent of the population lives in urban areas. Nearly 4,000 women age 15–49 had a live birth in the 5 years before the DHS survey, and 4,887 children under age 5 were included in the survey sample (Ministry of Health - MOH/Nepal, New ERA/Nepal, and ICF 2017).

Table 7 summarizes the estimates used in the cascade calculations for Nepal for ANC and sick child care, and shows that almost all women (94%) attended at least one ANC visit for their last pregnancy in the last 5 years. Antenatal care coverage was similar by place of residence (92% in rural and 95% in urban areas) but differed slightly by wealth and region. By wealth, service-contact coverage was the lowest for women in the lowest wealth quintile (87%), but there was little variation between the second and highest wealth quintiles (93% to 98%). While still relatively high, women from the Mid-Western Region had the lowest level of service-contact coverage (91%), although this was similar for the remaining regions (93% to 96%).

In Nepal, the average level of ANC readiness in facilities was 61%. While we could not test if this differed significantly by place of residence or wealth quintile (since both these variables were not in the Nepal SPA data), this differed significantly by region. By region, readiness to provide ANC care ranged from 57% in the Central Region to 74% in the Mid-Western Region.

A little over two-thirds of women in Nepal (69%) had at least four ANC visits for their last birth in the previous 5 years. This differed significantly by place of residence, wealth quintile, and region. Three-fourths of women living in urban areas attended at least four ANC visits compared with 62% of women in the rural

areas. This measure also increased with increasing wealth quintile with ranges from 57% for women in the lowest wealth quintile to 87% for women in the highest wealth quintile. By region, we observe the lowest level of at least four ANC visits for women in the Central Region (63%) compared with women in the Far-Western Region (77%).

The average ANC process quality level at facilities in Nepal was 51%. Inequity by region showed little variability with a range from 48% in the Central Region to 54% in the Western Region.

Table 7 Estimates of each component of Nepal's effective coverage measurement, by residence, wealth quintile, and region. Proportions with 95% confidence intervals

	Coverage	Readiness	Receipt of complete intervention	Process quality
ANC				
Total	0.94 [0.93, 0.95]	0.61 [0.58, 0.63]	0.69 [0.67, 0.72]	0.51 [0.48, 0.54]
Place of residence		NA	*	NA
Urban	0.95 [0.94, 0.97]		0.75 [0.72, 0.78]	
Rural	0.92 [0.90, 0.94]		0.62 [0.57, 0.66]	
Wealth quintile	*	NA	*	NA
Lowest	0.87 [0.84, 0.89]		0.57 [0.52, 0.61]	
Second	0.93 [0.91, 0.95]		0.65 [0.60, 0.70]	
Middle	0.97 [0.94, 0.98]		0.67 [0.61, 0.72]	
Fourth	0.97 [0.94, 0.98]		0.75 [0.71, 0.78]	
Highest	0.98 [0.95, 0.99]		0.87 [0.83, 0.91]	
Region	*	*	*	
Eastern	0.96 [0.94, 0.98]	0.59 [0.54, 0.64]	0.74 [0.70, 0.78]	0.52 [0.42, 0.61]
Central	0.93 [0.91, 0.95]	0.57 [0.52, 0.61]	0.63 [0.58, 0.68]	0.48 [0.45, 0.52]
Western	0.95 [0.93, 0.96]	0.59 [0.52, 0.66]	0.72 [0.65, 0.77]	0.54 [0.49, 0.59]
Mid-Western	0.91 [0.88, 0.93]	0.74 [0.68, 0.79]	0.69 [0.64, 0.73]	0.53 [0.48, 0.58]
Far-Western	0.96 [0.93, 0.97]	0.62 [0.56, 0.67]	0.77 [0.72, 0.82]	0.53 [0.49, 0.58]
SICK CHILD CARE				
Total	0.47 [0.40, 0.55]	0.61 [0.59, 0.63]	0.78 [0.72, 0.82]	0.35 [0.30, 0.40]
Place of residence		NA	NA	NA
Urban	0.42 [0.31, 0.53]			
Rural	0.54 [0.45, 0.63]			
Wealth quintile		NA	NA	NA
Lowest	0.46 [0.33, 0.59]			
Second	0.44 [0.32, 0.55]			
Middle	0.54 [0.42, 0.65]			
Fourth	0.52 [0.40, 0.64]			
Highest	0.37 [0.19, 0.61]			
Region			*	
Eastern	0.55 [0.43, 0.66]	0.57 [0.54, 0.61]	0.74 [0.61, 0.84]	0.29 [0.18, 0.43]
Central	0.35 [0.23, 0.50]	0.64 [0.60, 0.67]	0.69 [0.57, 0.78]	0.30 [0.22, 0.40]
Western	0.64 [0.49, 0.78]	0.64 [0.59, 0.69]	0.81 [0.69, 0.89]	0.49 [0.36, 0.62]
Mid-Western	0.59 [0.44, 0.72]	0.57 [0.53, 0.60]	0.87 [0.77, 0.93]	0.37 [0.28, 0.47]
Far-Western	0.37 [0.24, 0.52]	0.61 [0.56, 0.66]	0.91 [0.85, 0.95]	0.42 [0.32, 0.52]

* = non-overlapping confidence intervals
ANC = antenatal care
NA = not applicable. Disaggregated data not available.
Note: Estimates that do not include a confidence interval indicate that the SPA data was a census at the facility level.

In Table 7, approximately half (47%) of children under age 5 with diarrhea or ARI symptoms in the previous 2 weeks received care at a health facility. Care seeking was similar by place of residence, wealth quintile, or region due to the large uncertainty in the estimates. While not statistically different, 48% of children in

the urban areas received care for their symptoms compared with 54% in rural areas. By wealth, this ranged from 37% in the lowest quintile compared with 54% in the middle quintile. By region, this ranged from 37% in the Far-Western Region compared with 64% in the Western Region.

The average readiness for sick child care in health facilities in Nepal was 61%. We could not observe disparities in readiness by place of residence or wealth quintile. By region, there were no significant disparities with readiness of facilities ranging from 57% to 61% across the regions.

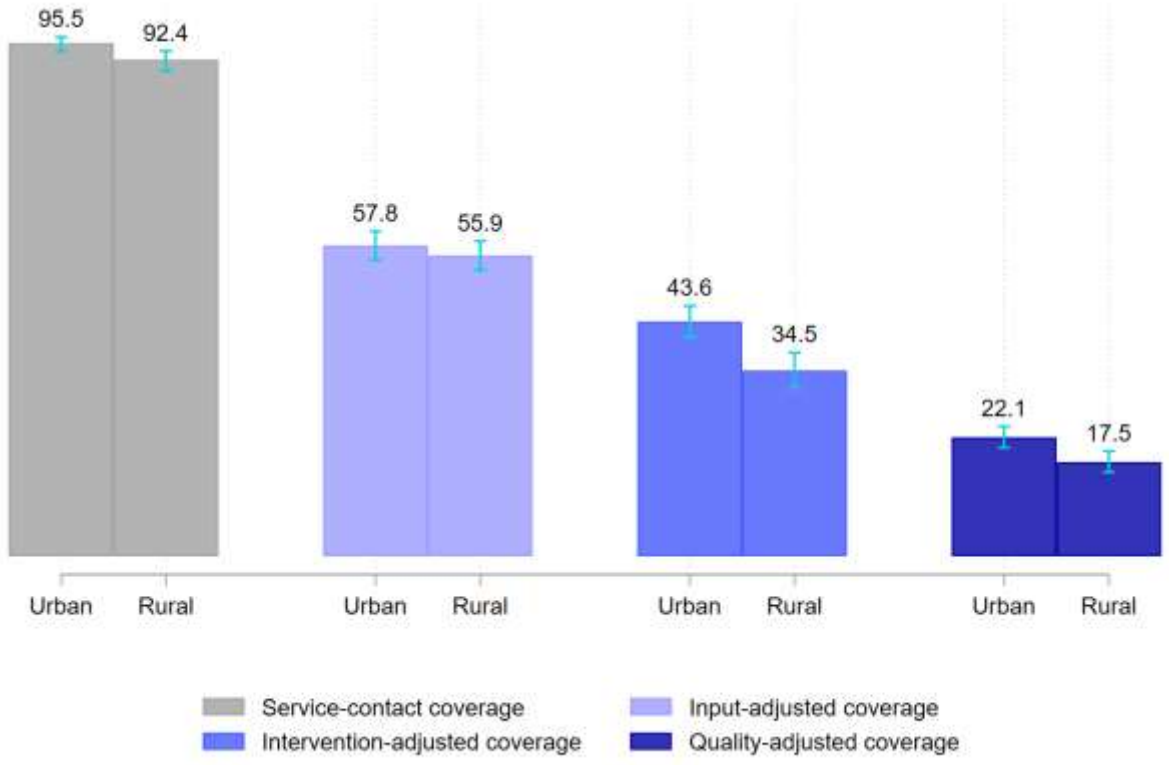
A little over three-quarters (78%) of children under age 5 diagnosed with diarrhea or pneumonia received appropriate treatment at a health facility. There were some significant inequities by region. The lowest level of receiving appropriate care was found for children in the Central Region (69%) compared with women in the Far-Western Region (91%).

The average sick child care process quality scores in health facilities in Nepal were approximately one-third (35%). These scores were likely similar by region due to the large uncertainty in the estimates, with ranges from approximately 30% in Eastern and Central regions to 49% in the Western Region.

3.3.1 Place of residence

Figure 14 shows a very high level of service-contact coverage that did not differ significantly by urban and rural areas (both over 92%). However, this dropped to almost half after considering the readiness of facilities to provide ANC care, although there was no significant disparity between the urban (58%) and rural (56%) areas. After considering the attendance of four ANC visits, the resulting intervention-adjusted coverage differed significantly by place of residence and dropped to 44% in urban areas and 35% in the rural areas. When we account for quality of care received for ANC at facilities, the quality-adjusted coverage differed significantly by place of residence with 22% in urban areas and 18% in the rural areas.

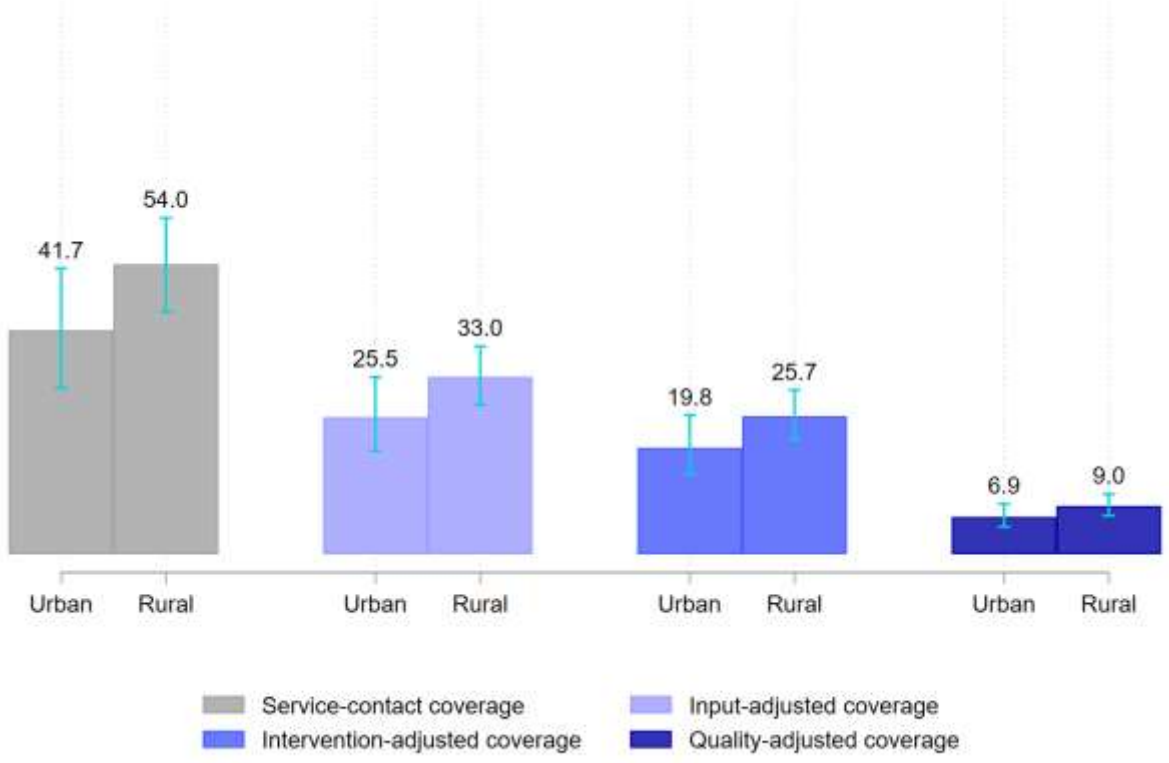
Figure 14 ANC effective coverage cascade, Nepal, by residence



ANC = antenatal care

Figure 15 shows that approximately half of children received care for their diarrhea and ARI symptoms with no significant disparity by place of residence, although the rural coverage estimates were higher than the urban coverage estimates. There was also no significant inequity by place of residence in the remaining coverage estimates. After accounting for sick child care health facility readiness, coverage dropped to 26% in urban areas and 33% in the rural areas. This was reduced slightly after considering if the appropriate care was received with the resulting intervention-adjusted coverage reduced to 20% in the urban areas and 26% in the rural areas. When quality of care was considered, there was a relatively larger decrease, with quality-adjusted coverage at 7% for urban and 9% for rural children.

Figure 15 SC effective coverage cascade, Nepal, by residence

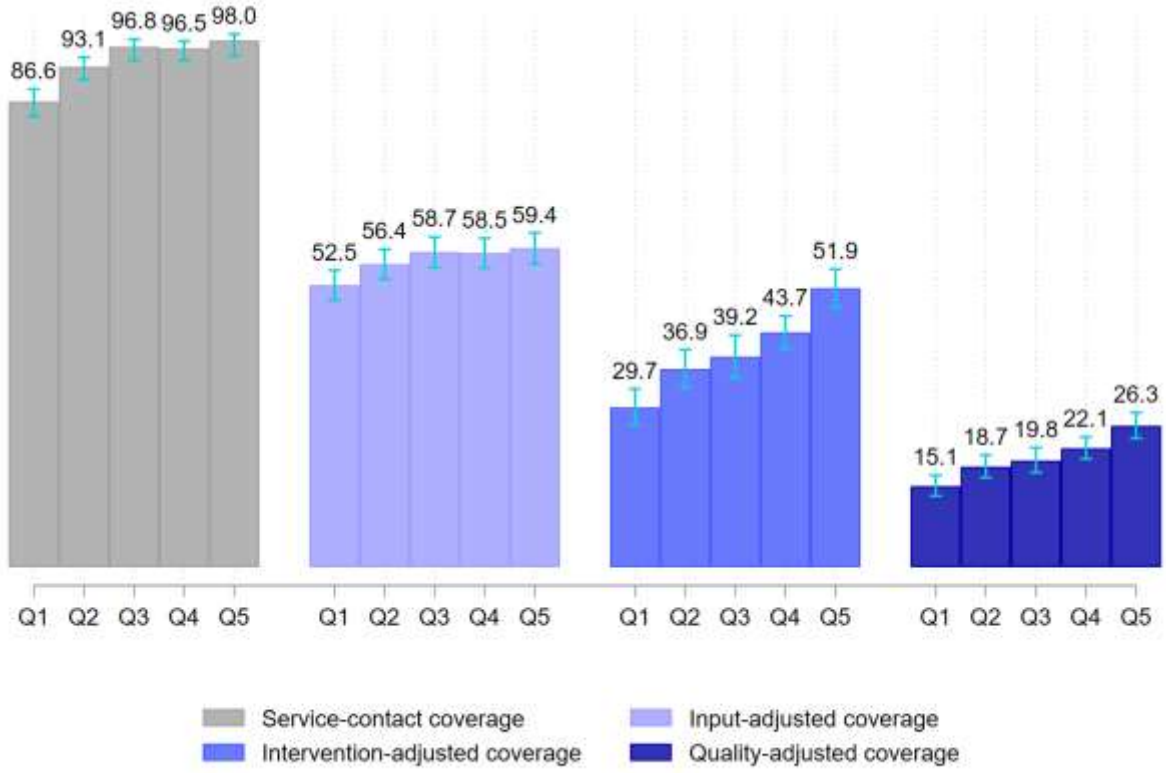


SC = sick child

3.3.2 Wealth quintiles

Figure 16 shows that there are high levels of ANC service-contact coverage, especially in the middle to highest wealth quintiles (97% to 98%). This was significantly lower in the lowest and second wealth quintiles (87% and 93%, respectively). When ANC readiness is considered, the resulting input-adjusted coverage drops by almost half and with no significant disparities between the wealth quintiles (53% to 59%). After accounting for women attending at least four ANC visits, we observe larger decreases for the lower wealth quintiles. The resulting intervention-adjusted coverage significantly differed by wealth quintile. This was the lowest for the lowest wealth quintile (30%) and increased with increasing wealth quintile with 52% in the highest wealth quintile. The quality-adjusted coverage also differed by wealth quintile and ranged from 15% for women in the lowest wealth quintile compared with 26% in the highest wealth quintile.

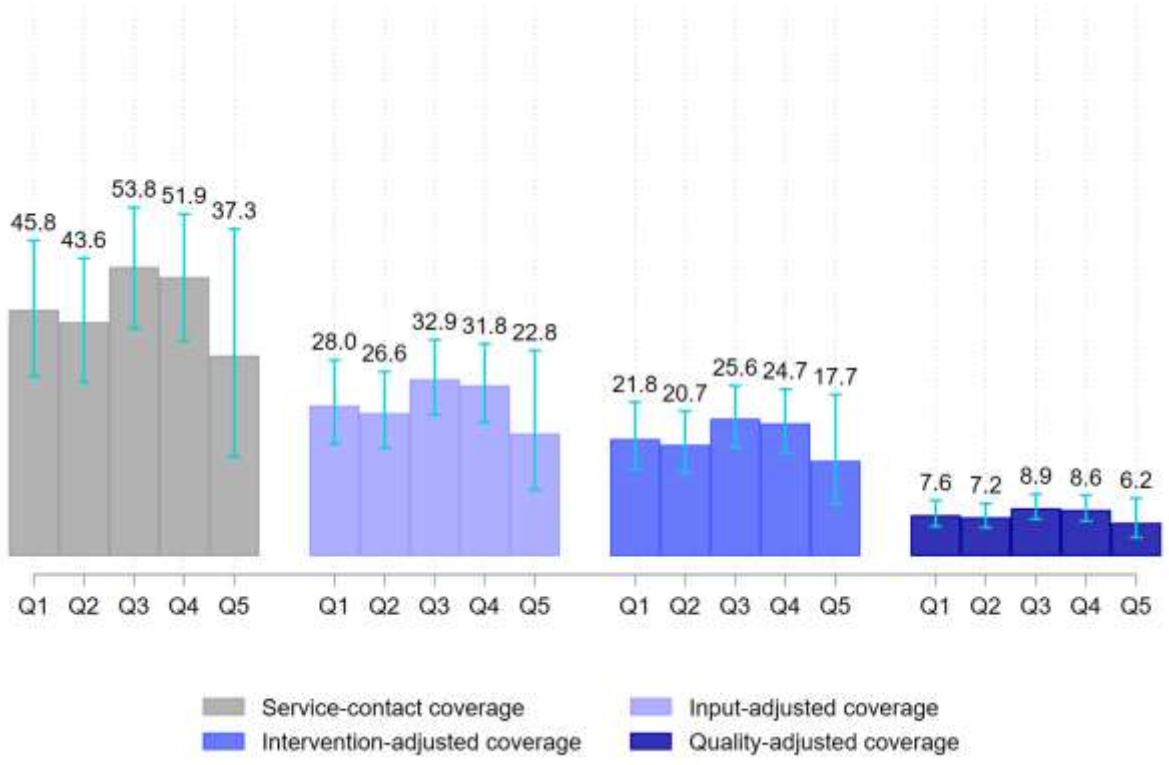
Figure 16 ANC effective coverage cascade, Nepal, by wealth quintile



ANC = antenatal care
Q = quintile

In Figure 17, for sick child care, we observe smaller drop-offs in coverage in the first three cascades, but with a larger drop-offs in the final step. In addition, there were no significant disparities between the wealth quintiles for each coverage estimate. The quality-adjusted coverage was very similar across the wealth quintiles and ranged between 6% to 9%.

Figure 17 SC effective coverage cascade, Nepal, by wealth quintile

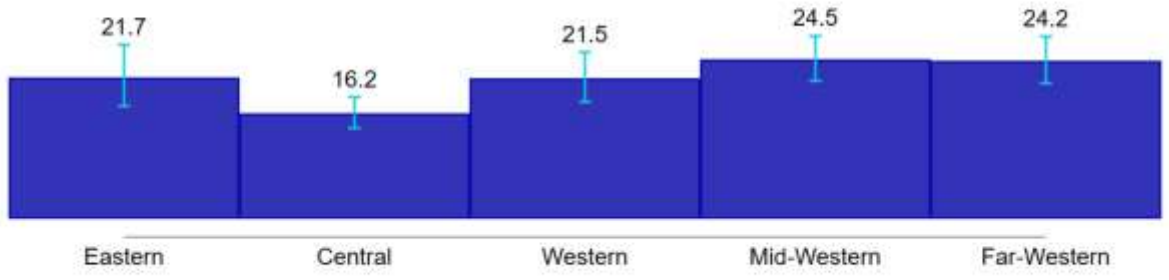


SC = sick child
Q = quintile

3.3.3 Regional disparities

In Appendix Table 5, we see the effective coverage cascade for ANC and sick child care by region in Nepal. For ANC coverage, there were some significant disparities by region for each step of the cascade. The Mid-Western Region had the lowest service-contact coverage, while the Central Region had the lowest coverage for the remaining coverage estimates in the cascade. Figure 18 shows the quality-adjusted coverage estimates for ANC. This ranged from 16% in the Mid-Western Region to 24% to 25% in the Mid-Western and Far-Western regions.

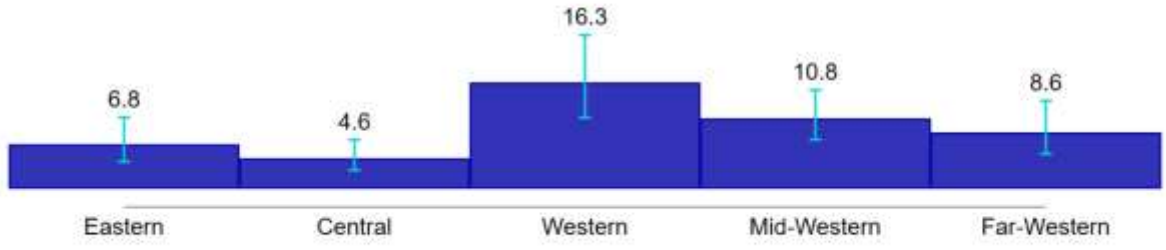
Figure 18 ANC quality-adjusted coverage, Nepal, by region



ANC = antenatal care

As shown in Appendix Table 5, there were no significant inequities by region for the sick child care service-contact and input-adjusted coverage estimates. However, there were some disparities in the last two coverage estimates. The Central Region had the lowest coverage estimates, while the Western Region had the highest in each step of the cascade. In Figure 19, we see that quality-adjusted coverage ranged from 4.6% in the Central Region to 16% in the Western Region.

Figure 19 SC quality-adjusted coverage, Nepal, by region



SC = sick child

3.4 Senegal

Senegal has four regions—North, West, Central, and South. For this analysis and to align with the SPA geographical organization, we used six regions. Appendix Table 2 shows the realignment. Just over 50% of the population lives in rural areas. In the 2018 DHS, 4,353 women had a live birth in the past 5 years and there were 5,820 children under age 5 (Agence Nationale de la Statistique et de la Démographie/ANSD and ICF 2020).

Table 8 shows the estimates for each measure used in the cascade calculations for Senegal for ANC and sick child care. Service-contact coverage is almost universal with 98% of women attending at least one ANC visit for their last pregnancy in the past 5 years. This ranged from 97% in rural areas to 100% in urban areas. There were significant disparities by wealth quintile, with an increase in service-contact coverage with increasing wealth quintile that ranged from 95% for women in the lowest wealth quintile to 100% for women in the highest wealth quintile. This also differed significantly by regions ranging from 91% in the South to approximately 100% in the remaining regions.

The average level of ANC readiness among health facilities in Senegal was 88%. This differed significantly from 69% for rural facilities compared with 88% for facilities in urban areas. Readiness also differed significantly by regions with the lowest level of readiness for ANC services found in health facilities in the North Region (77%) and the highest in the South Region (88%).

More than half of women (59%) had at least four ANC visits for their last birth in the previous 5 years. This differed significantly by place of residence, wealth quintile, and region. Rural women had a lower level of attendance of at least four ANC visits (50%) compared with urban women (71%). Attendance of at least four ANC visits increased with increasing wealth quintile from a low of 38% for women in the lowest wealth quintile to 77% in the highest. There were large disparities by region, with 38% of women in the East Region who attended four ANC visits compared with 76% in Dakar.

The average ANC process quality level at facilities in Senegal was 64% and this did not differ significantly between the urban (64%) and rural (72%) areas. However, this differed significantly by region with the lowest level of ANC quality process quality found in the East Region (53%) compared with 70% in the South.

Table 8 Estimates of each component of Senegal's effective coverage measurement, by residence, wealth quintile, and region. Proportions with 95% confidence intervals

	Coverage	Readiness	Receipt of complete intervention	Process quality
		ANC		
Total	0.98 [0.97, 0.98]	0.88 [0.84, 0.91]	0.59 [0.56, 0.61]	0.64 [0.61, 0.67]
Place of residence	*	*	*	
Urban	1.00 [0.99, 1.00]	0.88 [0.85, 0.91]	0.71 [0.68, 0.75]	0.64 [0.60, 0.67]
Rural	0.97 [0.96, 0.98]	0.69 [0.65, 0.73]	0.50 [0.47, 0.53]	0.72 [0.63, 0.80]
Wealth quintile	*	NA	*	NA
Lowest	0.95 [0.92, 0.96]		0.38 [0.34, 0.42]	
Second	0.97 [0.96, 0.98]		0.52 [0.48, 0.55]	
Middle	0.99 [0.98, 1.00]		0.58 [0.53, 0.62]	
Fourth	0.99 [0.99, 1.00]		0.72 [0.67, 0.76]	
Highest	1.00 [1.00, 1.00]		0.77 [0.71, 0.82]	
Region	*	*	*	*
North	0.97 [0.94, 0.99]	0.77 [0.72, 0.81]	0.55 [0.50, 0.60]	0.57 [0.53, 0.62]
Dakar	1.00 [1.00, 1.00]	0.89 [0.74, 0.96]	0.76 [0.70, 0.81]	0.67 [0.58, 0.74]
Thiès	0.99 [0.98, 1.00]	0.87 [0.79, 0.92]	0.71 [0.67, 0.75]	0.60 [0.50, 0.68]
Central	0.98 [0.96, 0.98]	0.91 [0.88, 0.94]	0.51 [0.46, 0.56]	0.66 [0.64, 0.68]
East	0.91 [0.86, 0.94]	0.92 [0.86, 0.96]	0.38 [0.30, 0.47]	0.53 [0.43, 0.64]
South	0.98 [0.97, 0.99]	0.96 [0.92, 0.98]	0.49 [0.45, 0.52]	0.70 [0.66, 0.73]
		SICK CHILD CARE		
Total	0.36 [0.32, 0.41]	0.76 [0.65, 0.84]	0.84 [0.67, 0.93]	0.59 [0.55, 0.64]
Place of residence			*	*
Urban	0.34 [0.27, 0.42]	0.75 [0.65, 0.83]	0.85 [0.69, 0.94]	0.59 [0.55, 0.64]
Rural	0.38 [0.33, 0.43]	0.92 [0.73, 0.98]	0.25 [0.25, 0.25]	0.83 [0.83, 0.83]
Wealth quintile		NA	NA	NA
Lowest	0.36 [0.31, 0.42]			
Second	0.34 [0.28, 0.40]			
Middle	0.43 [0.34, 0.52]			
Fourth	0.39 [0.29, 0.51]			
Highest	0.29 [0.16, 0.46]			
Region				*
North	0.32 [0.25, 0.40]	0.80 [0.69, 0.88]	0.75 [0.45, 0.91]	0.50 [0.42, 0.59]
Dakar	0.28 [0.18, 0.42]	0.70 [0.30, 0.93]	0.90 [0.71, 0.97]	0.55 [0.45, 0.64]
Thiès	0.41 [0.30, 0.54]	0.60 [0.42, 0.76]	0.74 [0.39, 0.93]	0.73 [0.63, 0.81]
Central	0.37 [0.31, 0.44]	0.82 [0.76, 0.87]	0.86 [0.76, 0.92]	0.57 [0.50, 0.65]
East	0.44 [0.34, 0.55]	0.86 [0.76, 0.92]	0.81 [0.43, 0.96]	0.55 [0.46, 0.64]
South	0.43 [0.36, 0.51]	0.78 [0.68, 0.86]	0.69 [0.51, 0.82]	0.65 [0.58, 0.70]

* = non-overlapping confidence intervals
ANC = antenatal care; NA = not applicable. Disaggregated data not available.
Note: Estimates that do not include a confidence interval indicate that the SPA data was a census at the facility level.

In Table 8 we also see that only approximately one-third of children (36%) under age 5 with diarrhea or ARI symptoms in the last 2 weeks received care at a health facility. There was little variation in care-seeking by place of residence, wealth quintile, or region with estimates ranging from approximately 30% to 40% for all variables.

However, readiness of health facilities for sick child care was higher with an average readiness of 76%. This was found to be higher in rural areas (92%) compared with urban areas (75%), although this was not significantly different. Disparities by region were large, but not significant. Average readiness in sick child care in Senegal ranged from 60% in Thiès to 86% for facilities in the East Region.

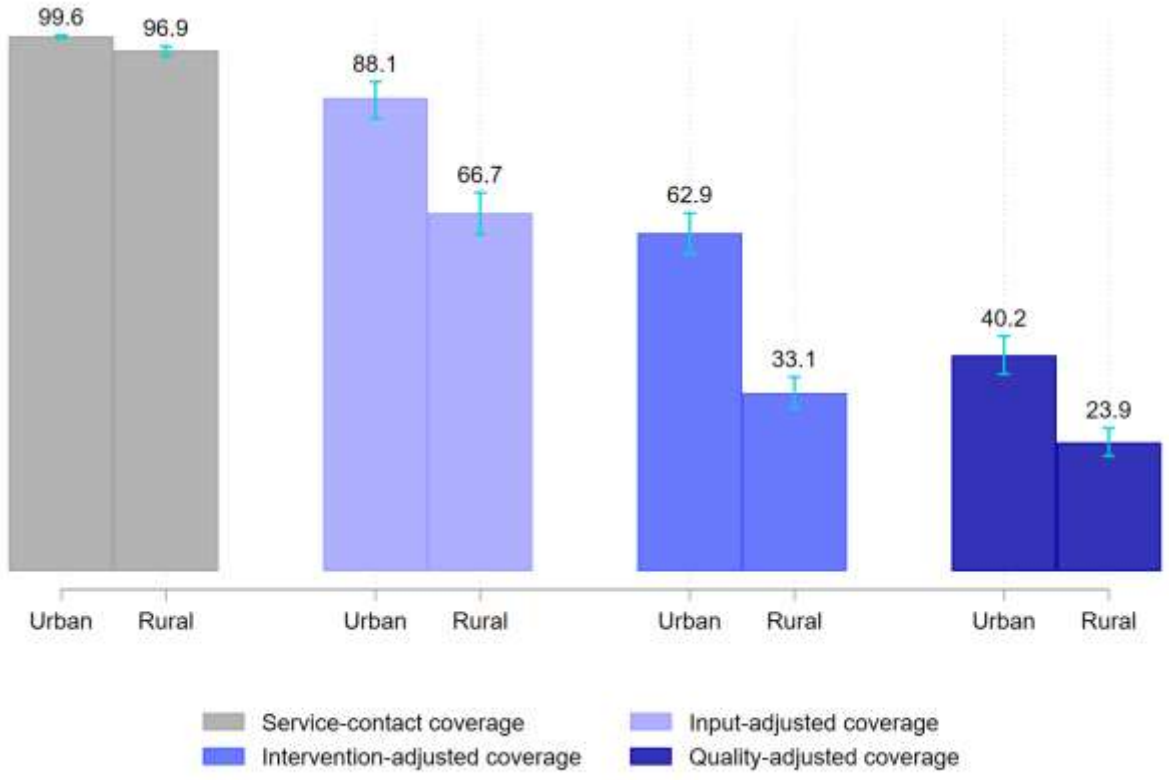
A relatively high percentage of children under age 5 (84%) received appropriate treatment for their symptoms at a health facility. There was a large and significant inequity by place of residence, which ranged from 25% in rural areas compared with 85% in urban areas. However, wide confidence intervals on the regional estimates resulted in a lack of significant difference by region, which ranged from 69% in the South Region to 90% in Dakar.

The average sick child care process quality scores in Senegal was 59% and this differed significantly between urban (59%) and rural (83%) facilities. This also differed significantly by region with the lowest level of average process quality found in health facilities in the North Region (50%) and the highest in Thiès (73%).

3.4.1 Place of residence

In Figure 20, we observe large decreases with each component of the cascade, with larger decreases for rural compared to urban areas. The disparities between urban and rural areas were significant for each ANC coverage estimate. From the almost universal service-contact coverage (97% to 99%), this drops to 88% among urban and 67% among rural areas when readiness is considered. After adjusting for attendance of at least four ANC visits, the resulting intervention-adjusted coverage reduces significantly to 63% in urban areas and 33% in rural areas. Finally, when considering the process quality of care, the quality-adjusted coverage is 40% in urban areas and 24% in rural areas.

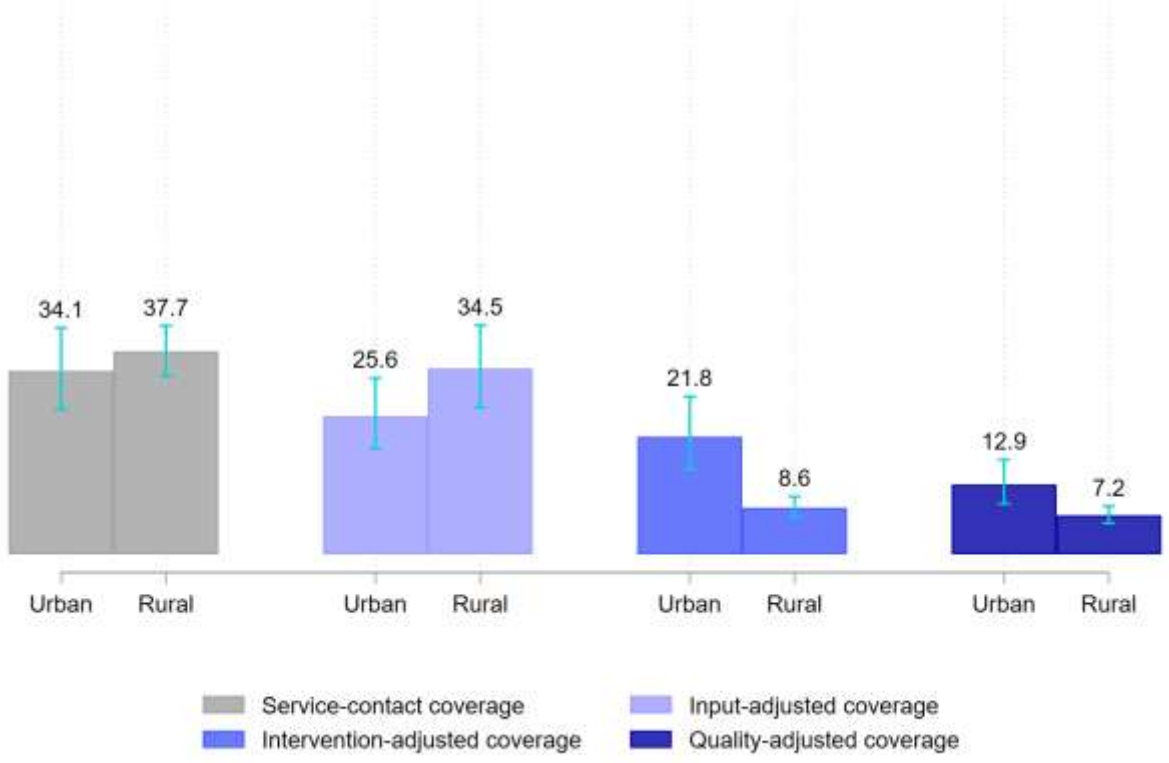
Figure 20 ANC effective coverage cascade, Senegal, by residence



ANC = antenatal care

There are much lower levels of coverage for sick child care compared to ANC (Figure 21). In addition, the declines with each step in the sick child cascade are much smaller compared with the ANC cascade. From approximately one-third of children (34% in urban and 38% in rural) with service-contact coverage, this is reduced slightly to 26% in urban areas and 35% in rural areas when readiness is considered. The decrease was larger for children in urban areas compared to rural areas, although the disparity in the resulting input-adjusted coverage remained nonsignificant. However, after adjusting for receiving appropriate care in health facilities, there is a large drop in the resulting intervention-adjusted coverage in rural areas to 9% and a smaller reduction for urban areas to 22%. This disparity in the resulting intervention-adjusted coverage was significant. Finally, when the quality of care the child receives at the facility is considered, the quality-adjusted coverage also differed significantly by place of residence, and was 13% for urban and 7% for the rural areas.

Figure 21 SC effective coverage cascade, Senegal, by residence

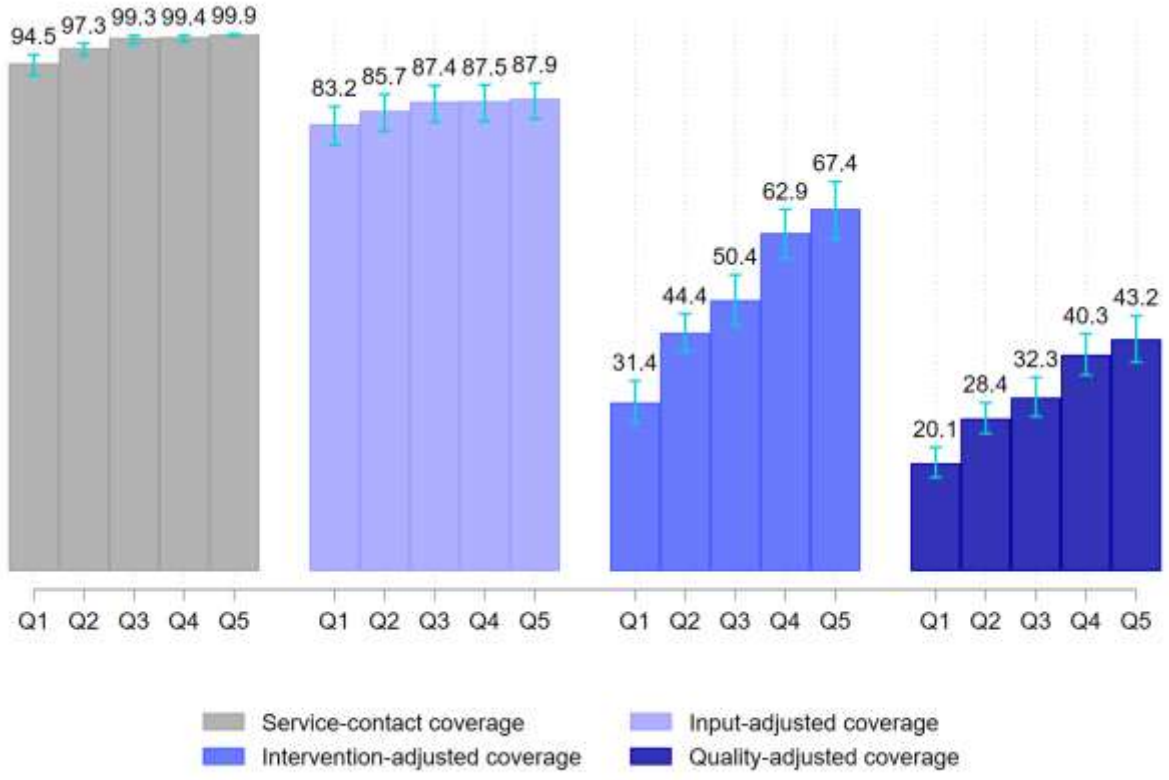


SC = sick child

3.4.2 Wealth quintiles

Figure 22 shows the effective coverage cascade for ANC by wealth quintile in Senegal. We can see high levels of service-contact coverage by wealth quintile, with more than 94% of women who have at least one ANC visit for their last pregnancy for all quintiles. There was a significant disparity in this estimate between women from the lowest and second wealth quintiles (95–97%) compared with the middle to highest quintiles (99–100%). We observe a moderate decline in coverage when readiness of the facilities is considered, and the resulting input-adjusted coverage did not differ significantly by wealth quintiles with ranges between 83–88%. However, there was a large decline after adjusting for women who attend at least four ANC visits, and especially for the lower wealth quintiles. The resulting intervention-adjusted coverage increased with increasing wealth, and ranged from 31% for women in the lowest wealth quintile to 67% for women in the highest quintile. A further reduction was observed for the last step of the cascade and again with significant inequity by wealth quintile. This quality-adjusted coverage increased with increasing wealth quintile, and ranged from 20% for the lowest wealth quintile to 43% for the highest wealth quintile.

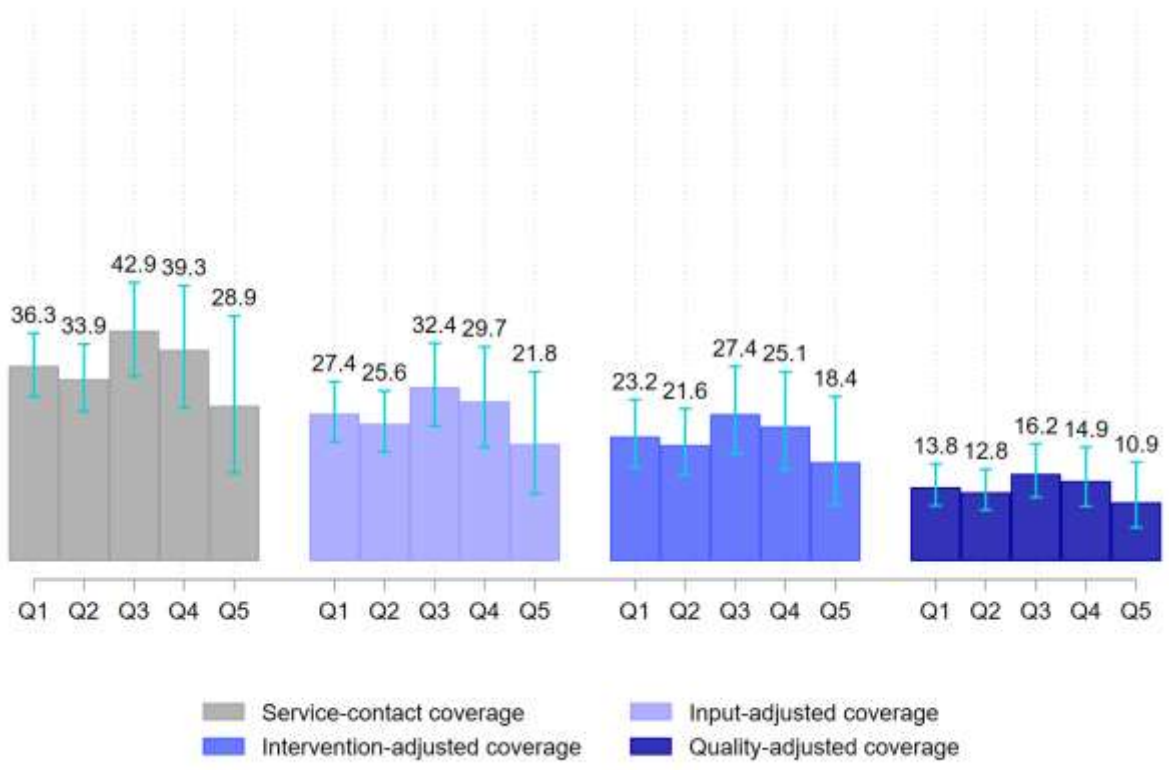
Figure 22 ANC effective coverage cascade, Senegal, by wealth quintile



ANC = antenatal care
Q = quintile

Figure 23 shows relatively lower levels of sick child coverage compared to ANC that were not significantly different by wealth quintile. In addition, there were small to moderate decreases in each step of the cascade. In the last step of the cascade, the quality-adjusted coverage ranged between 11–16% by wealth quintile with no significant disparities.

Figure 23 SC effective coverage cascade, Senegal, by wealth quintile

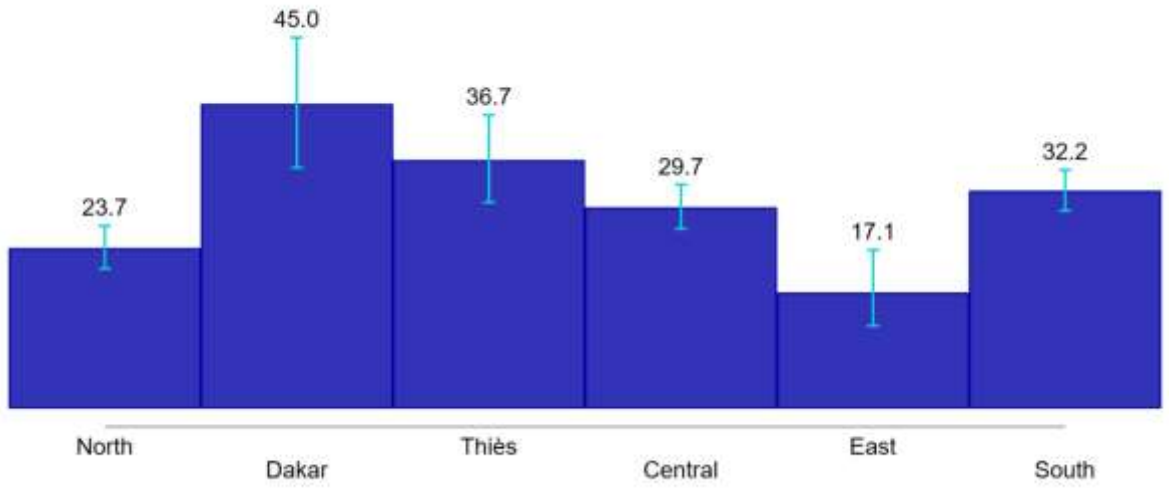


SC = sick child
Q = quintile

3.4.3 Regional disparities

Appendix Table 6 shows the effective coverage cascade for ANC and sick child care by regions in Senegal. For ANC coverage, there are similar patterns as observed by place or residence and wealth and with significant differences for each step of the cascade. Figure 24 shows the regional quality-adjusted coverage estimates for ANC in Senegal, which ranged from 17% in the East Region to 45% in Dakar.

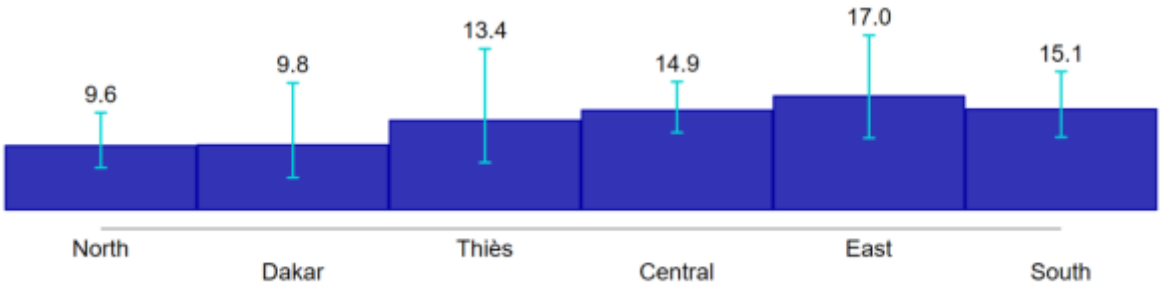
Figure 24 ANC quality-adjusted coverage, Senegal, by region



ANC = antenatal care

In contrast to ANC, there was lower coverage, smaller drop-offs in the cascade, and no significant differences by region for sick child care. In Figure 25, we observe that the quality-adjusted coverage ranged from 10% in North and Dakar regions to 17% in the East Region, although these differences were not significant.

Figure 25 SC quality-adjusted coverage, Senegal, by region



SC = sick child

3.5 Tanzania

Tanzania has 30 regions, grouped into nine geographic zones, that were used for regional disaggregation in this analysis. Nearly two-thirds (64%) of the population lives in rural areas. Just over 7,000 (7,079) women had a live birth in the 5 years before the DHS survey and 9,520 children under age 5 were included in the survey (Ministry of Health et al. 2016).

Table 9 summarizes the estimates for each measure used in the cascade calculations for Tanzania for ANC and sick child care. Service-contact coverage is almost universal with 98% of women who attended at least one ANC visit for their last pregnancy in the past 5 years. This was similar by place of residence, wealth, or region with 97–100% coverage for all these demographic variables.

The average level of ANC readiness among health facilities in Tanzania was 55%, which differed significantly from 51% for rural compared with 72% for the urban facilities. Readiness also differed significantly by region and ranged from 51% in the South West Highlands to 72% in Zanzibar.

Approximately half of women (51%) had at least four ANC visits for their last birth in the past 5 years. This differed significantly by all three variables. Less than half of rural women (45%) had at least four ANC visits compared with 64% of urban women. Attendance of at least four ANC visits increased with increasing wealth quintile from a low of 39% for women in the lowest wealth quintile to 70% in the highest quintile.

There were large disparities by region, which ranged from 31% of women in the Western Region compared with 73% in the Eastern Region.

The average ANC process quality level at facilities in Tanzania was 56%, and this did not differ significantly between urban (59%) and rural (54%) areas. However, this differed significantly by region with the lowest level of ANC quality process quality found in Zanzibar (48%) compared with 64% in the Central Region.

Table 9 Estimates of each component of Tanzania's effective coverage measurement, by residence, wealth quintile, and region. Proportions with 95% confidence intervals

	Coverage	Readiness	Receipt of complete intervention	Process quality
ANC				
Total	0.98 [0.97, 0.98]	0.55 [0.53, 0.58]	0.51 [0.49, 0.53]	0.56 [0.53, 0.58]
Place of residence		*	*	
Urban	0.98 [0.97, 0.99]	0.72 [0.66, 0.78]	0.64 [0.61, 0.67]	0.59 [0.55, 0.63]
Rural	0.98 [0.97, 0.98]	0.51 [0.49, 0.54]	0.45 [0.43, 0.47]	0.54 [0.52, 0.57]
Wealth quintile		NA	*	NA
Lowest	0.97 [0.96, 0.98]		0.39 [0.35, 0.43]	
Second	0.98 [0.97, 0.99]		0.43 [0.40, 0.46]	
Middle	0.98 [0.97, 0.99]		0.47 [0.43, 0.50]	
Fourth	0.98 [0.97, 0.99]		0.56 [0.53, 0.59]	
Highest	0.98 [0.97, 0.99]		0.70 [0.67, 0.73]	
Region	*	*	*	*
Western	0.99 [0.98, 0.99]	0.53 [0.46, 0.60]	0.31 [0.26, 0.38]	0.50 [0.44, 0.56]
Northern	0.97 [0.95, 0.98]	0.54 [0.48, 0.61]	0.56 [0.51, 0.61]	0.63 [0.60, 0.67]
Central	0.99 [0.98, 0.99]	0.47 [0.41, 0.54]	0.55 [0.50, 0.61]	0.64 [0.60, 0.68]
Southern Highlands	0.99 [0.99, 1.00]	0.59 [0.53, 0.66]	0.49 [0.44, 0.54]	0.60 [0.54, 0.65]
Southern	1.00 [0.99, 1.00]	0.52 [0.43, 0.61]	0.52 [0.45, 0.58]	0.52 [0.46, 0.58]
South West Highlands	0.97 [0.95, 0.99]	0.51 [0.43, 0.59]	0.44 [0.38, 0.51]	0.51 [0.44, 0.58]
Lake	0.97 [0.96, 0.98]	0.55 [0.49, 0.61]	0.44 [0.41, 0.48]	0.57 [0.52, 0.61]
Eastern	0.98 [0.97, 0.99]	0.62 [0.53, 0.71]	0.73 [0.69, 0.76]	0.58 [0.53, 0.63]
Zanzibar	1.00 [0.99, 1.00]	0.72 [0.65, 0.78]	0.53 [0.48, 0.57]	0.48 [0.40, 0.56]
SICK CHILD CARE				
Total	0.68 [0.65, 0.72]	0.77 [0.75, 0.80]	0.77 [0.74, 0.80]	0.31 [0.29, 0.34]
Place of residence				
Urban	0.70 [0.65, 0.75]	0.83 [0.78, 0.87]	0.75 [0.68, 0.80]	0.34 [0.30, 0.37]
Rural	0.68 [0.63, 0.72]	0.75 [0.72, 0.78]	0.78 [0.74, 0.81]	0.31 [0.27, 0.34]
Wealth quintile		NA	NA	NA
Lowest	0.58 [0.50, 0.66]			
Second	0.73 [0.66, 0.79]			
Middle	0.69 [0.61, 0.77]			
Fourth	0.69 [0.61, 0.75]			
Highest	0.72 [0.65, 0.79]			
Region		*	*	*
Western	0.66 [0.55, 0.75]	0.73 [0.63, 0.81]	0.79 [0.69, 0.87]	0.23 [0.18, 0.30]
Northern	0.54 [0.38, 0.70]	0.83 [0.75, 0.89]	0.77 [0.68, 0.84]	0.42 [0.33, 0.51]
Central	0.70 [0.58, 0.79]	0.85 [0.78, 0.90]	0.78 [0.68, 0.85]	0.41 [0.32, 0.51]
Southern Highlands	0.60 [0.49, 0.69]	0.73 [0.65, 0.80]	0.61 [0.49, 0.72]	0.33 [0.30, 0.37]
Southern	0.70 [0.57, 0.80]	0.55 [0.44, 0.66]	0.81 [0.66, 0.91]	0.21 [0.13, 0.32]
South West Highlands	0.66 [0.55, 0.75]	0.84 [0.74, 0.91]	0.73 [0.62, 0.82]	0.24 [0.17, 0.34]
Lake	0.74 [0.67, 0.79]	0.81 [0.75, 0.85]	0.76 [0.68, 0.83]	0.32 [0.28, 0.37]
Eastern	0.70 [0.62, 0.77]	0.72 [0.65, 0.78]	0.85 [0.73, 0.92]	0.29 [0.22, 0.37]
Zanzibar	0.64 [0.55, 0.72]	0.70 [0.62, 0.77]	0.84 [0.77, 0.89]	0.21 [0.15, 0.29]

* = Non-overlapping confidence intervals
ANC = antenatal care; NA = not applicable. Disaggregated data not available.
Note: Estimates that do not include a confidence interval indicate that the SPA data was a census at the facility level.

Table 9 also summarizes the coverage measures for sick child care. Approximately every 7 in 10 children under age 5 in Tanzania received care at a health facility for their diarrhea and ARI symptoms. Coverage was relatively consistent by place of residence, wealth quintile, and region with ranges from 55% to 75%.

The average readiness for sick child care in health facilities in Tanzania was 77%. This was similar by place of residence, although there were large and significant inequities by region. Readiness ranged from 55% in the Southern Region to 85% in the Central Region.

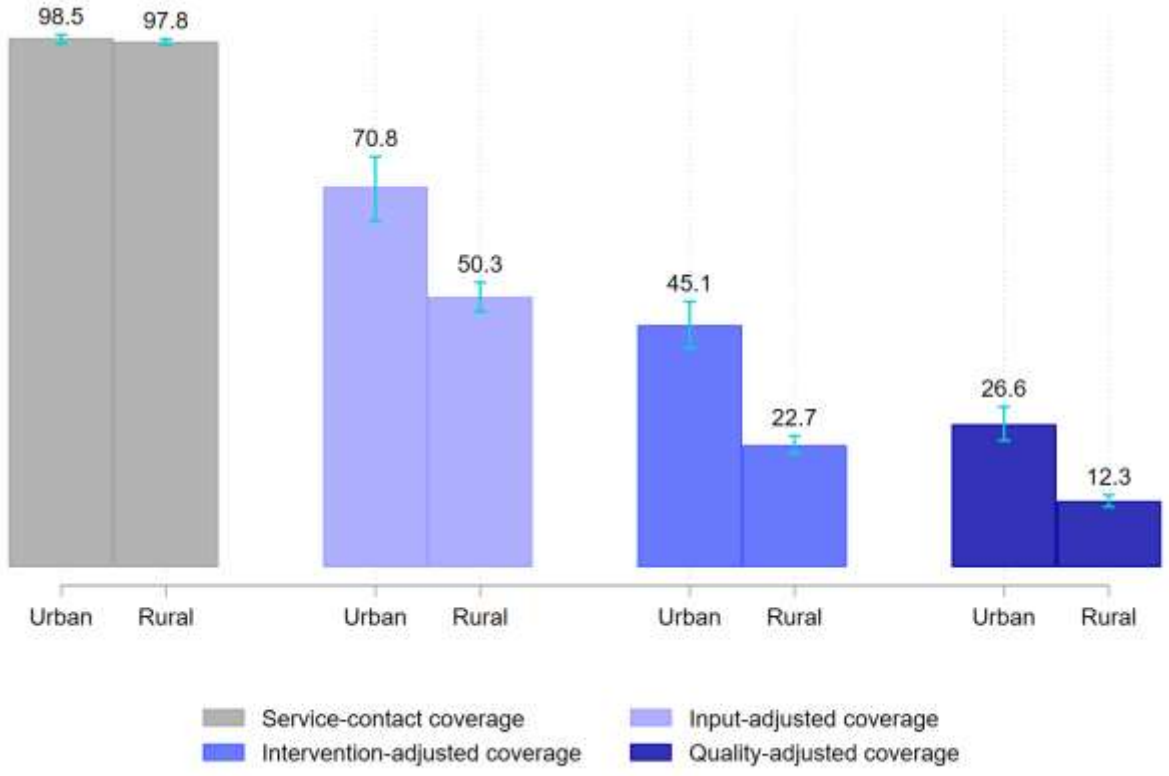
Approximately three-quarters (77%) of children under age 5 diagnosed with diarrhea or pneumonia received appropriate treatment at a health facility. This did not differ significantly by place of residence, but did differ significantly by region, ranging from 73% in the South West Highlands to 85% in the Eastern Region.

Health facilities in Tanzania had 31% average sick child care process quality scores. Rural and urban facilities had similar process quality scores, although there was significant variation by region. Quality process in facilities ranged from 21% in the Southern and Zanzibar regions to 41% in the Central Region.

3.5.1 Place of residence

In Tanzania, there is an almost universal level of service-contact coverage (Figure 26) in both urban and rural areas (98%). However, there were large declines with each step in the cascade and larger declines for rural compared to urban areas, which resulted in significant disparities for the three remaining coverage estimates. When readiness is considered, the input-adjusted coverage is reduced to 71% in urban areas and 50% in the rural areas. When we consider the attendance of at least four ANC visits, the resulting intervention-adjusted coverage drops to 45% in urban areas and 23% in the rural areas. Finally, when the process quality of care is considered, the quality-adjusted coverage was 27% in urban areas and 12% in the rural areas.

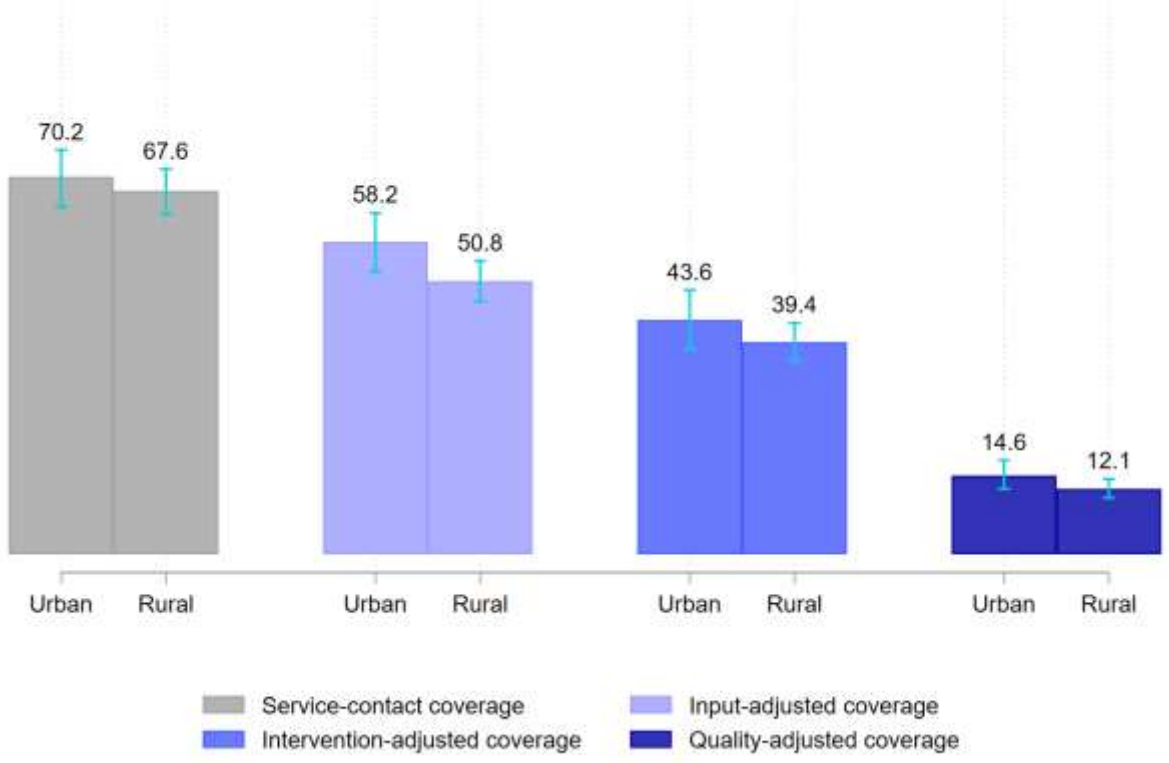
Figure 26 ANC effective coverage cascade, Tanzania, by residence



ANC = antenatal care

Figure 27 shows that approximately 70% of children under age 5 received care for symptoms and this was similar by place of residence. There was a moderate reduction in coverage when sick child readiness of facilities was considered, with the resulting input-adjusted coverage reduced to 58% in urban areas and 51% in rural areas with no significant disparities. There was also a minimal reduction after considering if the appropriate care was received with a small and nonsignificant disparity between urban (44%) and rural (39%) areas. The largest decrease was in the last step of the cascade when the quality of care was considered. However, this also did not differ by place or residence with 15% of quality-adjusted coverage in urban areas compared with 12% in the rural areas.

Figure 27 SC effective coverage cascade, Tanzania, by residence

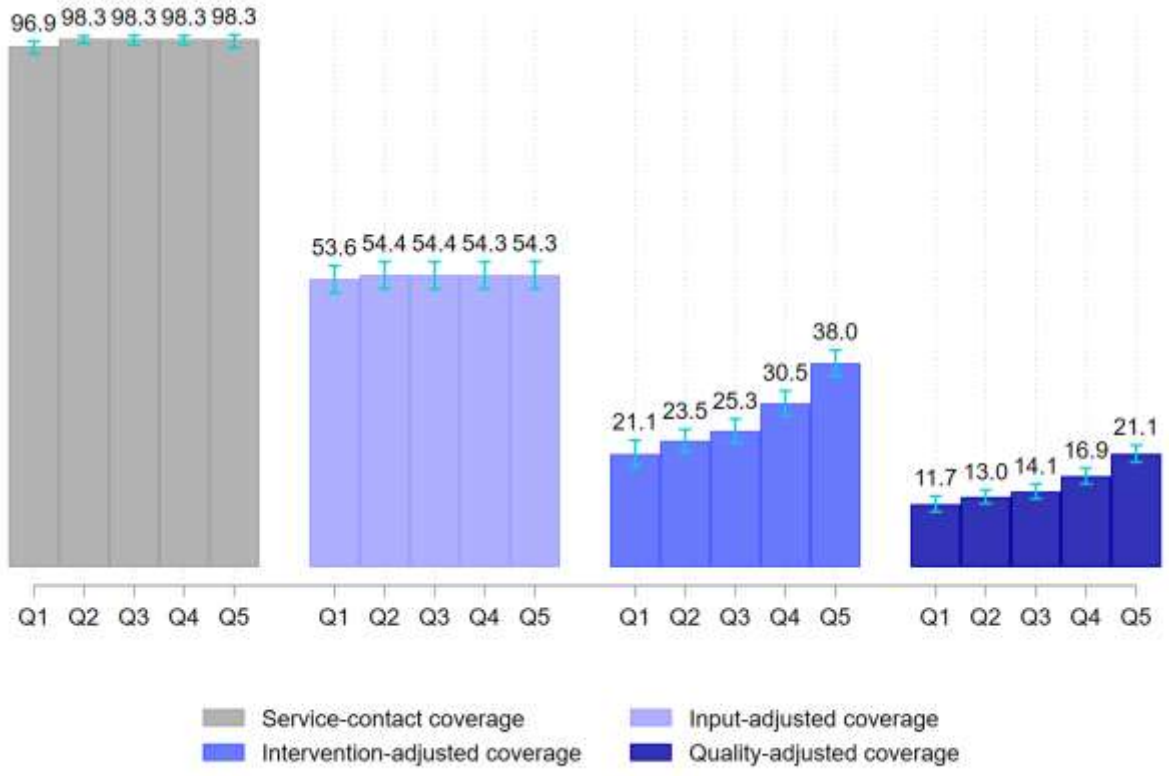


SC = sick child

3.5.2 Wealth quintiles

In Figure 28, we observe an almost universal service-contact coverage by wealth quintile (97–98%). This drops by approximately half when readiness is considered and again with no significant disparities by wealth quintiles (54% for all quintiles). The drop-off after accounting for women attending at least four ANC visits was greater for the lower wealth quintile compared to the highest. This resulted in significant disparities by wealth quintile. The resulting intervention-adjusted coverage increased with increasing wealth quintile, and ranged from 21% for women in the lowest wealth quintile to 38% in the highest. Finally, there were further reductions when we accounted for quality of care. The resulting quality-adjusted coverage differed significantly by wealth quintile and ranged from 12% in the lowest to 21% in the highest wealth quintile.

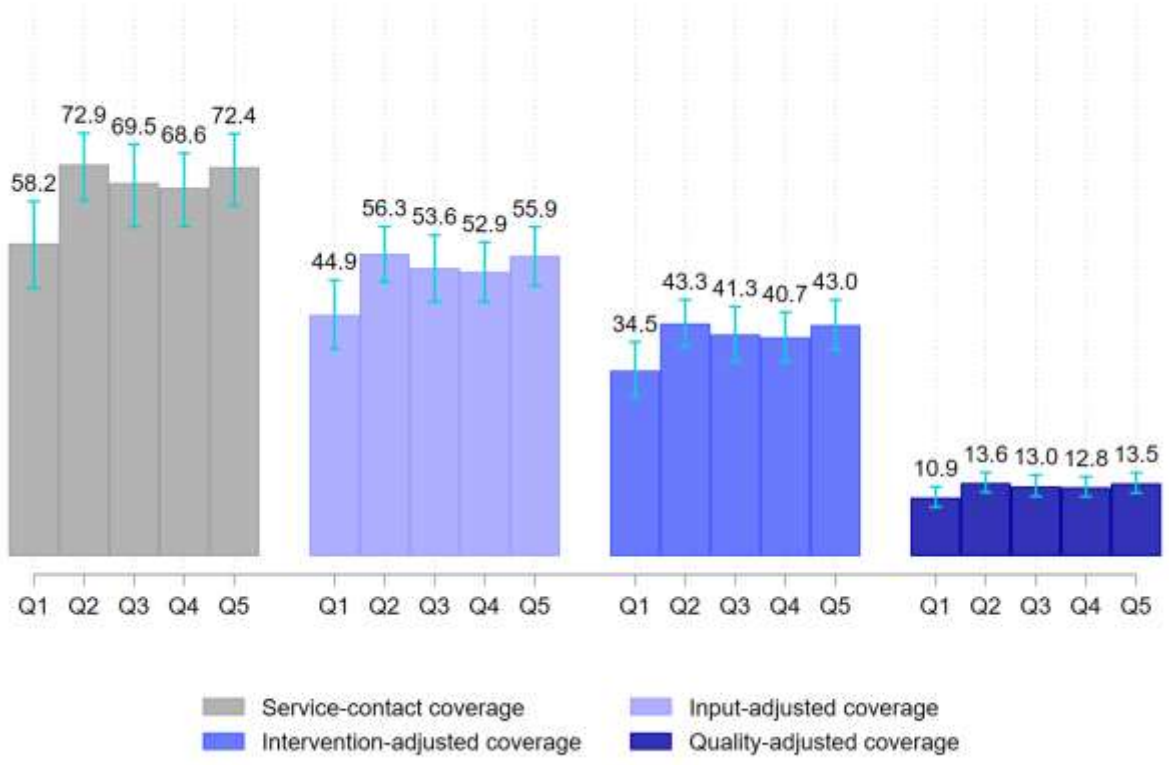
Figure 28 ANC effective coverage cascade, Tanzania, by wealth quintile



ANC = antenatal care
Q = quintile

Figure 29 shows sick child care cascade estimates by wealth quintile. Service-contact coverage was lower for children in the lowest wealth quintile (58%) compared with the remaining quintiles (69–73%); however, this only differed significantly between the lowest and second quintiles. There was a moderate reduction in coverage when readiness was considered, but with no significant inequities by wealth quintile. This ranged from 50% for children in the lowest wealth quintile compared with 56% in the second and highest quintiles. When considering if appropriate care was provided to children, there is a small reduction in coverage that was similar across wealth quintiles. This intervention-adjusted coverage ranged from 35% for children in the lowest wealth quintile to 43% in the second and highest quintiles. Finally, there was a larger decrease in the final step of the cascade. This quality-adjusted coverage ranged between 10–14% by wealth quintile with no significant inequities.

Figure 29 SC effective coverage cascade, Tanzania, by wealth quintile

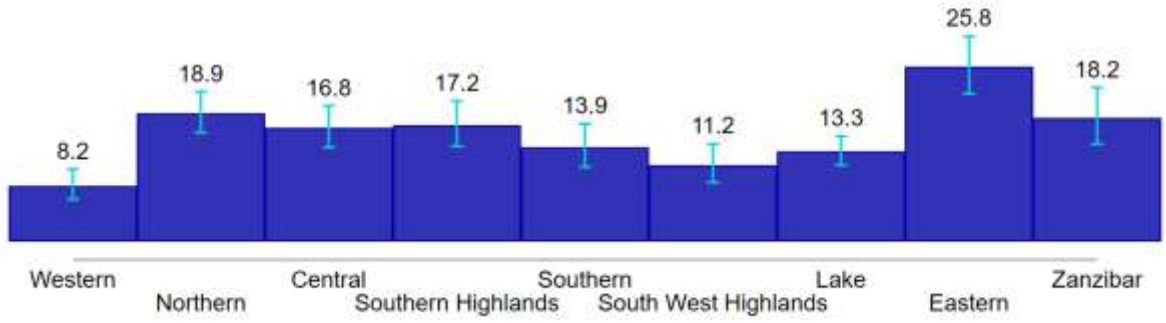


SC = sick child
Q = quintile

3.5.3 Regional disparities

Appendix Table 7 summarizes the effective coverage cascade for ANC and sick child care by regions in Tanzania. For ANC, all coverage estimates significantly differed by region, and the decreases at each step of the cascade were similar to those observed by place of residence and wealth quintile. Figure 30 shows the quality-adjusted coverage estimates for ANC in Tanzania, which ranged from 8% in the Western Region to 26% in the Eastern Region.

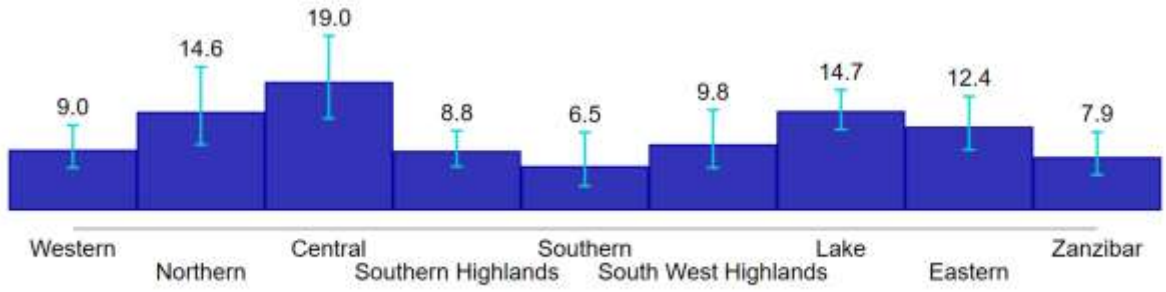
Figure 30 ANC quality-adjusted coverage, Tanzania, by region



ANC = antenatal care

For sick child care, only the service-contact coverage estimate did not differ significantly by region. Again, similar patterns in the decreases were observed by region as with place of residence and wealth quintile with the largest drop-off in the final step of the cascade. In Figure 31, we see that the quality-adjusted coverage for sick child care ranged from 7% in the Southern Region to 19% in the Central Region.

Figure 31 SC quality-adjusted coverage, Tanzania, by region

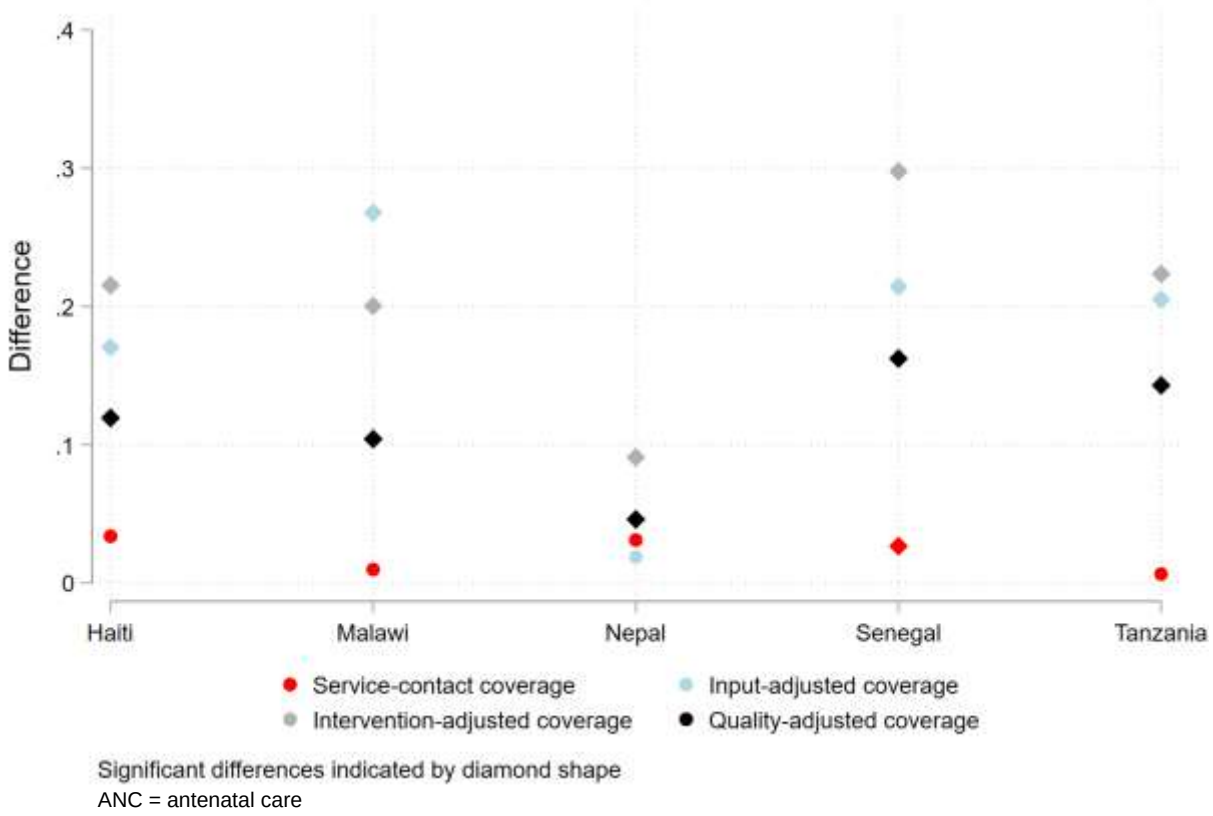


SC = sick child

3.6 Cross-national Comparison of Disparities

Figure 32 shows that across all countries, ANC quality-adjusted and intervention-adjusted coverage had statistically significant differences by place of residence. In addition, input-adjusted ANC coverage was significantly different by place of residence in all countries except Nepal, while service-contact coverage was significantly different by place in Senegal. For all countries except Nepal, input-adjusted and intervention-adjusted coverage had the largest magnitude of difference. In nearly all cases, these two values had differences of 20% or more when comparing rural and urban estimates.

Figure 32 Rural/urban differences in ANC effective coverage estimates

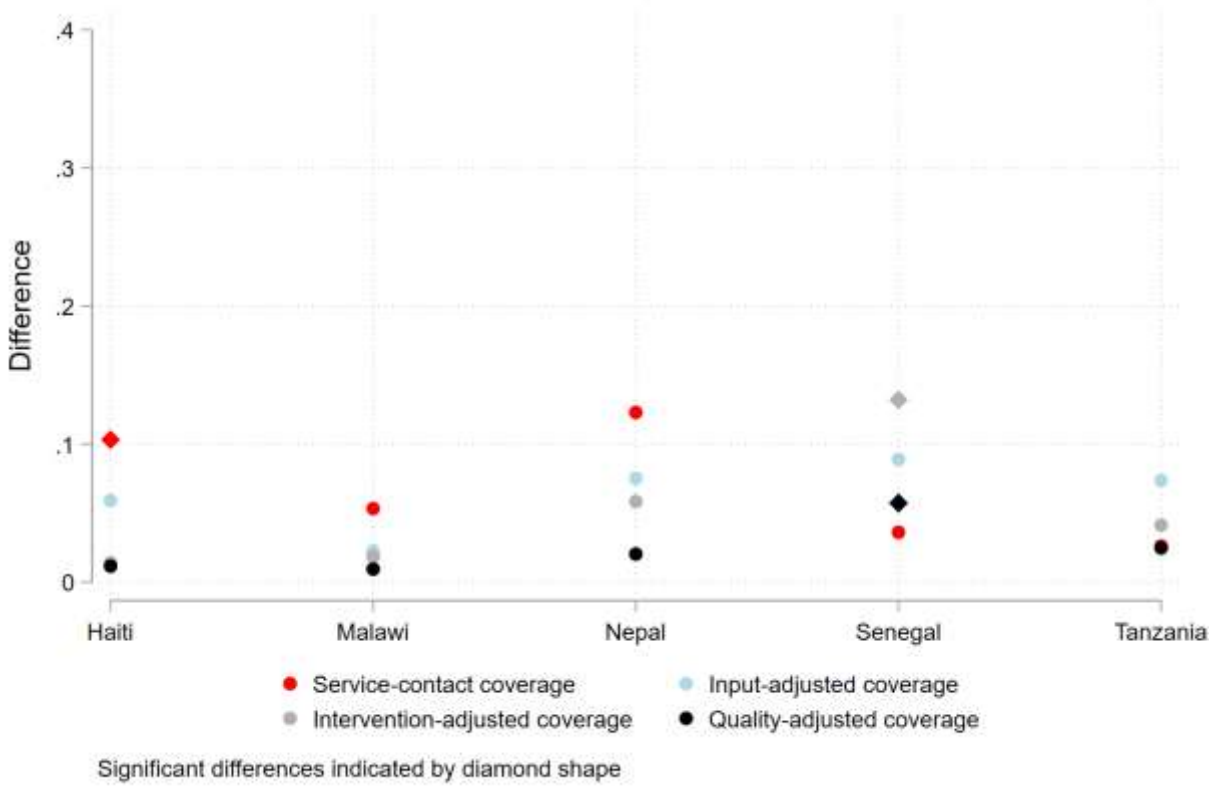


ANC = antenatal care

Sick child care had statistically significant differences in effective coverage estimates in only two countries, with different patterns, as seen in Figure 33. In Haiti, only service-contact coverage showed statistically significant differences. In Senegal, service-contact coverage and input-adjusted coverage were not significant, although the last two estimates on the effective coverage cascade—intervention and quality-adjusted coverage were both significant.

Rural/urban differences were generally of larger magnitude in ANC when compared to sick child care, except for the lowest rural/urban difference in ANC quality-adjusted coverage (Nepal 4.6%), which was higher than the highest rural/urban difference in sick child quality-adjusted coverage (Senegal 5.7%).

Figure 33 Rural/urban differences in sick child care effective coverage estimates



Similar to differences by place of residence, there are many statistically significant differences by wealth quintile in the ANC effective coverage estimates (Figure 34). Only Senegal (input-adjusted coverage) and Tanzania (service-contact coverage and input-adjusted coverage) had nonsignificant differences. It should be noted that the differences shown here are comparisons of the wealthiest (quintile 1) to the poorest (quintile 5). However, in some cases, the largest observed difference was between different quintiles, such as between quintile 1 and 4.

Congruent with disparities by place of residence, differences by wealth quintile were of larger magnitude in ANC when compared to sick child care.

Figure 34 Wealth differences in ANC effective coverage estimates

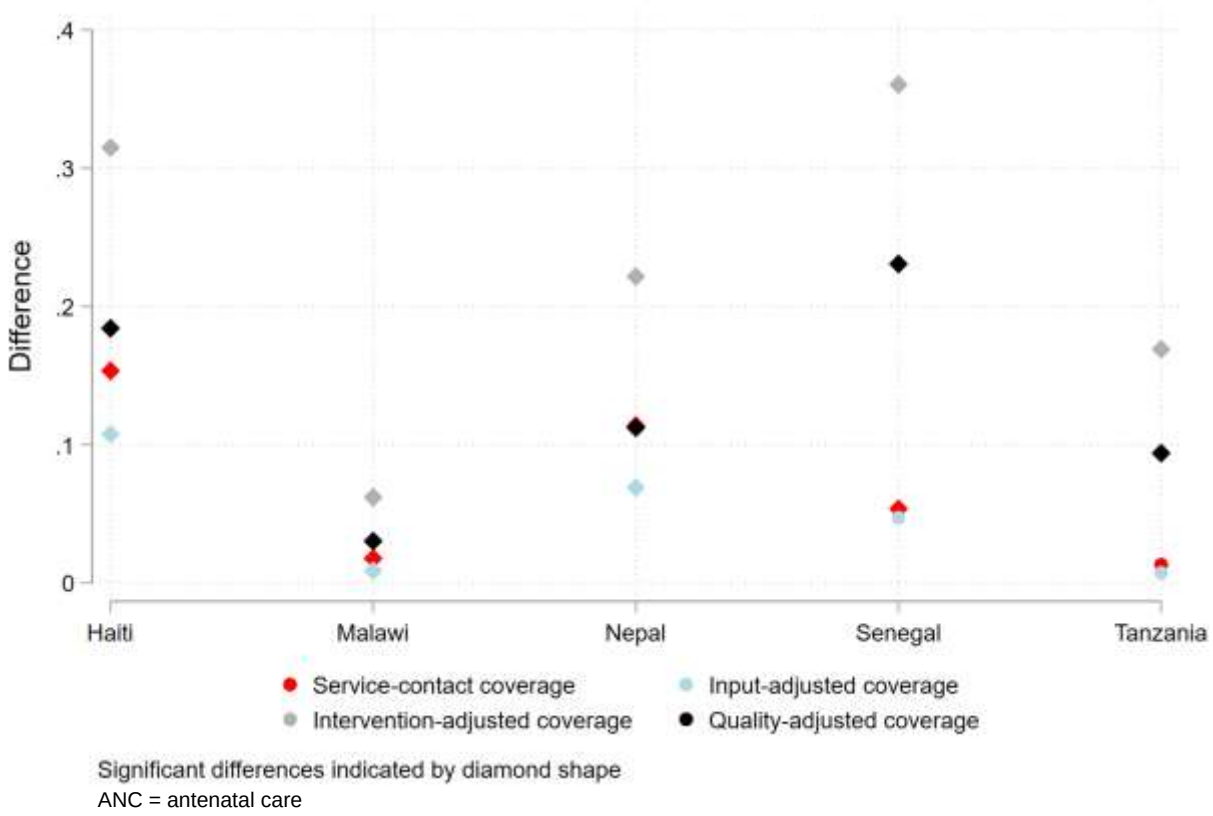
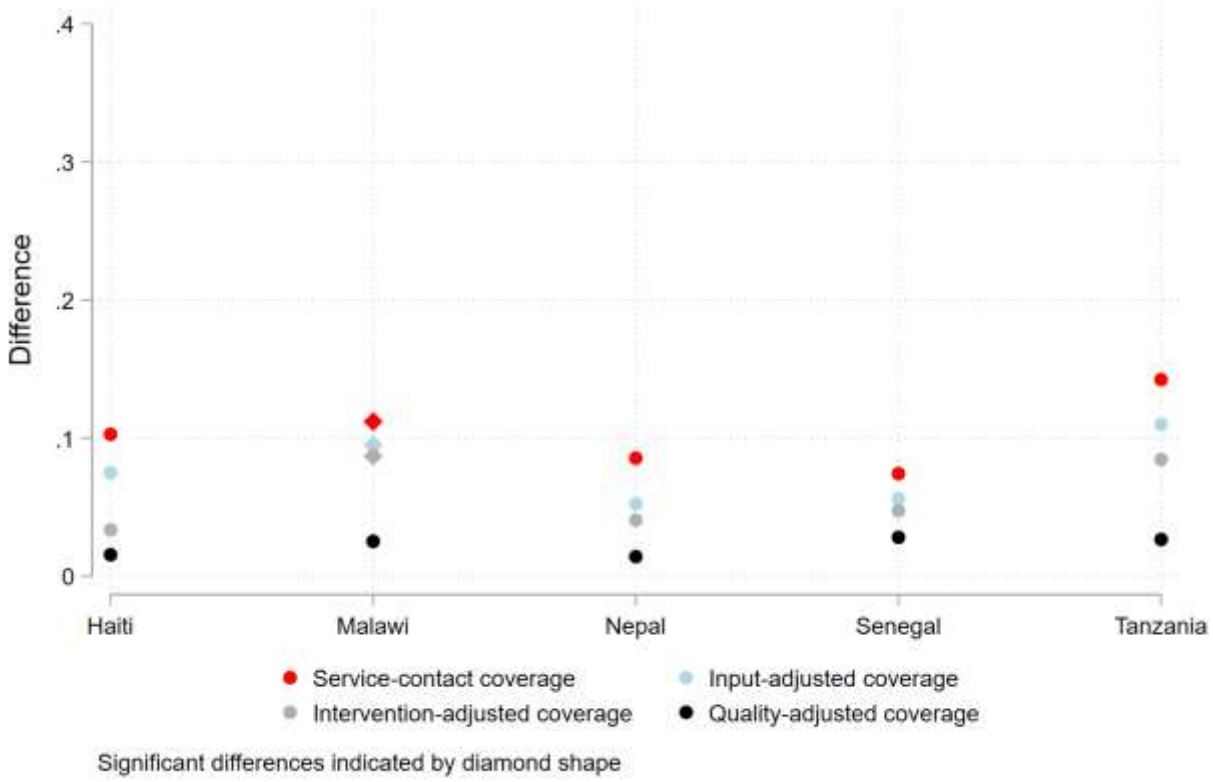


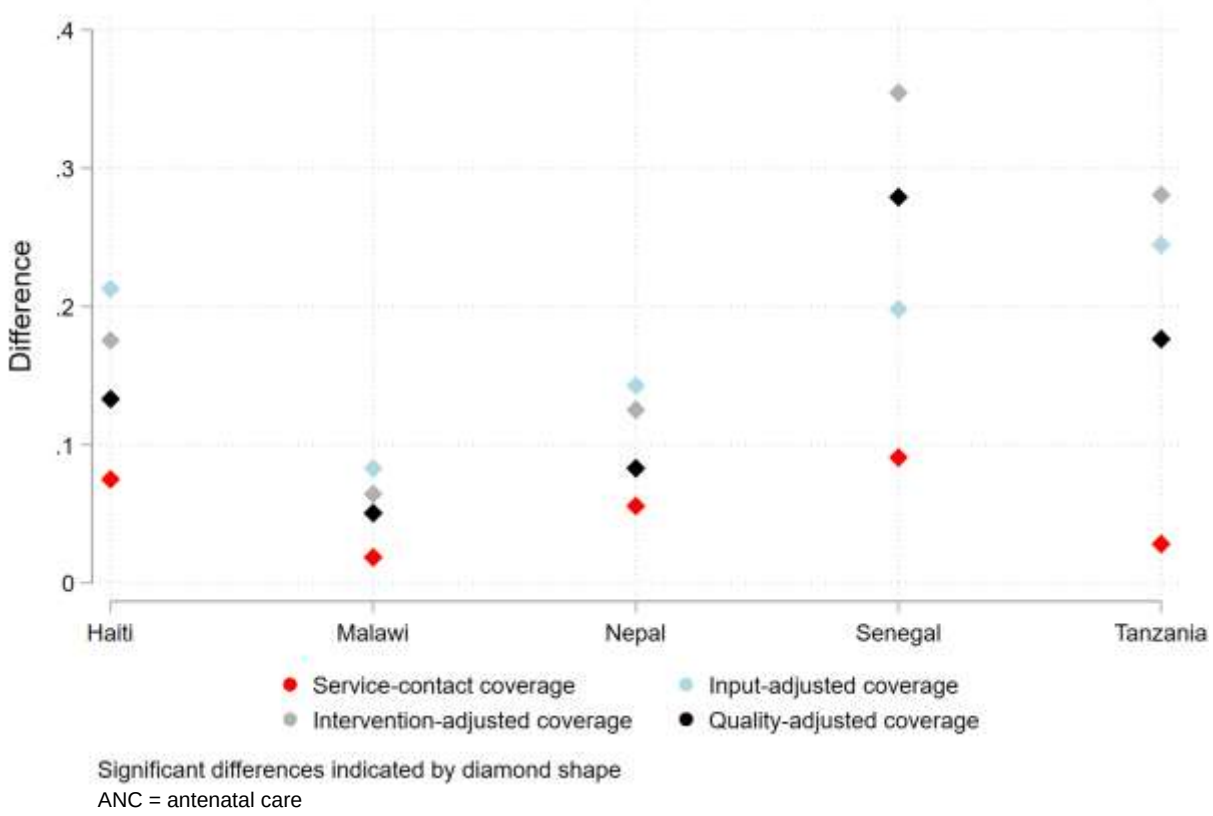
Figure 35 shows that only one country, Malawi, had statistically significant differences in any of the sick child care effective coverage estimates between the lowest and the highest wealth quintiles. However, Appendix Table 7 shows that in service-contact coverage in Tanzania, as well as all four effective coverage estimates in Haiti, there were no statistically significant differences between the lowest and highest wealth quintile. There were statistically significant differences in the lowest and fourth wealth quintiles, which did not appear in our summary graph.

Figure 35 Wealth differences in sick child care effective coverage estimates



We found consistent statistically significant regional differences in ANC effective coverage estimates across all countries (Figure 36). Variation in the difference of the estimates in the specific effective coverage estimates was smallest in Malawi and largest in Senegal.

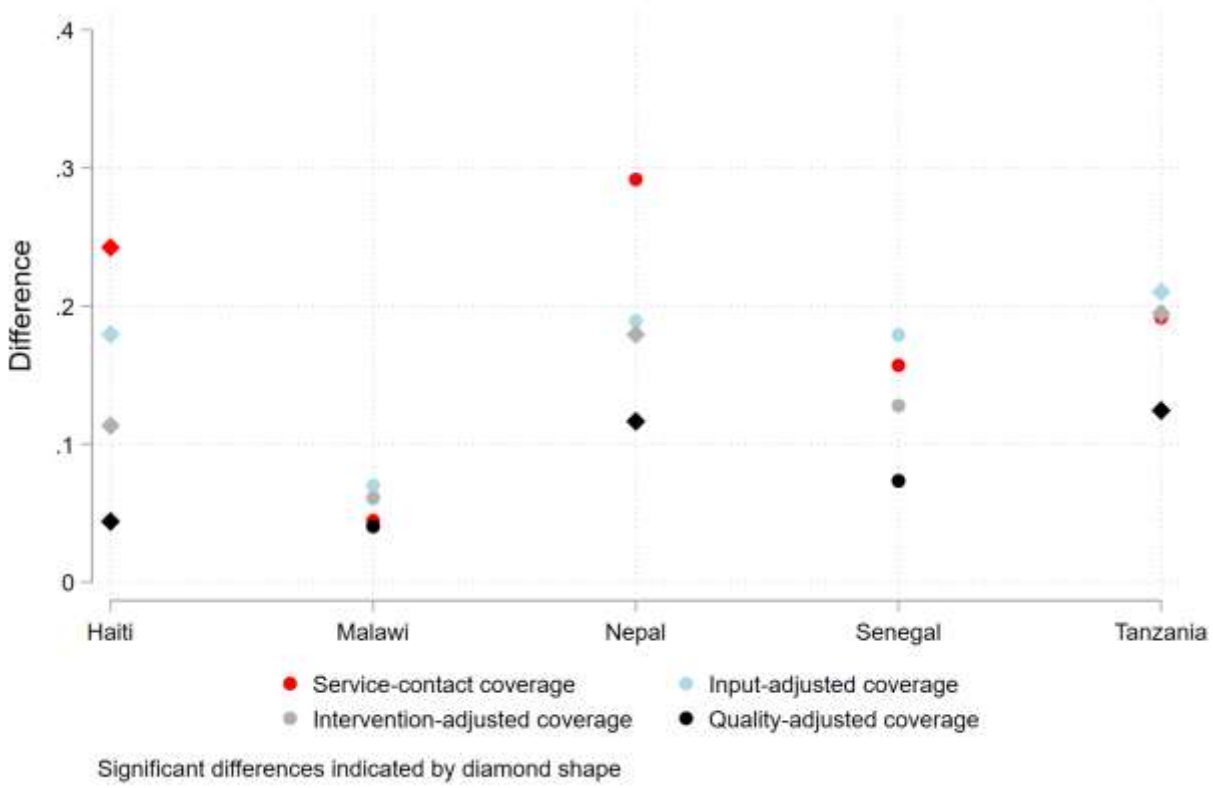
Figure 36 Regional differences in ANC effective coverage estimates



ANC = antenatal care

Figure 37 shows variation in the regional differences in the sick child effective coverage estimate. In Haiti, all effective coverage estimates were statistically significantly different between the highest and lowest region, while in Malawi and Senegal, the differences were not significant. In Tanzania, three of the four effective coverage estimates were significant, and in Nepal, two of the four were significant. Again, there was very little variation in the differences in effective coverage estimates in Malawi.

Figure 37 Regional differences in sick child care effective coverage estimates



Regional differences in quality-adjusted coverage within countries were generally larger for ANC compared to sick child care, except for Nepal, where the difference in ANC quality-adjusted coverage was 0.08 and in sick child care 0.117. When comparing countries, Senegal had the largest regional differences in ANC care, while Tanzania had the largest regional differences in sick child care.

In all comparisons except regional differences in sick child care (Figures 32–36), Senegal had the largest difference in quality-adjusted coverage. In the comparison by wealth quintiles, sick children in the highest wealth quintile had lower quality-adjusted effective coverage when compared to the lowest wealth quintile (Figure 23).

4 DISCUSSION AND CONCLUSION

As we apply the concept of effective coverage more broadly, it is important to use these measures to assess if different populations have equitable levels of effective coverage, so that we can target those who may be receiving lower levels of high-quality services. The goal of this report has been to assess the levels of effective coverage of ANC and sick child care by place of residence, wealth quintile, and region across five countries.

The results show four main findings.

4.1 Variation in Disparities

First, the disparities varied across the five countries. For ANC, in all countries except Nepal, the disparity in quality-adjusted coverage between urban and rural areas was over 10%. When comparing the lowest and highest wealth quintiles, ANC quality-adjusted coverage was over 10% only in Nepal (11%) and Senegal (23%). For sick child care, there were smaller levels of variation in the quality-adjusted coverage estimates. All differences by place of residence were under 6% and all differences by wealth quintile were under 3%. With sick child care, we also observed situations where rural populations had higher estimates of quality-adjusted coverage than urban populations, although these disparities were nonsignificant.

In Haiti, Malawi, and Tanzania, the disparity in ANC quality-adjusted coverage was larger by place of residence than by wealth quintiles. However, for sick child care, quality-adjusted coverage is larger by place of residence only in Senegal.

These divergent patterns can be explained by the particular context of each individual country, such as the geographic distribution of health facilities or the population, the proportion of the population and health facilities in rural or urban areas, and the health system structure.

Key Findings

- Disparities were heterogeneous across the five countries.
- Differences in ANC quality-adjusted coverage by wealth quintiles, place of residence, and region in all countries.
- Some differences in sick child care quality- adjusted coverage, but these differed by country.
- Along the cascade, we see the largest absolute difference in intervention-adjusted coverage for ANC. For sick child care, no one effective coverage measure consistently had the largest absolute difference, and most differences were not statistically significant.

4.2 ANC Quality-adjusted Coverage Has Significant Disparities

Second, there are significant disparities in ANC quality-adjusted coverage in all five countries by wealth quintile, place of residence, and region.

We anticipated this finding given that higher wealth has been shown to be associated with higher levels of multiple components of the effective coverage cascade: ANC coverage, receipt of complete intervention,

and process quality of care (Arroyave et al. 2021; Arsenault et al. 2018; Khatri et al. 2022; Selebano and Ataguba 2022). In the one study that examined equity in effective coverage of ANC, wealth and place of residence disparities were clear (Hategeka, Arsenault, and Kruk 2020). However, in most previous research, process quality has been measured using self-reported receipt of ANC interventions. As demonstrated in previous work, self-report of ANC process quality generally results in higher values than observation of ANC process quality (Blanc, Warren, et al. 2016; Liu et al. 2013; Riese, Assaf, and Pullum 2021). One study that used SPA observational data to assess structure and process quality in areas of different levels of poverty found that maternal health care quality did differ by poverty level, with increasing levels of quality found in areas of greater wealth (Sharma et al. 2017). Despite the fact that we did not assess wealth differentials for structure or process quality due to lack of client wealth quintile data in the SPA, we still found strong evidence that aligned with this previous work, and showed that inequities in ANC effective coverage exist across all five countries in this analysis.

Previous research has also shown urban/rural disparities in ANC coverage as well as ANC structural quality (Gage et al. 2018; Langa and Bhatta 2020; Samuel, Zewotir, and North 2021). It is important to note that in some cases, wealth differences may in fact explain much of the rural/urban inequities in ANC quality (Afulani 2015; Samuel, Zewotir, and North 2021). A potential area for future work would be to decompose the disparities in effective coverage estimates to assess the proportion of the rural-urban inequity that may be due to wealth disparities.

While we could not identify previous research that assessed regional variation in ANC in any of the five countries in this analysis, other research has shown that factors that vary by region, such as distance to health facility, are important to ANC coverage and receipt of complete intervention (Okedo-Alex et al. 2019; Tegegne et al. 2019). As mentioned earlier, ANC structural quality has been shown to differ by rural/urban status. Rural/urban differentials may also be a factor in the regional disparities in ANC quality-adjusted effective coverage because different regions are likely to have different proportions of rural and urban areas.

4.3 Few Disparities in Sick Child Quality-adjusted Coverage

Third, there are few significant disparities in sick child quality-adjusted coverage. No countries had significant inequities by wealth quintile. As shown in Table 2, three of the four components of the sick child care effective coverage cascade were measured with SPA data, which does not have wealth quintile information. In comparison, the ANC effective coverage cascade uses SPA data for only two of the four components. When each SPA measure, which does not vary over wealth quintile, is multiplied, the product becomes more similar, even if the first component was significantly different by wealth. It is therefore not surprising that no significant disparities in sick child quality-adjusted effective coverage were observed by wealth quintile. In addition, since coverage estimates for sick children were much lower than for ANC, the scope for disparities to be significant along the cascade is limited. Only Haiti and Malawi had significant disparities in coverage of sick child care by wealth quintile (Tables 5 and 6), and in Malawi, the highest wealth quintile had lower coverage than any of the lower quintiles. This is in contrast to evidence that has shown patterns of increasing coverage of care-seeking for sick children as wealth increases. This includes research in Malawi (Bradley, Rosapep, and Shiras 2020; Hategeka, Arsenault, and Kruk 2020; Liu et al. 2019).

Only in Senegal was there significant disparity in sick child quality-adjusted coverage by place of residence. In Tables 5–9, this finding was expected since even where there are rural-urban disparities in the components of sick child effective coverage, the magnitude of the disparities is generally small. The exception is Senegal, where there was a nearly 20 percentage point difference in readiness, a 60 percentage point difference in receipt of complete intervention, and an over 20 percentage point difference in process quality.

Only Haiti, Nepal, and Tanzania had significant disparities by region. Figure 37 shows that these three countries had larger and more statistically significant absolute differences in each step on the effective coverage cascade. This made it more likely that they would continue having significant disparities at the final quality-adjusted coverage measure.

Overall for sick child care, there is evidence of coverage inequities by wealth, place of residence, and geographic region. However, there is a dearth of evidence assessing inequities in quality of care or effective coverage by these sociodemographic variables. The one study from Rwanda that examined equity in maternal and child health effective coverage found inequities in effective coverage by wealth and place of residence. However, the research used maternal self-report of the quality of sick child care provided, which could result in quite different estimates than the observation approach used in this study (Campbell et al. 2013; Fischer Walker, Fontaine, and Black 2013). Future research should examine disparities in service readiness and quality of care among those who access facilities seeking sick child care services.

4.4 Large Magnitude of Difference in Intervention-adjusted Coverage

Finally, when looking at the absolute difference between Q1 and Q5 at each step along the ANC effective coverage cascade, the largest magnitude of difference was found in intervention-adjusted coverage (Figure 34). This may be explained by the fact that we did not have process quality data disaggregated by wealth quintile. The intervention-adjusted coverage measures were all multiplied by the mean process quality component value for the country, which resulted in convergence of the quality-adjusted coverage estimates. Similarly for place of residence, we also saw the largest differences in ANC intervention-adjusted coverage, except for Malawi where input-adjusted coverage was higher. Although we had process quality data disaggregated by place of residence in all countries except Nepal, we observed in Tables 5–9 that the process quality component values were not statistically significantly different for any country. This resulted in a similar convergence that we saw for the wealth quintile data.

For sick child care, with wealth quintile and place of residence, we saw very low magnitude of absolute differences between quintile 1 and quintile 5 and rural and urban. In both cases, these magnitudes were all below .15, although some were statistically significant. For the wealth quintile, this may be due to the fact that more components came from SPA data that do not have wealth quintile data available. For place of residence, this may be due to the relatively small number of statistically significant differences in the sick child care effective coverage components that contribute to convergence of the products, and similar estimates throughout the cascade.

This finding agrees with previous evidence that has shown that hospitals, more commonly located in urban areas, have better service readiness than lower-level facilities (Kruk et al. 2016; Lama et al. 2020; Leslie et al. 2017). Increasing readiness by improving availability of medicine and equipment at facilities in rural

areas and regions with low readiness may contribute to increasing the estimates of effective coverage and, subsequently, to improved MCH health outcomes.

4.5 Strengths and Limitations

A key strength of this paper is the focus on equity. Our results demonstrate that simply looking at the national-level effective coverage estimate often masks inequities by wealth, place of residence, and region. These disaggregated estimates are essential to be able to effectively utilize effective coverage that improves programming. While measurement of effective coverage is becoming more and more common, very few applications of effective coverage measures focus on equity in the estimates. This analysis also builds upon previous research on measurement of effective coverage using DHS and SPA data (Riese, Assaf, and Pullum 2021) to use simple, and therefore hopefully more replicable, measures of readiness and process quality.

This research is not without limitations. In the previous work that compared different approaches to measurement, we discussed limitations in the effective coverage measurement (Riese, Assaf, and Pullum 2021). In our methodology here, we calculate the effective coverage cascades by linking individuals from the DHS with facilities in the SPA with the same characteristic, whether it is place of residence or region. For wealth quintile, we only have data for the individuals from the DHS. This approach is based on data availability. Thus, it does not account for the variation in readiness or process quality that individuals with specific characteristics encounter when they visit a specific health facility. The inequalities in effective coverage may be larger than we are able to estimate by using the available DHS and SPA data (Exley and Marchant 2022). Due to higher coverage among the wealthy, the national estimates of quality are likely to include more wealthy than poor clients. Therefore, the national estimates are likely to be biased at a higher level. It is plausible that if wealth were associated with higher-quality care, national estimates of quality may be biased lower for wealthier quintiles and higher for poorer quintiles.

In addition, in this analysis, we used nonoverlapping confidence intervals to determine significant differences. However, this approach may be overly conservative and may have missed some significant differences where confidence intervals overlap (Knezevic 2020).

4.6 Conclusion

Disparities in effective coverage were evident in all countries, although the characteristics on which the effective coverage differed were not consistent over all countries. We showed that ANC consistently had more differences than sick child care. Policy makers and program managers can use these data to identify where and among which groups effective coverage is lower, and to target which steps along the effective coverage cascade are contributing to the low effective coverage. This will help to reduce the inequities in care and improve MCH health outcomes.

REFERENCES

Afulani, P. A. 2015. "Rural/Urban and Socioeconomic Differentials in Quality of Antenatal Care in Ghana." *PLoS One* 10 (2): e0117996. https://doi.org/10.1371/journal.pone.0117996

Agence Nationale de la Statistique et de la Démographie/ANSD, and ICF. 2020. *Sénégal: Enquête Démographique Et De Santé Continue (EDS-Continue 2018)*. Dakar, Sénégal: ANSD/ICF. https://www.dhsprogram.com/pubs/pdf/FR367/FR367.pdf

Anindya, K., T. Marthias, S. Vellakkal, N. Carvalho, R. Atun, A. Morgan, Y. Zhao, et al. 2021. "Socioeconomic Inequalities in Effective Service Coverage for Reproductive, Maternal, Newborn, and Child Health: A Comparative Analysis of 39 Low-Income and Middle-Income Countries." *EClinicalMedicine* 40: 101103. https://doi.org/10.1016/j.eclinm.2021.101103

Anyamele, O., J. Ukawuilulu, and B. Akanegbu. 2017. "The Role of Wealth and Mother's Education in Infant and Child Mortality in 26 Sub-Saharan African Countries: Evidence from Pooled Demographic and Health Survey (DHS) Data 2003–2011 and African Development Indicators (ADI), 2012." *Social Indicators Research* 130 (3): 1225–1146. https://doi.org/10.1007/s11205–015–1225-x

Arroyave, L., G. E. Saad, C. G. Victora, and A. J. D. Barros. 2021. "Inequalities in Antenatal Care Coverage and Quality: An Analysis from 63 Low and Middle-Income Countries Using the ANCq Content-Qualified Coverage Indicator." *International Journal for Equity in Health* 20 (1): 102. https://doi.org/10.1186/s12939–021–01440–3

Arsenault, C., K. Jordan, D. Lee, G. Dinsa, F. Manzi, T. Marchant, and M. E. Kruk. 2018. "Equity in Antenatal Care Quality: An Analysis of 91 National Household Surveys." *The Lancet Global Health* 6 (11): e1186-e1195. https://doi.org/10.1016/S2214–109X(18)30389–9

Banda, R., K. Fylkesnes, and I. F. Sandøy. 2015. "Rural-Urban Differentials in Pregnancy-Related Mortality in Zambia: Estimates Using Data Collected in a Census." *Population Health Metrics* 13 (1): 32. https://doi.org/10.1186/s12963–015–0066–9

Blanc, A. K., C. Diaz, K. J. McCarthy, and K. Berdichevsky. 2016. "Measuring Progress in Maternal and Newborn Health Care in Mexico: Validating Indicators of Health System Contact and Quality of Care." *BMC Pregnancy and Childbirth* 16 (1): 255. https://doi.org/10.1186/s12884–016–1047–0

Blanc, A. K., C. Warren, K. J. McCarthy, J. Kimani, C. Ndwiga, and S. RamaRao. 2016. "Assessing the Validity of Indicators of the Quality of Maternal and Newborn Health Care in Kenya." *Journal of Global Health* 6 (1): 010405. https://www.jogh.org/documents/issue201601/jogh-06–010405.pdf

Bradley, S. E. K., L. Rosapep, and T. Shiras. 2020. "Where Do Caregivers Take Their Sick Children for Care? An Analysis of Care Seeking and Equity in 24 USAID Priority Countries." *Global Health: Science and Practice* 8 (3): 518–533. https://doi.org/10.9745/GHSP-D-20–00115

Campbell, H., S. el Arifeen, T. Hazir, J. O'Kelly, J. Bryce, I. Rudan, and S. A. Qazi. 2013. "Measuring Coverage in MNCH: Challenges in Monitoring the Proportion of Young Children with Pneumonia Who Receive Antibiotic Treatment." *PLoS Medicine* 10 (5): e1001421. https://doi.org/10.1371/journal.pmed.1001421

Exley, J., and T. Marchant. 2022. "Inequalities in Effective Coverage Measures: Are We Asking Too Much of the Data?" *BMJ Global Health* 7 (5): e009200. http://dx.doi.org/10.1136/bmjgh-2022–009200

Fischer Walker, C. L., O. Fontaine, and R. E. Black. 2013. "Measuring Coverage in MNCH: Current Indicators for Measuring Coverage of Diarrhea Treatment Interventions and Opportunities for Improvement." *PLoS Medicine* 10 (5): e1001385. https://doi.org/10.1371/journal.pmed.1001385

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): 59. https://doi.org/10.1186/s12992–018–0379–0

Hategeka, C., C. Arsenault, and M. E. Kruk. 2020. "Temporal Trends in Coverage, Quality and Equity of Maternal and Child Health Services in Rwanda, 2000–2015." *BMJ Global Health* 5 (11): e002768. http://dx.doi.org/10.1136/bmjgh-2020–002768

Institut Haïtien de l'Enfance - IHE/Haïti, and ICF. 2018. *Haïti Enquête Mortalité, Morbidité Et Utilisation Des Services 2016–2017 - EMMUS-VI*. Pétion-Ville/Haïti: IHE/Haïti, ICF. http://dhsprogram.com/pubs/pdf/FR326/FR326.pdf

Khatri, R. B., J. Durham, R. Karkee, and Y. Assefa. 2022. "High Coverage but Low Quality of Maternal and Newborn Health Services in the Coverage Cascade: Who Is Benefitted and Left Behind in Accessing Better Quality Health Services in Nepal?" *Reproductive Health* 19 (1): 163. https://doi.org/10.1186/s12978–022–01465-z

Knezevic, A. 2020. "Overlapping Confidence Intervals and Statistical Significance." Ithaca, NY, USA: Cornell Statistical Consulting Unit. http://www.cscu.cornell.edu/news/statnews/stnews73.pdf

Koulidiati, J.-L., M. De Allegri, A. Souares, S. Ouedraogo, H. Hien, P. J. Robyn, and S. Brenner. 2018a. "Factors Associated with Effective Coverage of Child Health Services in Burkina Faso." *Tropical Medicine & International Health* 23 (11): 1188–1199. https://onlinelibrary.wiley.com/doi/abs/10.1111/tmi.13140

Koulidiati, J. L., M. De Allegri, A. Souares, S. Ouedraogo, H. Hien, P. J. Robyn, and S. Brenner. 2018b. "Factors Associated with Effective Coverage of Child Health Services in Burkina Faso." *Tropical Medicine & International Health* 23 (11): 1188–1199. https://doi.org/10.1111/tmi.13140

Kruk, M. E., H. H. Leslie, S. Verguet, G. M. Mbaruku, R. M. K. Adanu, and A. Langer. 2016. "Quality of Basic Maternal Care Functions in Health Facilities of Five African Countries: An Analysis of National Health System Surveys." *The Lancet Global Health* 4 (11): e845-e855. https://doi.org/10.1016/S2214–109X(16)30180–2

Lama, T. P., M. K. Munos, J. Katz, S. K. Khatry, S. C. LeClerq, and L. C. Mullany. 2020. “Assessment of Facility and Health Worker Readiness to Provide Quality Antenatal, Intrapartum and Postpartum Care in Rural Southern Nepal.” *BMC Health Services Research* 20 (1): 16. https://doi.org/10.1186/s12913–019–4871-x

Langa, N., and T. Bhatta. 2020. “The Rural-Urban Divide in Tanzania: Residential Context and Socioeconomic Inequalities in Maternal Health Care Utilization.” *PLoS ONE* 15 (11): e0241746. https://doi.org/10.1371/journal.pone.0241746

Leslie, H. H., D. Spiegelman, X. Zhou, and M. E. Kruk. 2017. “Service Readiness of Health Facilities in Bangladesh, Haiti, Kenya, Malawi, Namibia, Nepal, Rwanda, Senegal, Uganda and the United Republic of Tanzania.” *Bulletin of the World Health Organization* 95 (11): 738–748. http://dx.doi.org/10.2471/BLT.17.191916

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. http://dx.doi.org/10.1136/bmjopen-2019–029631

Liu, L., M. Li, L. Yang, L. Ju, B. Tan, N. Walker, J. Bryce, et al. 2013. “Measuring Coverage in MNCH: A Validation Study Linking Population Survey Derived Coverage to Maternal, Newborn, and Child Health Care Records in Rural China.” *PLoS ONE* 8 (5): e60762. https://doi.org/10.1371/journal.pone.0060762

Marsh, A. D., M. Muzigaba, T. Diaz, J. Requejo, D. Jackson, D. Chou, J. A. Cresswell, 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

Ministry of Health - MOH/Nepal, New ERA/Nepal, and ICF. 2017. *Nepal Demographic and Health Survey 2016*. Kathmandu, Nepal: MOH/Nepal, New ERA, and ICF. http://dhsprogram.com/pubs/pdf/FR336/FR336.pdf

Ministry of Health, Community Development, Gender, Elderly, Children - MoHCDGEC/Tanzania Mainland, Ministry of Health - MoH/Zanzibar, National Bureau of Statistics - NBS/Tanzania, Office of Chief Government Statistician - OCGS/Zanzibar, and ICF. 2016. *Tanzania Demographic and Health Survey and Malaria Indicator Survey 2015–2016*. Dar es Salaam, Tanzania: MoHCDGEC, MoH, NBS, OCGS, and ICF. http://dhsprogram.com/pubs/pdf/FR321/FR321.pdf

Mulholland, E., L. Smith, I. Carneiro, H. Becher, and D. Lehmann. 2008. “Equity and Child-Survival Strategies.” *Bulletin of the World Health Organization* 86 (5): 399–407. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2647438/pdf/07–044545.pdf/

National Statistical Office/Malawi, and ICF. 2017. *Malawi Demographic and Health Survey 2015–16*. Zomba, Malawi: National Statistical Office and ICF. http://dhsprogram.com/pubs/pdf/FR319/FR319.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. 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

Nwosu, C. O., and J. E. Ataguba. 2019. “Socioeconomic Inequalities in Maternal Health Service Utilisation: A Case of Antenatal Care in Nigeria Using a Decomposition Approach.” *BMC Public Health* 19 (1): 1493. https://doi.org/10.1186/s12889–019–7840–8

Okedo-Alex, I. N., I. C. Akamike, O. B. Ezeanosike, and C. J. Uneke. 2019. “Determinants of Antenatal Care Utilisation in Sub-Saharan Africa: A Systematic Review.” *BMJ Open* 9 (10): e031890. http://dx.doi.org/10.1136/bmjopen-2019–031890

Riese, S., S. Assaf, and T. Pullum. 2021. *Measurement Approaches for Effective Coverage Estimation*. DHS Methodological Reports 31. Rockville, Maryland, USA: ICF. https://www.dhsprogram.com/pubs/pdf/MR31/MR31.pdf

Rutstein, S. O. 2008. *The DHS Wealth Index: Approaches for Rural and Urban Areas*. DHS Working Papers No. 60. Calverton, Maryland, USA: Macro International. http://dhsprogram.com/pubs/pdf/WP60/WP60.pdf.

Rutstein, S. O., and K. Johnson. 2004. *The DHS Wealth Index*. DHS Comparative Reports No. 6. Calverton, Maryland, USA: ORC Macro. http://dhsprogram.com/pubs/pdf/CR6/CR6.pdf

Samuel, O., T. Zewotir, and D. North. 2021. “Decomposing the Urban–Rural Inequalities in the Utilisation of Maternal Health Care Services: Evidence from 27 Selected Countries in Sub-Saharan Africa.” *Reproductive Health* 18 (1): 216. https://doi.org/10.1186/s12978–021–01268–8

Sauer, S. M., T. Pullum, W. Wang, L. Mallick, and H. H. Leslie. 2020. “Variance Estimation for Effective Coverage Measures: A Simulation Study.” *Journal of Global Health* 10 (1): 010506. https://jogh.org/documents/issue202001/jogh-10–010506.pdf

Selebano, K. M., and J. E. Ataguba. 2022. “Decomposing Socio-Economic Inequalities in Antenatal Care Utilisation in 12 Southern African Development Community Countries.” *SSM - Population Health* 17: 101004. https://doi.org/10.1016/j.ssmph.2021.101004

Serván-Mori, E., C. Juárez-Ramírez, S. Meneses-Navarro, I. Heredia-Pi, N. Armenta-Paulino, E. Orozco-Núñez, and G. Nigenda. 2022. “Ethnic Disparities in Effective Coverage of Maternal Healthcare in Mexico, 2006–2018: A Decomposition Analysis.” *Sexuality Research and Social Policy* (2022). https://doi.org/10.1007/s13178–021–00685–5

Sharma, J., H. H. Leslie, F. Kundu, and M. E. Kruk. 2017. “Poor Quality for Poor Women? Inequities in the Quality of Antenatal and Delivery Care in Kenya.” *PLoS ONE* 12 (1): e0171236. https://doi.org/10.1371/journal.pone.0171236

Tegegne, T. K., C. Chojenta, T. Getachew, R. Smith, and D. Loxton. 2019. “Antenatal Care Use in Ethiopia: A Spatial and Multilevel Analysis.” *BMC Pregnancy and Childbirth* 19 (1): 399. https://doi.org/10.1186/s12884–019–2550-x

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): e000506. https://doi.org/10.1136/bmjgh-2017–000506

Victora, C., A. Matijasevich, M. Silveira, I. Santos, A. Barros, and F. Barros. 2010. “Socio-Economic and Ethnic Group Inequities in Antenatal Care Quality in the Public and Private Sector in Brazil.” *Health Policy and Planning* 25 (4): 253–261. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2889278/

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

WHO. 2016. *Standards for Improving Quality of Maternal and Newborn Care in Health Facilities.* Geneva, Switzerland: WHO. https://www.who.int/publications/i/item/9789241511216

Yaya, S., G. Bishwajit, and V. Shah. 2016. “Wealth, Education and Urban-Rural Inequality and Maternal Healthcare Service Usage in Malawi.” *BMJ Global Health* 1 (2): e000085. http://dx.doi.org/10.1136/bmjgh-2016–000085

APPENDIX

Appendix Table 1 Items included in antenatal and sick child care facility readiness and process quality of care measures

	Antenatal care	Sick child care
Facility readiness	(3 items)	(2 items)
	Power (electricity or generator)	Medication availability: zinc/oral rehydration salts (ORS) for diarrhea
	Soap and running water or alcohol-based hand rub	Medication availability: antibiotics for pneumonia (amoxicillin suspension or dispensable pediatric-dosed tablets)
	Access to adequate sanitation facilities for clients	
Process quality of care	(3 items)	(6 items)
	Provider checked blood pressure	Provider counted respiration for 60 seconds
	Daily oral iron and folic acid supplementation (counseled or prescribed)	Provider checked skin turgor for dehydration (e.g., pinch abdominal skin)
	Provider counseled on breastfeeding	Provider weighed client
		Provider checked palms/conjunctiva for pallor
		Provider plotted weight on growth chart
		Provider discussed weight/growth/growth chart

Appendix Table 2 Alignment of regions from the DHS, the SPA, and designation used in this analysis

	DHS	SPA	Designation used in this analysis
Haiti	**10 departments**	**10 departments**	**10 departments**
	Aire Métropolitaine	Aire Métropolitaine	Aire Métropolitaine
	Reste-Ouest	Reste-Ouest	Reste-Ouest
	Sud-Est	Sud-Est	Sud-Est
	Nord	Nord	Nord
	Nord-Est	Nord-Est	Nord-Est
	Artibonite	Artibonite	Artibonite
	Centre	Centre	Centre
	Sud	Sud	Sud
	Grand-Anse	Grand-Anse	Grand-Anse
	Nord-Ouest	Nord-Ouest	Nord-Ouest
	Nippes	Nippes	Nippes
Malawi	**3 regions**	**3 regions**	**3 regions**
	North	North	North
	Central	Central	Central
	South	South	South
Nepal	**5 development regions**[a]	**5 development regions**[b]	**5 development regions**
	Eastern	Eastern	Eastern
	Central	Central	Central
	Western	Western	Western
	Mid-Western	Mid-Western	Mid-Western
	Far-Western	Far-Western	Far-Western
Senegal	**4 large regions**	**14 regions**	**6 large regions**
	North	Louga Sédhiou Kaffrine	North
	West	Dakar	Dakar
		Kolda	Thiès
	Central	Kédougou Fatick Matam Tambacounda	Central
		Kaolack Thiès	East
	South	Diourbel Saint Louis Ziguinchor	South

Continued...

Appendix Table 2*—Continued*

	DHS	SPA	Designation used in this analysis
Tanzania	**9 geographic zones**	**30 regions**	**9 geographic zones**
	Western	Tabora Kigoma	Western
	Northern	Kilimanjaro Tanga Arusha	Northern
	Central	Dodoma Singida Manyara	Central
	Southern Highlands	Iringa Njombe Ruvuma	Southern Highlands
	Southern	Lindi Mtwara	Southern
	South West Highlands	Mbeya Rukwa Katavi	South West Highlands
	Lake	Kagera Mwanza Geita Mara Simiyu Shinyanga	Lake
	Eastern	Dar es Salaam Pwani Morogoro	Eastern
	Zanzibar	Kaskazini Unguja Kusini Unguja Mjini Magharibi Kaskazini Pemba Kusini Pemba	Zanzibar

[a] Dataset includes disaggregation by province (7). DHS final report disaggregates by ecological zone (3), development region (5), and province (7).
[b] Dataset also includes disaggregation by district (75). SPA final report disaggregates by ecological zone (3).

Appendix Table 3 Effective coverage cascade estimates for ANC and sick child care, Haiti, proportions with 95% confidence intervals

	Service-contact coverage	Input-adjusted coverage	Intervention-adjusted coverage	Quality-adjusted coverage
		ANC		
Total	0.914 [0.901, 0.926]	0.641 [0.632, 0.650]	0.427 [0.407, 0.447]	0.250 [0.237, 0.264]
Place of residence		*	*	*
Urban	0.935 [0.917, 0.950]	0.751 [0.737, 0.764]	0.569 [0.537, 0.601]	0.33 [0.308, 0.353]
Rural	0.902 [0.882, 0.918]	0.580 [0.569, 0.592]	0.354 [0.330, 0.379]	0.21 [0.194, 0.227]
Wealth quintile	*	*	*	*
Lowest	0.825 [0.792, 0.853]	0.578 [0.557, 0.599]	0.280 [0.246, 0.317]	0.164 [0.144, 0.186]
Second	0.908 [0.883, 0.928]	0.636 [0.621, 0.652]	0.367 [0.337, 0.398]	0.215 [0.197, 0.234]
Middle	0.930 [0.901, 0.951]	0.652 [0.634, 0.669]	0.453 [0.418, 0.488]	0.265 [0.244, 0.287]
Fourth	0.950 [0.933, 0.963]	0.666 [0.655, 0.677]	0.507 [0.477, 0.537]	0.297 [0.278, 0.316]
Highest	0.979 [0.952, 0.990]	0.686 [0.672, 0.699]	0.595 [0.563, 0.626]	0.348 [0.328, 0.369]
Region	*	*	*	*
Aire Métropolitaine	0.912 [0.880, 0.936]	0.708 [0.685, 0.729]	0.499 [0.453, 0.545]	0.263 [0.233, 0.296]
Reste-Ouest	0.896 [0.843, 0.933]	0.650 [0.617, 0.681]	0.383 [0.317, 0.454]	0.222 [0.184, 0.266]
Sud-Est	0.916 [0.854, 0.953]	0.568 [0.537, 0.599]	0.356 [0.292, 0.425]	0.216 [0.173, 0.266]
Nord	0.934 [0.900, 0.957]	0.725 [0.703, 0.747]	0.523 [0.456, 0.590]	0.307 [0.265, 0.352]
Nord-Est	0.949 [0.913, 0.971]	0.576 [0.558, 0.594]	0.434 [0.393, 0.476]	0.275 [0.241, 0.311]
Artibonite	0.904 [0.867, 0.931]	0.535 [0.516, 0.554]	0.356 [0.318, 0.394]	0.213 [0.186, 0.243]
Centre	0.932 [0.894, 0.957]	0.693 [0.669, 0.716]	0.502 [0.441, 0.564]	0.292 [0.253, 0.335]
Sud	0.881 [0.829, 0.919]	0.604 [0.573, 0.634]	0.354 [0.288, 0.427]	0.226 [0.179, 0.281]
Grand-Anse	0.913 [0.866, 0.945]	0.603 [0.577, 0.628]	0.383 [0.331, 0.437]	0.226 [0.187, 0.270]
Nord-Ouest	0.956 [0.932, 0.972]	0.626 [0.612, 0.639]	0.416 [0.384, 0.449]	0.261 [0.234, 0.290]
Nippes	0.937 [0.901, 0.961]	0.748 [0.723, 0.771]	0.530 [0.459, 0.599]	0.346 [0.271, 0.429]
		SICK CHILD CARE		
Total	0.260 [0.230,0.291]	0.189 [0.168, 0.213]	0.085 [0.072, 0.100]	0.039 [0.033, 0.047]
Place of residence	*			
Urban	0.324 [0.266, 0.389]	0.225 [0.185, 0.270]	0.094 [0.072, 0.122]	0.046 [0.035, 0.060]
Rural	0.221 [0.193, 0.252]	0.166 [0.145, 0.189]	0.080 [0.066, 0.098]	0.035 [0.028, 0.043]
Wealth quintile	*	*	*	*
Lowest	0.188 [0.156, 0.225]	0.137 [0.114, 0.165]	0.062 [0.050, 0.077]	0.028 [0.023, 0.036]
Second	0.238 [0.188, 0.296]	0.173 [0.137, 0.216]	0.078 [0.060, 0.100]	0.036 [0.028, 0.047]
Middle	0.289 [0.218, 0.373]	0.211 [0.160, 0.273]	0.095 [0.071, 0.126]	0.044 [0.033, 0.059]
Fourth	0.313 [0.255, 0.379]	0.228 [0.186, 0.277]	0.103 [0.081, 0.129]	0.047 [0.037, 0.060]
Highest	0.291 [0.220, 0.374]	0.212 [0.162, 0.274]	0.095 [0.071, 0.126]	0.044 [0.033, 0.059]
Region	*	*	*	*
Aire Métropolitaine	0.375 [0.279, 0.481]	0.209 [0.158, 0.270]	0.089 [0.061, 0.128]	0.047 [0.032, 0.069]
Reste-Ouest	0.132 [0.077, 0.218]	0.079 [0.046, 0.130]	0.032 [0.018, 0.056]	0.015 [0.008, 0.026]
Sud-Est	0.199 [0.113, 0.327]	0.159 [0.091, 0.262]	0.063 [0.032, 0.121]	0.029 [0.015, 0.057]
Nord	0.239 [0.176, 0.316]	0.193 [0.143, 0.256]	0.082 [0.050, 0.133]	0.038 [0.022, 0.063]
Nord-Est	0.298 [0.216, 0.395]	0.236 [0.172, 0.314]	0.065 [0.023, 0.171]	0.031 [0.012, 0.078]
Artibonite	0.267 [0.214, 0.327]	0.189 [0.152, 0.232]	0.091 [0.063, 0.130]	0.037 [0.025, 0.056]
Centre	0.310 [0.226, 0.408]	0.258 [0.190, 0.341]	0.145 [0.093, 0.220]	0.059 [0.037, 0.091]
Sud	0.266 [0.205, 0.338]	0.239 [0.184, 0.304]	0.085 [0.045, 0.155]	0.038 [0.019, 0.077]
Grand-Anse	0.235 [0.166, 0.320]	0.196 [0.140, 0.268]	0.133 [0.081, 0.210]	0.046 [0.027, 0.079]
Nord-Ouest	0.212 [0.142, 0.303]	0.176 [0.119, 0.252]	0.056 [0.027, 0.112]	0.017 [0.008, 0.038]
Nippes	0.268 [0.169, 0.398]	0.244 [0.155, 0.364]	0.145 [0.080, 0.250]	0.055 [0.026, 0.114]

* = non-overlapping confidence intervals

Appendix Table 4 Effective coverage cascade estimates for ANC and sick child care, Malawi, proportions with 95% confidence intervals

	Service-contact coverage	Input-adjusted coverage	Intervention-adjusted coverage	Quality-adjusted coverage
		ANC		
Total	0.981 [0.977, 0.986]	0.486 [0.484, 0.488]	0.246 [0.240, 0.253]	0.120 [0.119, 0.132]
Place of residence		*	*	*
Urban	0.99 [0.983, 0.994]	0.706 [0.702, 0.709]	0.416 [0.386, 0.446]	0.208 [0.184, 0.235]
Rural	0.98 [0.975, 0.985]	0.438 [0.436, 0.440]	0.215 [0.209, 0.221]	0.104 [0.098, 0.110]
Wealth quintile	*	*	*	*
Lowest	0.972 [0.963, 0.980]	0.482 [0.477, 0.486]	0.230 [0.218, 0.242]	0.112 [0.105, 0.120]
Second	0.984 [0.977, 0.989]	0.487 [0.485, 0.490]	0.237 [0.225, 0.249]	0.116 [0.108, 0.124]
Middle	0.976 [0.967, 0.983]	0.483 [0.480, 0.487]	0.236 [0.223, 0.249]	0.115 [0.107, 0.124]
Fourth	0.989 [0.983, 0.993]	0.490 [0.487, 0.492]	0.245 [0.232, 0.258]	0.119 [0.111, 0.128]
Highest	0.990 [0.984, 0.994]	0.490 [0.488, 0.493]	0.292 [0.276, 0.308]	0.143 [0.133, 0.153]
Region	*	*	*	*
North	0.992 [0.985, 0.995]	0.501 [0.499, 0.504]	0.259 [0.246, 0.272]	0.151 [0.139, 0.165]
Central	0.989 [0.984, 0.992]	0.528 [0.526, 0.531]	0.279 [0.267, 0.292]	0.135 [0.124, 0.147]
South	0.973 [0.964, 0.980]	0.446 [0.442, 0.449]	0.215 [0.207, 0.223]	0.101 [0.093, 0.109]
		SICK CHILD CARE		
Total	0.528 [0.504, 0.551]	0.448 [0.428, 0.467]	0.410 [0.389, 0.431]	0.119 [0.107,0.132]
Place of residence				
Urban	0.482 [0.424, 0.541]	0.424 [0.374, 0.477]	0.390 [0.338, 0.445]	0.110 [0.085, 0.142]
Rural	0.535 [0.510, 0.560]	0.447 [0.426, 0.468]	0.409 [0.387, 0.431]	0.120 [0.107, 0.134]
Wealth quintile	*	*	*	
Lowest	0.555 [0.506, 0.602]	0.471 [0.430, 0.511]	0.431 [0.392, 0.470]	0.125 [0.110, 0.142]
Second	0.505 [0.460, 0.550]	0.428 [0.390, 0.467]	0.392 [0.356, 0.429]	0.114 [0.100, 0.130]
Middle	0.540 [0.495, 0.585]	0.458 [0.421, 0.497]	0.420 [0.384, 0.457]	0.122 [0.107, 0.138]
Fourth	0.578 [0.531, 0.623]	0.490 [0.451, 0.529]	0.449 [0.411, 0.486]	0.130 [0.115, 0.148]
Highest	0.443 [0.391, 0.496]	0.376 [0.332, 0.421]	0.344 [0.303, 0.387]	0.100 [0.086, 0.116]
Region				
North	0.566 [0.510, 0.620]	0.494 [0.446, 0.542]	0.440 [0.389, 0.493]	0.099 [0.076, 0.128]
Central	0.524 [0.485, 0.563]	0.463 [0.429, 0.498]	0.433 [0.398, 0.468]	0.139 [0.122, 0.158]
South	0.522 [0.491, 0.553]	0.424 [0.398, 0.449]	0.379 [0.349, 0.410]	0.104 [0.085, 0.127]

* = non-overlapping confidence intervals

Appendix Table 5 Effective coverage cascade estimates for ANC and sick child care, Nepal, proportions with 95% confidence intervals

	Service-contact coverage	Input-adjusted coverage	Intervention-adjusted coverage	Quality-adjusted coverage
		ANC		
Total	0.941 [0.929, 0.951]	0.570 [0.544, 0.596]	0.395 [0.371, 0.421]	0.200 [0.183, 0.218]
Place of residence			*	*
Urban	0.955 [0.940, 0.966]	0.578 [0.551, 0.605]	0.436 [0.407, 0.466]	0.221 [0.202, 0.241]
Rural	0.924 [0.903, 0.940]	0.559 [0.532, 0.586]	0.345 [0.314, 0.379]	0.175 [0.156, 0.195]
Wealth quintile	*	*	*	*
Lowest	0.866 [0.839, 0.890]	0.525 [0.497, 0.552]	0.297 [0.265, 0.332]	0.151 [0.133, 0.171]
Second	0.931 [0.908, 0.949]	0.564 [0.536, 0.592]	0.369 [0.334, 0.405]	0.187 [0.167, 0.209]
Middle	0.968 [0.943, 0.983]	0.587 [0.558, 0.615]	0.392 [0.353, 0.432]	0.198 [0.176, 0.223]
Fourth	0.965 [0.944, 0.979]	0.585 [0.557, 0.612]	0.437 [0.406, 0.468]	0.221 [0.202, 0.242]
Highest	0.980 [0.952, 0.992]	0.594 [0.564, 0.622]	0.519 [0.483, 0.555]	0.263 [0.240, 0.288]
Region	*	*	*	*
Eastern	0.963 [0.941, 0.977]	0.566 [0.516, 0.616]	0.421 [0.376, 0.467]	0.217 [0.173, 0.267]
Central	0.933 [0.906, 0.953]	0.529 [0.481, 0.575]	0.335 [0.293, 0.380]	0.162 [0.139, 0.187]
Western	0.946 [0.926, 0.961]	0.559 [0.491, 0.626]	0.401 [0.340, 0.464]	0.215 [0.180, 0.256]
Mid-Western	0.907 [0.877, 0.931]	0.671 [0.615, 0.723]	0.460 [0.406, 0.515]	0.245 [0.212, 0.281]
Far-Western	0.956 [0.931, 0.973]	0.590 [0.530, 0.647]	0.456 [0.400, 0.513]	0.242 [0.208, 0.280]
		SICK CHILD CARE		
Total	0.474 [0.399, 0.551]	0.290 [0.245, 0.340]	0.226 [0.188, 0.268]	0.079 [0.063, 0.098]
Place of residence				
Urban	0.417 [0.310, 0.532]	0.255 [0.192, 0.329]	0.198 [0.149, 0.259]	0.069 [0.051, 0.094]
Rural	0.540 [0.451, 0.626]	0.330 [0.278, 0.387]	0.257 [0.214, 0.305]	0.090 [0.072, 0.112]
Wealth quintile				
Lowest	0.458 [0.335, 0.588]	0.280 [0.209, 0.365]	0.218 [0.162, 0.287]	0.076 [0.055, 0.104]
Second	0.436 [0.324, 0.554]	0.266 [0.201, 0.343]	0.207 [0.156, 0.270]	0.072 [0.053, 0.098]
Middle	0.538 [0.423, 0.649]	0.329 [0.263, 0.403]	0.256 [0.203, 0.317]	0.089 [0.069, 0.116]
Fourth	0.519 [0.400, 0.637]	0.318 [0.249, 0.395]	0.247 [0.192, 0.311]	0.086 [0.065, 0.113]
Highest	0.373 [0.185, 0.609]	0.228 [0.123, 0.383]	0.177 [0.098, 0.301]	0.062 [0.035, 0.108]
Region			*	*
Eastern	0.550 [0.432, 0.663]	0.314 [0.249, 0.387]	0.233 [0.176, 0.302]	0.068 [0.041, 0.110]
Central	0.353 [0.231, 0.498]	0.224 [0.150, 0.322]	0.154 [0.100, 0.229]	0.046 [0.028, 0.075]
Western	0.644 [0.487, 0.776]	0.414 [0.319, 0.515]	0.333 [0.250, 0.429]	0.163 [0.109, 0.236]
Mid-Western	0.589 [0.439, 0.725]	0.335 [0.257, 0.424]	0.292 [0.221, 0.376]	0.108 [0.075, 0.152]
Far-Western	0.368 [0.238, 0.519]	0.226 [0.149, 0.326]	0.206 [0.136, 0.300]	0.086 [0.054, 0.135]

* = non-overlapping confidence intervals

Appendix Table 6 Effective coverage cascade estimates for ANC and sick child care, Senegal, proportions with 95% confidence intervals

	Service-contact coverage	Input-adjusted coverage	Intervention-adjusted coverage	Quality-adjusted coverage
		ANC		
Total	0.980 [0.974, 0.988]	0.863 [0.826, 0.892]	0.505 [0.475, 0.534]	0.323 [0.296, 0.351]
Place of residence	*	*	*	*
Urban	0.996 [0.992, 0.998]	0.881 [0.843, 0.911]	0.629 [0.590, 0.666]	0.402 [0.367, 0.438]
Rural	0.969 [0.959, 0.977]	0.667 [0.627, 0.704]	0.331 [0.303, 0.361]	0.239 [0.214, 0.267]
Wealth quintile	*		*	*
Lowest	0.945 [0.923, 0.961]	0.832 [0.793, 0.865]	0.314 [0.276, 0.354]	0.201 [0.174, 0.23]
Second	0.973 [0.960, 0.982]	0.857 [0.819, 0.887]	0.444 [0.409, 0.479]	0.284 [0.256, 0.314]
Middle	0.993 [0.982, 0.997]	0.874 [0.836, 0.904]	0.504 [0.457, 0.551]	0.323 [0.288, 0.36]
Fourth	0.994 [0.985, 0.998]	0.875 [0.837, 0.905]	0.629 [0.583, 0.673]	0.403 [0.365, 0.442]
Highest	0.999 [0.996, 1.000]	0.879 [0.842, 0.909]	0.674 [0.619, 0.725]	0.432 [0.389, 0.475]
Region	*	*	*	*
North	0.973 [0.945, 0.987]	0.747 [0.698, 0.790]	0.413 [0.366, 0.461]	0.237 [0.207, 0.270]
Dakar	1.000 [1.000, 1.000]	0.891 [0.738, 0.959]	0.675 [0.570, 0.765]	0.450 [0.356, 0.548]
Thiès	0.994 [0.983, 0.998]	0.867 [0.785, 0.920]	0.616 [0.552, 0.676]	0.367 [0.305, 0.434]
Central	0.976 [0.963, 0.984]	0.889 [0.853, 0.917]	0.453 [0.406, 0.501]	0.297 [0.266, 0.331]
East	0.909 [0.864, 0.940]	0.841 [0.777, 0.889]	0.320 [0.242, 0.410]	0.171 [0.122, 0.234]
South	0.984 [0.974, 0.991]	0.945 [0.904, 0.969]	0.462 [0.425, 0.499]	0.322 [0.292, 0.352]
		SICK CHILD CARE		
Total	0.364 [0.324, 0.406]	0.275 [0.231, 0.323]	0.232 [0.180, 0.294]	0.138 [0.106, 0.177]
Place of residence			*	*
Urban	0.341 [0.269, 0.421]	0.256 [0.196, 0.327]	0.218 [0.158, 0.293]	0.129 [0.094, 0.176]
Rural	0.377 [0.332, 0.425]	0.345 [0.273, 0.426]	0.086 [0.069, 0.107]	0.072 [0.058, 0.090]
Wealth quintile				
Lowest	0.363 [0.306, 0.424]	0.274 [0.222, 0.334]	0.232 [0.175, 0.300]	0.138 [0.104, 0.181]
Second	0.339 [0.279, 0.404]	0.256 [0.203, 0.317]	0.216 [0.161, 0.284]	0.128 [0.095, 0.171]
Middle	0.429 [0.344, 0.518]	0.324 [0.252, 0.406]	0.274 [0.200, 0.362]	0.162 [0.119, 0.218]
Fourth	0.393 [0.285, 0.513]	0.297 [0.212, 0.399]	0.251 [0.171, 0.352]	0.149 [0.102, 0.212]
Highest	0.289 [0.164, 0.456]	0.218 [0.125, 0.352]	0.184 [0.104, 0.306]	0.109 [0.063, 0.184]
Region				
North	0.320 [0.248, 0.401]	0.257 [0.194, 0.331]	0.191 [0.126, 0.279]	0.096 [0.063, 0.145]
Dakar	0.285 [0.180, 0.419]	0.199 [0.102, 0.352]	0.180 [0.086, 0.336]	0.098 [0.048, 0.189]
Thiès	0.414 [0.297, 0.541]	0.249 [0.161, 0.363]	0.184 [0.097, 0.321]	0.134 [0.071, 0.239]
Central	0.369 [0.307, 0.435]	0.302 [0.248, 0.361]	0.259 [0.209, 0.317]	0.149 [0.115, 0.190]
East	0.442 [0.343, 0.546]	0.378 [0.289, 0.476]	0.307 [0.175, 0.482]	0.170 [0.107, 0.259]
South	0.432 [0.355, 0.513]	0.338 [0.270, 0.414]	0.233 [0.170, 0.311]	0.151 [0.108, 0.205]

* = non-overlapping confidence intervals

Appendix Table 7 Effective coverage cascade estimates for ANC and sick child care, Tanzania, proportions with 95% confidence intervals

	Service-contact coverage	Input-adjusted coverage	Intervention-adjusted coverage	Quality-adjusted coverage
		ANC		
Total	0.980 [0.975, 0.984]	0.542 [0.517, 0.567]	0.275 [0.259, 0.291]	0.153 [0.142, 0.164]
Place of residence		*	*	*
Urban	0.985 [0.974, 0.991]	0.708 [0.645, 0.764]	0.451 [0.408, 0.494]	0.266 [0.236, 0.298]
Rural	0.978 [0.972, 0.983]	0.503 [0.476, 0.530]	0.227 [0.211, 0.244]	0.123 [0.112, 0.134]
Wealth quintile			*	*
Lowest	0.969 [0.956, 0.979]	0.536 [0.510, 0.561]	0.211 [0.187, 0.236]	0.117 [0.103, 0.132]
Second	0.983 [0.975, 0.989]	0.544 [0.518, 0.569]	0.235 [0.215, 0.256]	0.130 [0.118, 0.144]
Middle	0.983 [0.972, 0.990]	0.544 [0.518, 0.569]	0.253 [0.232, 0.276]	0.141 [0.128, 0.155]
Fourth	0.983 [0.973, 0.989]	0.543 [0.518, 0.569]	0.305 [0.282, 0.328]	0.169 [0.155, 0.184]
Highest	0.983 [0.967, 0.991]	0.543 [0.517, 0.569]	0.380 [0.356, 0.404]	0.211 [0.195, 0.227]
Region	*	*	*	*
Western	0.987 [0.976, 0.992]	0.523 [0.453, 0.593]	0.165 [0.130, 0.207]	0.082 [0.062, 0.107]
Northern	0.974 [0.955, 0.985]	0.529 [0.464, 0.594]	0.298 [0.255, 0.346]	0.189 [0.161, 0.221]
Central	0.989 [0.977, 0.995]	0.469 [0.404, 0.536]	0.261 [0.218, 0.308]	0.168 [0.139, 0.201]
Southern Highlands	0.994 [0.986, 0.998]	0.591 [0.526, 0.653]	0.288 [0.247, 0.333]	0.172 [0.141, 0.208]
Southern	0.996 [0.989, 0.999]	0.520 [0.429, 0.609]	0.268 [0.215, 0.329]	0.139 [0.110, 0.174]
South West Highlands	0.973 [0.950, 0.986]	0.493 [0.415, 0.571]	0.219 [0.176, 0.269]	0.112 [0.087, 0.144]
Lake	0.969 [0.956, 0.978]	0.532 [0.472, 0.590]	0.235 [0.204, 0.269]	0.133 [0.113, 0.156]
Eastern	0.984 [0.967, 0.992]	0.613 [0.525, 0.695]	0.445 [0.382, 0.511]	0.258 [0.218, 0.303]
Zanzibar	0.997 [0.992, 0.999]	0.714 [0.646, 0.773]	0.378 [0.332, 0.425]	0.182 [0.144, 0.228]
		SICK CHILD CARE		
Total	0.685 [0.650, 0.717]	0.528 [0.497, 0.559]	0.406 [0.377, 0.437]	0.128 [0.114, 0.143]
Place of residence				
Urban	0.702 [0.646, 0.753]	0.582 [0.526, 0.635]	0.436 [0.382, 0.492]	0.146 [0.121, 0.175]
Rural	0.676 [0.632, 0.717]	0.508 [0.470, 0.546]	0.394 [0.359, 0.430]	0.121 [0.105, 0.140]
Wealth quintile	*			
Lowest	0.582 [0.499, 0.660]	0.449 [0.386, 0.514]	0.345 [0.296, 0.399]	0.109 [0.091, 0.129]
Second	0.729 [0.662, 0.787]	0.563 [0.510, 0.614]	0.433 [0.389, 0.478]	0.136 [0.119, 0.156]
Middle	0.695 [0.613, 0.766]	0.536 [0.474, 0.597]	0.413 [0.363, 0.464]	0.130 [0.111, 0.151]
Fourth	0.686 [0.613, 0.750]	0.529 [0.473, 0.584]	0.407 [0.362, 0.454]	0.128 [0.111, 0.148]
Highest	0.724 [0.652, 0.786]	0.559 [0.503, 0.613]	0.430 [0.384, 0.477]	0.135 [0.117, 0.155]
Region		*	*	*
Western	0.660 [0.551, 0.754]	0.481 [0.386, 0.577]	0.381 [0.300, 0.471]	0.090 [0.063, 0.126]
Northern	0.545 [0.379, 0.701]	0.453 [0.317, 0.597]	0.349 [0.244, 0.472]	0.146 [0.097, 0.212]
Central	0.696 [0.579, 0.792]	0.592 [0.489, 0.687]	0.461 [0.368, 0.557]	0.190 [0.136, 0.258]
Southern Highlands	0.598 [0.494, 0.693]	0.439 [0.354, 0.527]	0.266 [0.196, 0.350]	0.088 [0.065, 0.118]
Southern	0.700 [0.570, 0.803]	0.385 [0.290, 0.489]	0.312 [0.222, 0.420]	0.065 [0.036, 0.115]
South West Highlands	0.655 [0.548, 0.748]	0.551 [0.447, 0.651]	0.401 [0.308, 0.502]	0.098 [0.063, 0.149]
Lake	0.736 [0.675, 0.790]	0.595 [0.535, 0.652]	0.454 [0.390, 0.520]	0.147 [0.120, 0.178]
Eastern	0.701 [0.616, 0.774]	0.507 [0.434, 0.579]	0.428 [0.350, 0.510]	0.124 [0.090, 0.169]
Zanzibar	0.643 [0.552, 0.725]	0.451 [0.374, 0.531]	0.379 [0.311, 0.452]	0.079 [0.053, 0.116]

* = non-overlapping confidence intervals