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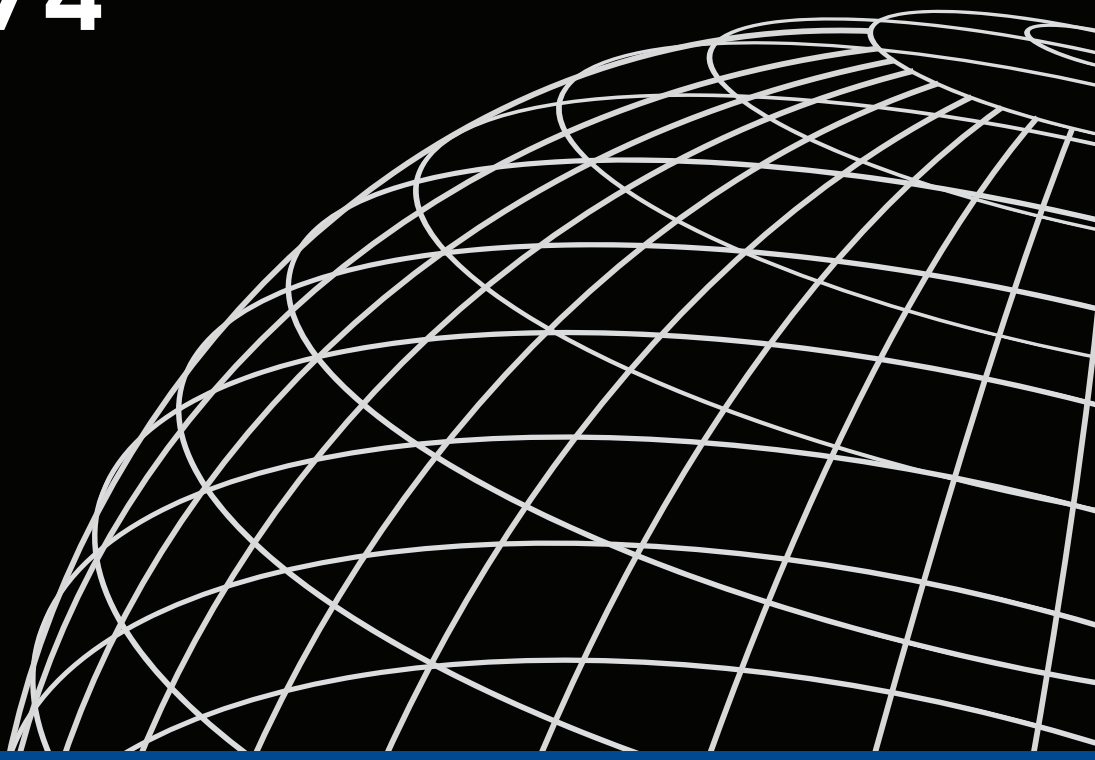
CONTRACEPTIVE USE, METHOD MIX, AND METHOD AVAILABILITY: A MULTILEVEL ANALYSIS

DHS ANALYTICAL STUDIES 74



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DHS Analytical Study No. 74

Contraceptive Use, Method Mix, and Method Availability: A Multilevel Analysis

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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

Access to a range of contraceptives affords women greater opportunity to find a method that meets their unique reproductive needs, possibly leading to greater diversity in the method mix and increased contraceptive use at population levels. A more diverse method mix may also directly correlate with increased use. However, these relationships have not been concurrently or robustly assessed. We used data from six countries with both recent Demographic and Health Surveys (DHS) household surveys and Service Provision Assessment (SPA) facility surveys conducted within 2 years of each other. The analysis included data from women age 15-49 and health facilities that provide family planning (FP) services. We examined the subnational relationships between modern contraceptive prevalence (mCP), balance of methods in use, availability of FP services and mix of methods (at least one short-acting, one long-acting or permanent method, and one nonhormonal method) provided. In Haiti and Malawi, where SPA surveys are censuses that enable linking household and facility data by household clusters, we conducted multilevel, multivariable logistic regressions, applying a novel method for approximating level-weights (individual- and cluster-level) to estimate the contribution of community-level factors to an individual outcome (use of FP).

The subnational analysis showed that the relationships between mCP with diversity in the method mix and method availability, as well as relationships between method mix and method availability, vary by country; many countries showed minimal or no evidence of associations. However, in Senegal, we found expected relationships between greater mCP, more facilities with FP, and a more balanced mix. A more balanced mix was also associated with a greater number of facilities with a mix of methods. Among rural women in Haiti and Malawi, after controlling for other factors, there were marginally significant, modest (20%) increases in the odds of using FP if a woman lived in a cluster with a high number of facilities that offered a mix of methods compared with women living in areas with a low number of facilities with a mix of methods. In both countries, the odds of using contraceptives also increased if there was some community distribution or mobile outreach versus none. In urban Haiti, the odds were nearly twice as high. Although relationships between method availability, method use, and method mix are complex, method choice should continue to be a central tenet of rights-based FP to ensure that women have access to the methods that meet their needs.

KEY WORDS: family planning, contraceptive use, method mix, method skew

ACRONYMS AND ABBREVIATIONS

AD	average deviation
AOR	adjusted odds ratio
BLM	Banja la Mtsogolo
CI	confidence interval
DHS	Demographic and Health Survey
DRC	Democratic Republic of the Congo
FP	family planning
FPE	Family Planning Effort Index
IUD	intrauterine device
LAM	lactational amenorrhea method
mCP	modern contraceptive prevalence
SPA	Service Provision Assessment
UOR	unadjusted odds ratio
USAID	United States Agency for International Development
WHO	World Health Organization

1 BACKGROUND OF THE REPORT

Globally, one in ten women of reproductive age, which includes 190 million women, who do not want to become pregnant do not use a contraceptive method (UN DESA 2019). Unwanted or unplanned pregnancies carry many risks that include unsafe abortion, stillbirth, preterm births, and even neonatal and maternal deaths. Approximately 295,000 women died from complications during pregnancy and childbirth in 2017, and roughly 2.5 million neonatal deaths occurred in 2018 with 36% of these deaths occurring within 48 hours of birth (Lawn et al. 2014; WHO et al. 2019). Contraceptive methods offer women and couples the opportunity to control the timing and spacing of pregnancies, which can reduce maternal and neonatal deaths (Ahmed et al. 2012; Bhutta et al. 2014; Stover and Ross 2010).

Ensuring that a wide range of contraceptive methods is available is a critical component of ensuring that women have their needs met. Since contraceptive needs vary over a woman's reproductive lifecycle (MacQuarrie et al. 2019), it is important to offer a variety of methods from which women can choose an effective method that meets their needs, whether they are temporarily spacing pregnancies, or limiting future, further, or any childbearing. Among other factors, limited availability of contraceptive methods compels women to choose either ineffective methods or methods that are inadequate for their reproductive needs and which contribute to method discontinuation and unplanned pregnancies (Samuel, Fetters, and Desta 2016).

Bruce (1990) identified method choice—the ability to choose from a variety of methods—as a core component of quality family planning (FP) services that is essential to the client experience. In their revision of Bruce's framework, Jain and Hardee (2018) continue to acknowledge the importance of method choice and expanded it to include both the availability of FP equipment and qualified health-care professionals to deliver the method. In recognition of the importance of method availability, FP2020 Core Indicator number 11 measures the proportion of facilities, by level, with at least three or five modern methods available (Track20 n.d.). This indicator, which is usually drawn from facility-based surveys, provides valuable insight into the methods women can choose.

Several studies have found a positive relationship between method availability and the proportion of women who are currently using a method, which is also known as contraceptive prevalence (Freedman and Berelson 1976; Jain 1989; Ross, Keesbury, and Hardee 2015; Ross et al. 2002; Sutherland, Otterness, and Janowitz 2011; Wang et al. 2012). For example, Wang et al. (2012) linked Service Provision Assessment (SPA) surveys and Demographic and Health Survey (DHS) data from four East African countries to examine the relationship between contraceptive use and the regional availability of contraceptives. They found that the odds of a woman using modern contraception increased by 50% with the addition of one available method. Ross and Hardee (2013) used DHS data and the National Family Planning Effort Index (FPE) to show that high and consistent access to methods was associated with increased use of contraceptive methods. In addition, an analysis of national data from 113 countries, which also used the FPE, suggested that adding one more method to the mix increased the modern contraceptive use by 4 to 8 percentage points (Ross and Stover 2013).

While those studies examined the associations between availability and use across national or subnational units, others have investigated the association between contraceptive availability and use at more granular

levels. One study linked data from women interviewed in the 2003 Egypt DHS to nearby facilities interviewed in the SPA surveys to investigate the relationship between contraceptive use and the quality of FP services, which included contraceptive supply. The study found an increase in intrauterine device (IUD) use by women who lived near facilities with high-quality FP services (Hong, Montana, and Mishra 2006). A study from Kenya, linking women to their reported source of care, found that having a consistent stock of methods was marginally associated with use of a modern method (Tumlinson et al. 2015). Skiles et al. (2015) report a positive association between contraceptive use in Malawi and both access to a reliable stock of methods and distance to facilities that offer FP services. Similarly, a study by Shiferaw et al. (2017) found that Ethiopian women who lived near health facilities with a wide range of contraceptive options had greater odds of using contraceptives. In a recent publication, Wang and Mallick (2019) linked women interviewed in DHS with SPA and found a relationship between contraceptive use and the number of methods available at FP facilities. Their analysis confirms earlier results by Chen and Guilkey (2003), which showed the positive correlation between contraceptive use and the number of methods available at a facility within 5 km.

Results of an assessment by Babazadeh et al. (2020) contradict other studies that relate method availability and distance with higher method use among women in Kinshasa, the Democratic Republic of Congo (DRC). There was no significant change in the percentage of women who used modern contraceptives and lived close to service delivery points that offered at least three or five or more contraceptive methods. Given the high fertility rate in the DRC, demand for FP is low, and there are very limited FP services available across the country (Kwete et al. 2018). These findings imply that both demand- and supply-side factors at the national and subnational levels can dictate how method availability and FP services interact to influence contraceptive use.

In addition to the level of contraceptive use, it is also important to consider the methods used by women. Method mix, along with the percent distribution of contraceptive users, is often used as a proxy for method choice or availability (Bertrand et al. 2014; Sullivan et al. 2006). Although FP experts do not recognize an ideal method mix, this metric can represent the extent to which women have a choice of methods available to meet their FP needs (Bertrand et al. 2014; Ho and Wheeler 2018; RamaRao and Jain 2015; Sullivan et al. 2006). Method choice may also provide women with an opportunity for switching methods rather than discontinuing contraception entirely (Jain 1989), although method availability alone may not be the strongest factor that explains discontinuation (Blanc, Curtis, and Croft 1999), since a country's method mix responds to both supply-side and demand-side factors.

Supply-side factors such as provider bias, government policies, FP programs, and facility characteristics can influence method mix. Attitudes toward certain population groups also influence whether providers discuss, recommend, and offer contraceptive methods (Calhoun et al. 2013; RamaRao and Jain 2015; Solo and Festin 2019; Sullivan et al. 2006). Method-specific bias stems from providers' lack of knowledge about the range of available methods, opinions about certain contraceptive methods, and skill in administering modern methods (Lince-Deroche et al. 2020; Rattan et al. 2016; Solo and Festin 2019; Tuoane, Diamond, and Madise 2003). Along with provider bias, government policies and FP programs can affect the types of contraceptive methods available for women, as evidenced by the prevalence of IUD use in Egypt (Sullivan et al. 2006).

Demand-side factors such as the length of time the method has been available in a country, user characteristics and preferences, and attributes of the methods can also influence method mix (Sullivan et al. 2006). A method recently introduced into a country may not have a sizeable proportion of users compared to a method with a longer history of use in the country. Thus, demand may be lower until potential users become more familiar with the new method. Properties of methods can also influence the types of contraceptives preferred by users. For example, ease of use, convenience, and effectiveness have been identified as factors that increased uptake of implants in sub-Saharan Africa (Jacobstein 2018). Characteristics of the users and preferences, including knowledge about different methods, desire for discretion, demand for spacing or limiting, age, religion, and socioeconomic status are also key factors that influence demand for FP methods (Ho and Wheeler 2018; Rattan et al. 2016).

Supply and demand factors, whether alone or in combination, can cause an imbalance in the method mix (Sullivan et al. 2006). A balanced method mix, in which each method has the same proportion of users, is not the ideal because all methods are not equally effective or desired (Bertrand et al. 2014; Ross, Keesbury, and Hardee 2015). A skewed method mix may also indicate a limited choice of methods. Researchers have defined the method mix as skewed if more than half of users rely on a single method (Bertrand et al. 2000; Bertrand et al. 2014; Sullivan et al. 2006). Using this definition, Sullivan et al. (2006) analyzed national survey data from 96 countries and found that 35% of the countries had a skewed method mix. Nearly half of the countries with a skewed mix were located in sub-Saharan Africa where contraceptive prevalence is low and traditional contraceptive methods are dominant. In a later analysis of 109 countries, 30% of the countries had a skewed method mix with fewer relying on traditional methods (Bertrand et al. 2014). In addition, Bertrand and colleagues reported no association between method skew and modern contraceptive prevalence. A skewed method mix can exist even in settings with high modern contraceptive prevalence (RamaRao and Jain 2015). The “50% rule” shows which method dominates a country’s method mix, but does not show the changes in methods over time (Ross, Keesbury, and Hardee 2015).

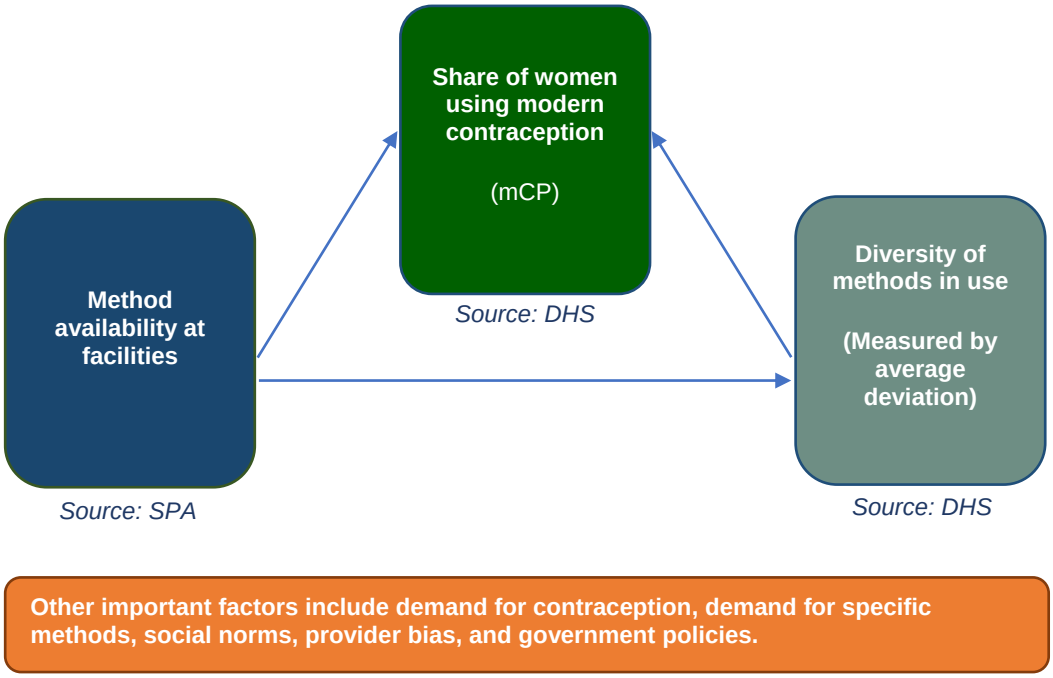
To address the limitations of the 50% rule, alternative measures of assessing method skew have been used (Bertrand et al. 2000; Blanc, Curtis, and Croft 1999). Ross, Keesbury, and Hardee (2015) use the average deviation (AD) method, a measure similar to the index of dissimilarity (Shryock, Siegel, and Larmon 1973), as a way to assess deviations from a standard distribution or use of all methods. Countries with a high AD have a skewed method mix, while those with a low AD value have a more balanced mix. Analysis of the national survey data from 123 countries revealed that 15 countries that previously had a skewed method mix had moved toward having a more balanced mix. Countries have achieved a less skewed mix by replacing traditional methods with modern contraceptive methods. The AD method offers an alternative approach to further investigate the relationship between method skew and contraceptive prevalence, at both the national and subnational levels.

Although it is possible that a wide range of methods may be available, there is an overall preference for only one or two forms of FP despite availability. Currently, there is a gap in the research that explores relationships between contraceptive use, method skew or balance, and method availability in tandem with an examination of the relationship between method skew or balance and method availability. This may be due to a dearth of data from health facilities. Meanwhile, stakeholders may assume that the method mix can be a proxy for method availability (Sullivan et al. 2006). Although it is true that using a method that is not available would be unlikely, the converse—more method availability signals greater diversity in use—has not been proven.

Thus, the balance of method mix deserves further examination to understand if skew may be related to supply-side factors, which can reflect limited rights to reproductive health. The SPA surveys provide an opportunity to explore such questions by collecting data on the service environment and availability. Both SPA and DHS are national surveys drawn from a representative sample and include geospatial coordinates data (for facilities in SPA or clusters in DHS). This allows for linkages at the population, subnational, and even cluster levels depending on the survey design. Linking these data sources allows for deeper analysis on the supply side to examine health facility factors that may be associated with contraceptive prevalence method mix as gauged through DHS household surveys.

This paper uses the AD method to explore the method mix and contraceptive use in Malawi, Haiti, Bangladesh, Nepal, Senegal, and Tanzania. By using health facility surveys conducted in the same countries, this report goes beyond looking at data on contraceptive use to relate both modern contraceptive prevalence (mCP) and AD to contraceptive method availability at the facility level. The report extends existing research by exploring the relationship between contraceptive prevalence and factors such as method balance, method availability, and access to FP services at subnational levels, and conducts an individual and community-level analysis where data permits. The hypothesized pathways for these relationships are summarized in Figure 1.

Figure 1 Pathways between method availability, contraceptive use, and diversity of methods in use



Our study attempts to answer the following research questions.

1. Are there associations between greater availability of methods and a balanced method mix?
2. Is greater availability of methods associated with a higher contraceptive use?

To answer these questions, our study draws from data from multiple sources of information from both household surveys and health facility surveys conducted by the DHS Program.

2 DATA AND METHODS

2.1 Data

This analysis used data from the six countries with recent (within the last decade), closely timed SPA health facility and DHS household surveys, which were conducted within 2 years of one another. The countries include Bangladesh, Haiti, Malawi, Nepal, Senegal, and Tanzania. In all countries, except Haiti, the SPA precedes or is conducted within the same year as the DHS. As described below, this is ideal because the dependent variables of interest are DHS-based measures and the independent variables are largely SPA-based.

SPA surveys are conducted with a nationally representative sample or a census of health facilities. Haiti and Malawi were census surveys and the remainder were samples. The facilities included formal sector public, private (for-profit, not-for-profit, nongovernmental, and faith-based), and mixed private-public facilities. Informal outlets such as pharmacies and mobile clinics are usually not surveyed. Included in the survey is a facility inventory, which collects information about the services, basic infrastructure, equipment, medicines, and guidelines, which can be used to describe the availability of services and the readiness of facilities to provide those services. For FP, this includes if FP services are offered, and if a suite of methods is offered, prescribed, available, and valid (not expired) at the facility on the day of the survey.

The DHS households are also drawn from a nationally representative sample of households and are representative subnationally as well as by urban and rural residence. Households solicited for participation in the survey are selected with a stratified two-stage cluster sampling design. At the first stage, enumeration areas are selected within each stratum, and are typically based on the most recent census. In the second stage, a sample of households is randomly selected from a household listing. The households selected within each enumeration area are then described as clusters. Table 1 shows the year and sample of households, women, and facilities in the respective surveys for each country.

Table 1 Surveys included in the analysis with sample sizes

Country	DHS survey	Number of households interviewed	Number of women interviewed	SPA survey	Number of health facilities interviewed
Bangladesh[1]	2014	17,300	17,863	2014	1,524
Haiti	2016-17	13,405	14,371	2017-18	1,007
Malawi	2015-16	26,361	24,562	2013-14	977
Nepal	2016	11,040	12,862	2015	963
Senegal	2017	8,380	16,787	2017	396
Tanzania	2015-16	12,563	13,266	2014-15	1,188

[1] The Bangladesh sample included ever-married women; however, the survey only posed questions about contraceptive use to currently married women. This sample included 16,858 women.

To facilitate subnational analysis, we used current administrative level-1 units in each country. For example, we used provinces, and in Bangladesh we used regions. Although some provinces have been renamed, we used the numbered provinces because they had not been renamed at the time of the DHS. In Malawi, where district information was available and appropriate (large enough sample size), we used districts (administrative level 2 unit). In addition, given the small population in the Zanzibar Archipelago of Tanzania, we aggregated the islands into one category (Zanzibar).

These surveys were reviewed and approved by the ICF Review Board and the Ethics Review Committee of each country. All data are publicly available from https://www.dhsprogram.com/. The final reports for each survey are available online from the same website and provide detailed information about the survey design, response rates, and other topics.

2.2 Methods

We conducted a stepwise analysis to understand the relationships between contraceptive use, method mix, and method availability for each country separately. The following sections detail the measures used in the analysis.

2.2.1 DHS measures

We first examined contraceptive prevalence and method mix within subnational administrative units (e.g., regions and provinces), and presented the overall levels in each country. Modern contraceptive prevalence, method mix of modern methods, the average deviation of the method mix, and method source were coded as:

Modern contraceptive prevalence (mCP): The proportion of women age 15-49 who are using a modern contraceptive method. For all the surveys except the Bangladesh 2014 survey, this includes all women. The Bangladesh 2014 survey included only ever-married women, and contraceptive use was only examined among currently married women. Modern contraceptive methods include female and male sterilization IUD, implants, injectables, pills, female and male condoms, foam or jelly, emergency contraceptive pill, and the lactational amenorrhea method (LAM). The mCP may also include other modern contraceptive methods that are country-specific or less common but were reported by the respondent and identified in the dataset as modern methods.

Method mix: Seven categories were produced for this variable among women age 15-49 who were using a modern contraceptive method. This includes female sterilization, IUD, implants/Norplant, injectables, pills, male condom, and other methods. Other methods included methods in low use in the countries; these were emergency contraceptive pill, LAM, female condom, standard days method, and male sterilization. In Nepal, male sterilization was approximately 13% but was combined with other modern methods to be consistent with the other countries in the analysis, where male sterilization was very uncommon.

Average deviation (AD) (balance in method mix): To examine the balance in the distribution of method mix, we used the AD method (Ross, Keesbury, and Hardee 2015). This measure can also be expressed as the mean deviation from a uniform distribution. The AD was computed by first creating a dummy variable for each of the seven methods in the method mix variable. We then subtracted 14.3% (100% divided by 7) from the percentage of each method available. The value 14.3% would be the percent if all 7 methods were distributed evenly (the average value or a uniform distribution). We then sum the absolute value of the deviations of each method from this average value and divide the sum by seven. The AD was computed for the country as a whole and by region within each country.

Method source: To bring additional context to the source of FP in each country, we examine responses to the question, *"Where did you obtain (CURRENT METHOD) the last time?"* We harmonized responses across countries. These consolidated categories were government hospital, government health center or

clinic (including FP clinics in Haiti, Nepal, and Senegal), mobile clinic, fieldworker, other public source (health post or health huts in Senegal and dispensaries in Tanzania), private, pharmacy, and nonmedical/unspecified such as shop, church, friend or relative. In Malawi, we also included a separate category for Banja La Mtsogolo (BLM), a FP program run by Marie Stopes International that provides outreach services, which are often situated within public facilities.

2.2.2 Service environment measures

We examined several service environment variables that reflect geographic access to FP facilities, which are defined as the number of facilities that provide FP services and two measures of availability of a range of methods. These include percent of facilities with a mix of methods and the number of facilities with a mix of methods, as defined below. The number of facilities with a mix of methods incorporates both access to facilities with FP and availability of methods. Although the number of facilities alone may moderate the relationship between the percent and number of facilities with a mix of methods, we theorize that each of these facility-based measures may yield distinct relationships with the dependent variables of mCP and AD. Thus, we examined them independently. We present the overall and subnational indicators of the service environment for each country separately.

Number of facilities that provide FP services

To create a measure of geographic access to FP services, we summarized the number of facilities, among all facilities interviewed in the SPA survey, that reported providing FP services. In Haiti and Malawi, where the SPA surveys are census surveys, this raw number reflects the true number of facilities with FP service. However, in the other countries in this study, this number serves as a proxy only because these surveys were samples. The measure created proportionately reflects FP services since SPA surveys are sampled to be representative at the subnational level. The SPA sampling design accounts for the distribution of facilities across subnational levels and samples accordingly. In this sense, this variable is useful for within-country analysis to compare relative subnational access. Confidence intervals (95%) are presented in tables for each country where the SPA survey was a sample (Bangladesh, Nepal, Senegal, Tanzania).

Availability of mix of method types (percentage)

This variable measures the level of availability of a mix of methods at facilities. This reflects the percentage of all facilities that provide FP services with at least one short-acting, one long-acting or permanent, and one barrier or nonhormonal method. Short-acting methods include pills, injectables, or the emergency contraceptive pill. For this category, the method must be provided and available at the time of the survey. Long-acting and permanent methods include implants or IUDs, which the facility states are provided and the observer notes are in stock and not expired, or male or female sterilization, which the facility states are routinely provided. Barrier or nonhormonal methods include condom (male or female) or cycle beads for Standard Days Method.

Number of facilities with a mix of method types

This variable combines the above two variables and summarizes the number of facilities that provide FP and have at least three types of methods: one short-acting, one long-acting or permanent, and one barrier or nonhormonal method. Similar to the number of facilities with FP services, this is also a proxy of the true

number, which reflects a representative proportion of facilities at subnational or national levels in sample surveys (Bangladesh, Nepal, Senegal, and Tanzania).

2.2.3 National and subnational-level analysis

We calculated contraceptive prevalence, method mix, and AD at the national and subnational levels. To examine the relationship between mCP and AD, a scatter plot was produced for each country for all the first-level administrative units (region, division, province), for Malawi by district, presented among urban, rural, and total. For the three countries that had above 10 regions, a linear regression of mCP and AD was fit to produce a best fit line that described this relationship. This was performed for Haiti, Senegal, and Tanzania. The regression was also performed for Malawi at the district level. The results from the linear regression would identify if the relationship is significant and in which direction. The R^2 value would also indicate the strength of the relationship. However, the results should be interpreted with caution because these analyses do not control for the myriad factors that may influence contraceptive use or the average deviation.

2.2.4 Individual and cluster-level analysis in Haiti and Malawi

Given that the SPA was a census in Haiti and Malawi, we conducted an individual and cluster-level analysis in Haiti and Malawi to examine the relationship between contraceptive use and the FP service environment variables related to method availability and access. We geographically linked the SPA health facility data to clusters of women sampled in the DHS household surveys. This method is not recommended when the SPA survey is a sample (Burgert and Prosnitz 2014). However, in Haiti and Malawi, the ability to link allows for the examination of individual and community factors related to contraceptive use. To link SPA data to DHS, we created summary variables that describe all the facilities located within a 5-kilometer radius for urban clusters and 10-kilometer radius for rural clusters. These distances account for the maximum potential displacement of clusters (Burgert and Prosnitz 2014). Geographically displacing the location of the clusters is standard practice in DHS surveys in order to protect the anonymity of survey respondents. This method of linking may not be appropriate in highly urbanized areas, such as Port-au-Prince, a densely populated metropolitan area (IHSI 2015), where care seekers have access to a large number of facilities and where the 5 kilometer radius may not accurately capture the facilities that care seekers attend (Wang et al. 2015). Previous research has documented differences in the service environment by urban and rural residence (Wang et al. 2015). Therefore, we conducted this analysis separately for urban and rural residence and excluded 3,632 urban residents of Port-au-Prince, Haiti. We also excluded 13 rural clusters in Haiti within 5 kilometers of Port-au-Prince (653 women) given that their proximity to a large number of health facilities is atypical for rural residence.

We created one count variable reflecting the number of facilities with a mix of methods within the relative proximity to each cluster, 5 or 10 kilometers. We hypothesized that there may not be a linear relationship between proximity to incrementally greater numbers of facilities with FP choices and contraceptive use, and we categorized this variable. The categories were none, low, medium, and high. The low, medium, and high categories were created with tercile cut points among clusters with any facilities that met the criteria (providing FP or providing FP with a mix of methods). The terciles were created for each variable, respective to each country's distribution as well as respective to urban and rural cluster locality. Thus, the number of facilities that are included in each low, medium, and high category differ. Table 2 shows the distribution and highlights the importance of creating categories respective to each country and place of

residence. As discussed in the results section, there were 20% of women in urban Haiti living in a cluster that linked to no facilities, 13% in rural Haiti, less than 1% in urban Malawi, and 16% in rural Malawi.

Table 2 Distribution of number of facilities with a mix of methods, by country and residence

		Number of facilities with a mix of methods			
Country	**Residence**	**None**	**Low**	**Medium**	**High**
Haiti	Urban	0	1	2-3	4-5
	Rural	0	1-2	3	4-8
Malawi	Urban	0	1-9	10-17	18-37
	Rural	0	1-2	3-4	5-43

We conducted multilevel, multivariable logistic regression to examine the relationships between our dependent variable (outcome) of interest—contraceptive use—and individual and community-level factors. Multilevel models account for the similarities that may exist among individuals within communities. These models partition the variance in the outcome between individuals and their communities and allow for an estimation of variation in the outcome explained by the community-level factors. Random intercept models were fit to allow the intercept to vary across clusters. These multilevel models are among the first to utilize recently developed methods for estimating cluster weights as described in a forthcoming publication (Elkasabi, Ren, and Pullum 2020). In these models, we applied the Stata code provided by the publication, which denormalized the level-1 individual weights and approximated the level-2 weights by equally allocating the variation in weights between the individual and cluster levels (α=0.50) (Elkasabi, Ren, and Pullum 2020).

Individual-level factors included education (none, primary, and secondary or higher); wealth quintile; employment (not employed, professional employment, and agriculture or other work); age (15-19, 20-29, 30-39, and 40-49); marital status (never married, currently married, and formerly married); and exposure to FP messages in the last few months (yes or no). We did not include parity as a control because it was highly correlated with marriage and age.

Community-level variables were department (Haiti) or region (Malawi), population density, and a measure of community-level outreach. Population density is a standard variable included in the DHS Geospatial Covariate data file. Population density is extracted from the UN-Adjusted Population Density, Gridded Population of the World, Version 4 (CIESIN and Columbia University 2016). The Geospatial Covariate data file provides population density relative to each cluster sampled in DHS surveys (Mayala et al. 2018). We categorized population density of urban and rural residences separately, by using three quantiles of density: low, medium, and high. The outreach variable was calculated at the cluster level using aggregated responses to the question, "*Where did you obtain (CURRENT METHOD) the last time?*". First, a binary variable was created to reflect if an individual contraceptive, identified as a woman's source for FP, was either community-based or mobile outreach. In Malawi, this included outreach from a mobile clinic, health surveillance assistants, community-based distribution agents or door-to-door, and BLM. In Haiti, this included a community health worker or a mobile clinic. Next, we calculated the percentage of outreach as a source for last FP method for each cluster among women who were using modern contraception. Finally, we categorized clusters as 0 (no outreach), and among the clusters with any outreach, terciles of low, medium, or high outreach, which were calculated separately for urban and rural residence.

To keep the analysis meaningfully consistent across residences and countries, the same reference group was chosen across all models. For each independent variable, we chose the baseline or lowest reference group within each category (such as lowest wealth or lowest age group), unless the sample size in that category was small. In total, our regressions included all women age 15-49, a total of 3,098 women in urban Haiti, 6,987 in rural Haiti, 4,496 women in urban Malawi, and 20,066 women in rural Malawi.

All analyses used Stata 16.0 and applied the *svy* command to account for nonresponse and multistage survey design, except for the SPA survey data in Haiti and Malawi. In those two countries, SPA survey data were only adjusted for nonresponse because these surveys are census surveys. Therefore, descriptive tables for these two countries' SPA-based statistics do not include confidence intervals.

3 RESULTS

Results will be discussed by country in alphabetical order. The results begin with a description of the mCP and method mix overall and by region. The AD is also presented as a summary measure for the distribution of mixed methods. The higher the AD, the more skewed the distribution, with one or two methods predominating. A lower AD indicates a more uniform mix of method use.

We present two sets of scatter plots for each country. The first set describes the relationship between mCP and several indicators using DHS and SPA data, at subnational levels overall and by urban and rural residence. The indicators include the AD, number of FP facilities, and the percentage of facilities with at least three method types (short-acting, long-acting, and nonhormonal or barrier). The second set of scatter plots demonstrates the relationships between AD as the dependent variable, and the three above-mentioned SPA indicators. In Haiti and Malawi, we present the results of the multilevel, multivariable logistic regression that examined the relationship between contraceptive use, individual, and community-level factors, and focused on the FP service environment.

3.1 Bangladesh

Just over half (54%) of currently married women age 15-49 in Bangladesh use a modern contraceptive method (Appendix Table 1). This ranged from 41% in the Sylhet Division to 63% in Rangpur. Figure 2 shows the method mix in Bangladesh among women who use a modern contraceptive method. The most frequently used modern method in Bangladesh for all divisions was the pill, which was used by over 50% of women in Chattogram, Dhaka, Rangpur, and Sylhet. Injectables were the second most used method for all divisions, except for Sylhet in which there was almost an equal distribution of women who used injectables and female sterilization (16%). The overall AD in Bangladesh was 12.7, which ranged from 11.0 in Sylhet to 15.1 in Barisal. Although Sylhet had the lowest AD score, which reflected the most method balance, one method (the pill) dominates the method mix.

Figure 3 shows the distribution of sources of FP methods. The public sector serves 49% of modern contraceptive users with 20% obtaining their method from a fieldworker. Over two-thirds of women receive their method from a pharmacy, which is expected since pills dominate the method mix. Refills for pills can largely be obtained from pharmacies, whereas for injectables or other long-term methods, attendance at a health facility is required.

Figure 2 Method mix by region, Bangladesh

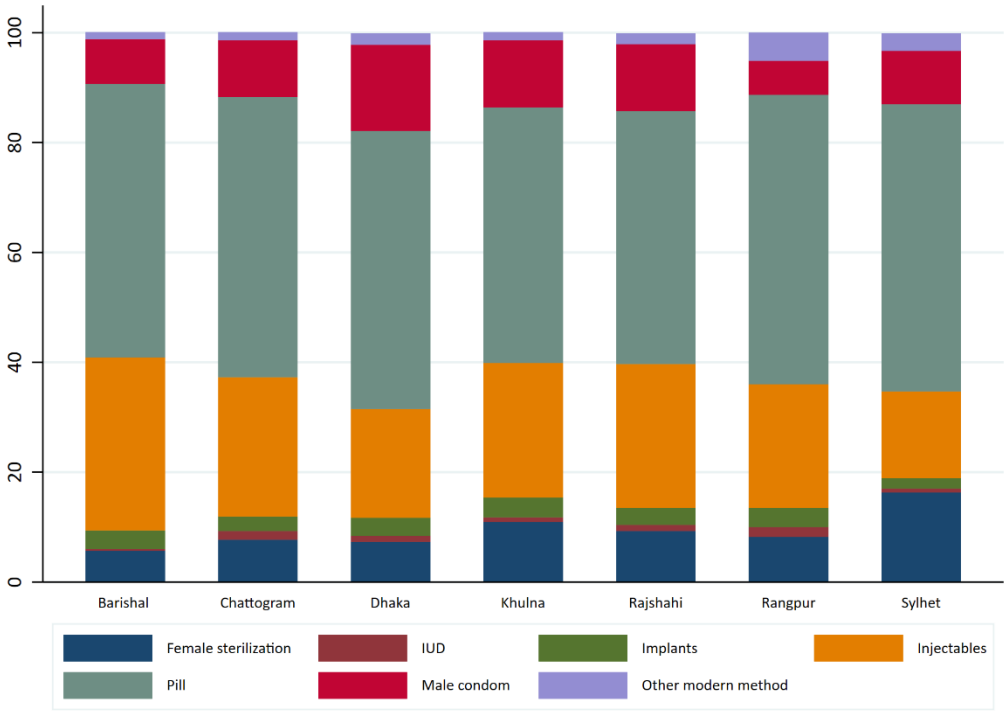
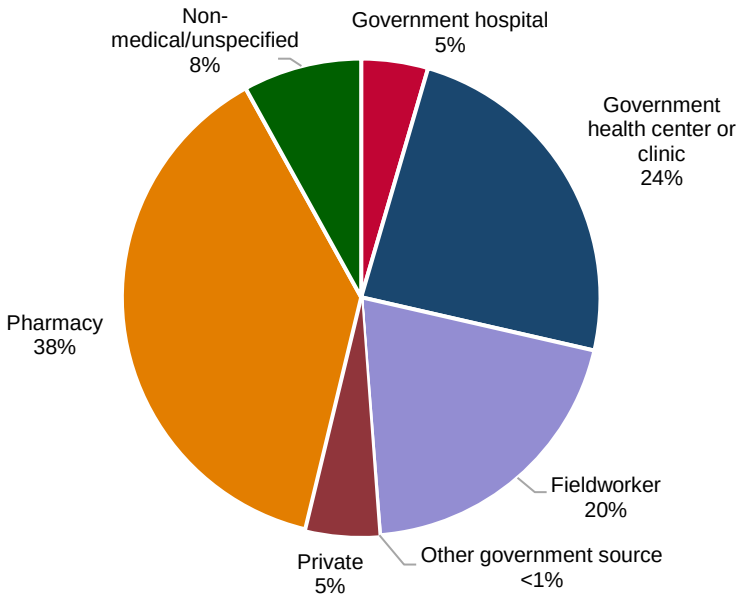


Figure 3 Most recent source of family planning method, Bangladesh



Note: Government health centers or clinics includes family planning clinics. Private includes private doctors, hospitals, clinics, and other private sources.

Table 3 shows the number of facilities by region as well as facilities with a mix of methods. A large number (over 200) of facilities that provide FP services were sampled in Dhaka and Chattogram, while there were only 91 sampled facilities that provided FP in Sylhet and 103 in Barishal. Although these numbers do not represent the true number of facilities, the number of facilities sampled per region is proportionate to the true numbers. The number of sampled facilities with a mix of methods ranged from 22 in Sylhet to 114 in Dhaka, with the largest percentage of facilities with a mix of methods found in Rangpur (46%).

Table 3 Family planning facilities and availability of methods, Bangladesh SPA 2014

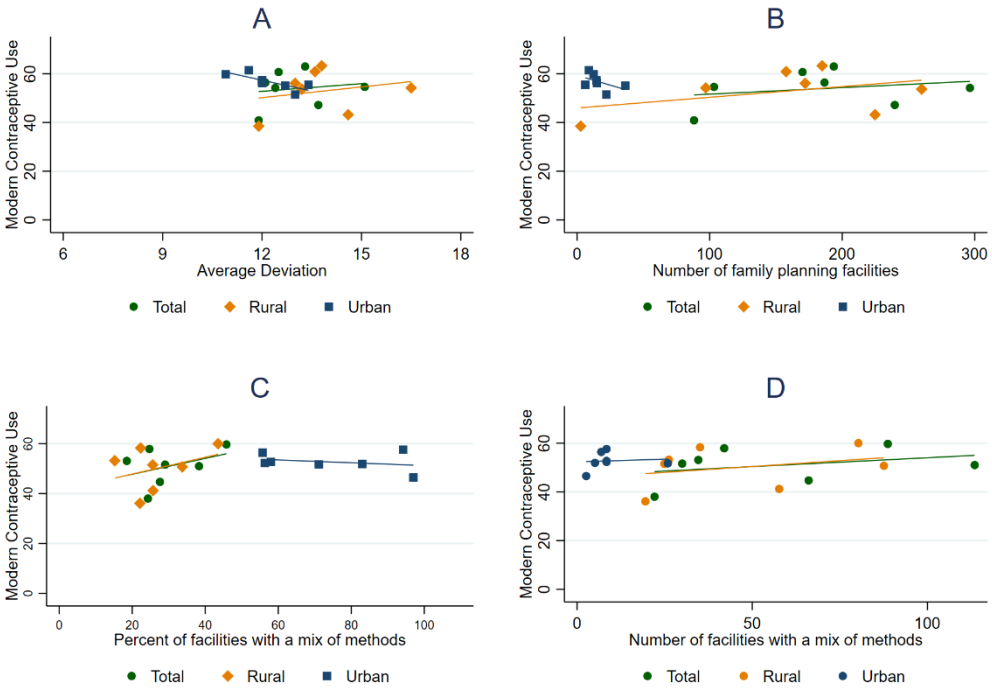
	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	1,281	31.0 [27.9,34.2]	397
Barishal	103	29.0 [22.8,36.2]	30
Chattogram	240	27.6 [21.5,34.6]	66
Dhaka	296	38.3 [30.6,46.6]	114
Khulna	187	18.5 [14.9,22.8]	35
Rajshahi	170	24.7 [17.4,33.9]	42
Rangpur	194	45.8 [34.8,57.2]	89
Sylhet	91	24.3 [18.0,32.0]	22

Note: CI = confidence interval; FP = family planning.

Figure 4A describes the relationship between mCP and several measures at the overall level and by urban and rural clusters. There is no clear pattern observed from the plot of mCP and AD, although the Sylhet Division had the lowest mCP and the lowest AD (mCP of 41% and AD of 11.9). Figure 4C shows an increase in mCP, with an increase in the percentage of facilities with a mix of method overall and in rural areas. However, we cannot test for significance given so few data points. The trend was not observed for urban areas. Figures 4B and 4D do not show any clear relationship between mCP and the number of facilities or the number of facilities with a mix of methods.

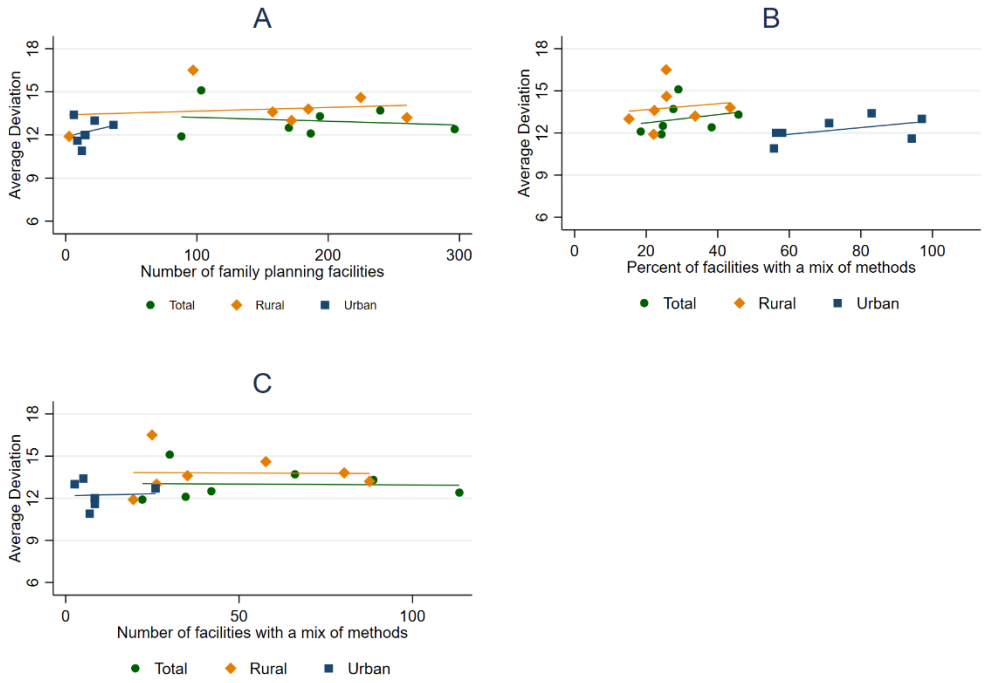
Figures 5A-5C show no clear relationship between AD and the number of facilities, percent of facilities with a mix of methods, and number of facilities with a mix of methods. We do observe that urban facilities have a larger percentage of facilities with a mix of methods compared to rural facilities, although there are fewer facilities in urban areas compared to the rural areas.

Figure 4 **Contraceptive prevalence by average deviation and measures of method availability, Bangladesh**



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

Figure 5 **Average deviation by measures of method availability, Bangladesh**



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

3.2 Haiti

Less than a quarter (22%) of women age 15-49 in Haiti use a modern contraceptive method (Appendix Table 2). This ranged from 16% in Rest-Ouest to 28% in Centre and Nippes. Injectables were the most used method in Haiti overall (54%), and for all regions except Aire Metropolitaine (Figure 6). In Aire Metropolitaine, the most used method was the male condom (46%), followed by injectables (41%). For all but three regions (Aire Metropolitaine, Sud-Est, and Sud), injectables were used by more than half of users and by approximately two-thirds or more of women in Nord-Ouest and Grand'Anse (66%) and Artibonite (68%). The overall AD in Haiti was 15.3, with ranges from 13.8 in Rest-Ouest and Sud-Est to 16.7 in Aire Metropolitaine. Despite Aire Metropolitaine not having one method that dominates the mix (over 50%), the AD score was the highest.

Figure 6 Method mix by region, Haiti

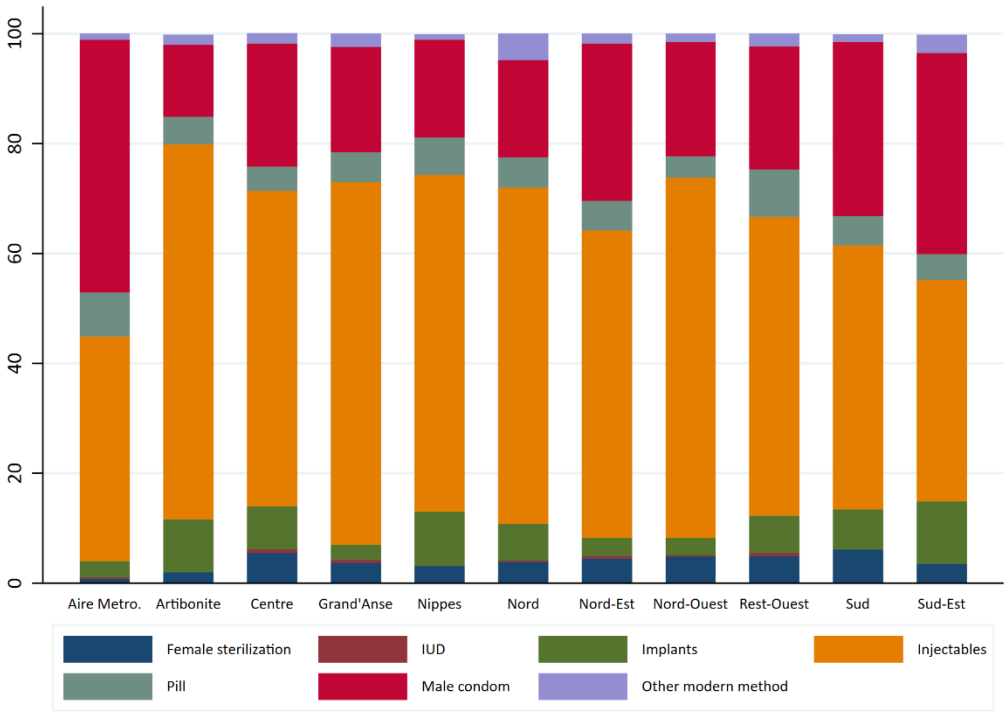
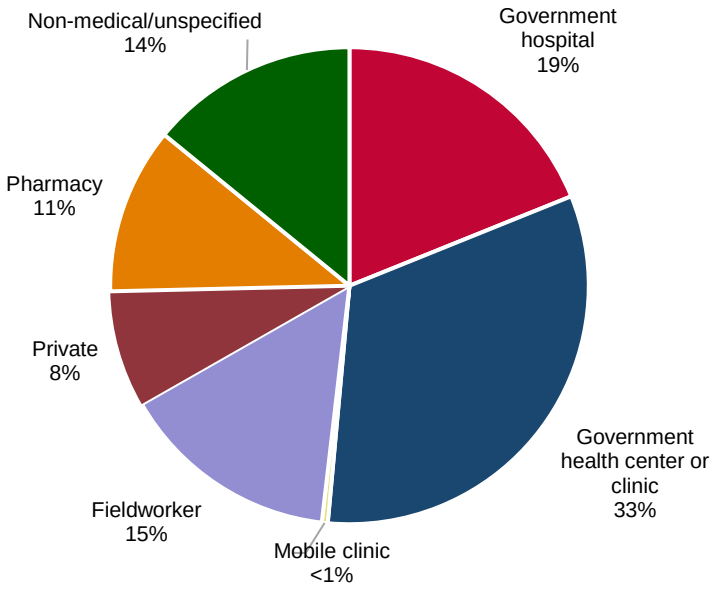


Figure 7 shows the source where women obtained their most recent FP method in Haiti. Just over half of all women obtain their contraceptives from a government hospital or health facility. An additional 15% obtain their method from a fieldworker, 8% from a private medical source, and 11% from a pharmacy.

Figure 7 Most recent source of family planning method, Haiti



Note: Government health centers or clinics includes family planning clinics. Private includes private doctors, hospitals, clinics, and other private sources.

Table 4 shows that the largest number of facilities were in Aire Metropolitaine, Ouest, and Artibonite regions (all with over 100 facilities). However, the largest percentage of facilities with a mix of methods was found in Centre (61% with 38 facilities), and Nippes (61% with 28 facilities). The Ouest Department had 117 facilities (the second largest in the country) and only 9% had a mix of FP methods, which left only 11 facilities that provide FP services with a mix of methods. Aire Metropolitaine, with the largest number of facilities with FP services, also had fewer than 25% of facilities with a mix of methods. This meant that there were only 32 facilities with this service and method availability in the entire metro area.

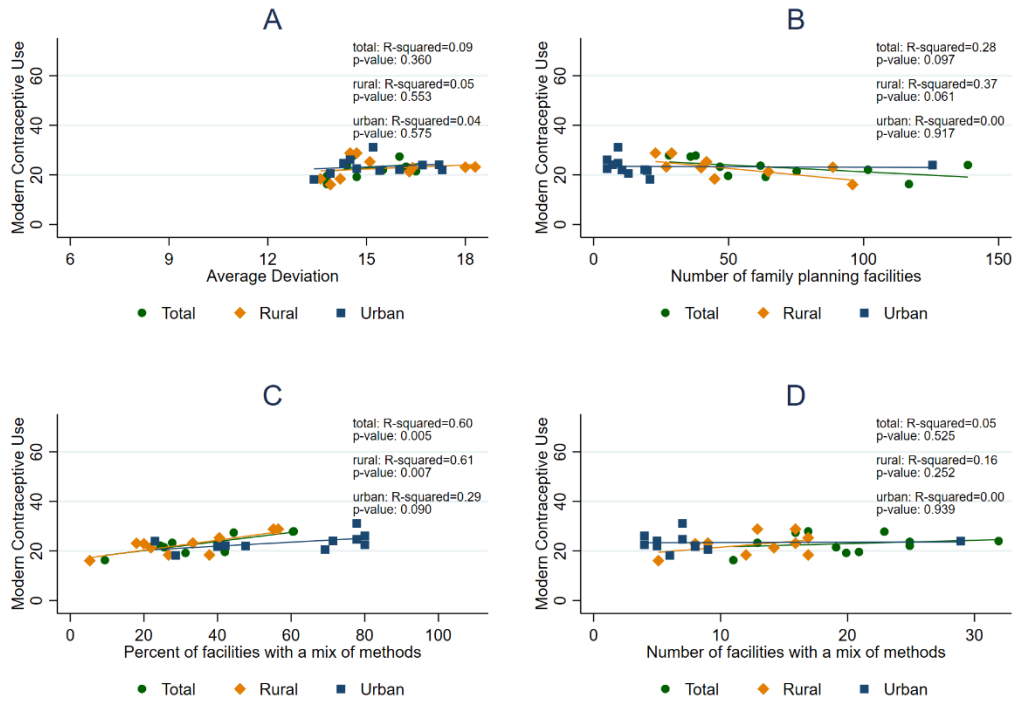
Table 4 Family planning facilities and availability of methods, Haiti SPA 2017-18

	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	756	29.3	221
Aire Metropolitaine	139	23.0	32
Ouest	117	9.4	11
Sud-Est	50	42.0	21
Nord	62	40.3	25
Nord'Est	36	44.4	16
Artibonite	102	24.5	25
Centre	38	60.5	23
Sud	64	31.3	20
Grand'Anse	47	27.7	13
Nord-Ouest	75	25.5	19
Nippes	28	60.7	17

Note: CI = confidence interval; FP = family planning; SPA = Service Provision Assessment.

Figure 8A illustrates that there is no significant relationship between mCP and AD overall and also for rural and urban areas. There was also no significant relationship found between mCP and the number of facilities or the number of facilities with a mix of methods (Figures 8B and 8D). However, in Figure 8C, there is a positive, significant relationship between mCP and the percentage of facilities with a mix of methods overall and in rural areas. The larger the percentage of facilities with a mix of methods, the larger the mCP in the region. The R-squared value was also relatively high for the total and rural areas (approximately 0.6), which indicates that the percentage of facilities with a mix of methods explains most of the variance of mCP at the regional level. This significance was not found for urban areas. Like Bangladesh, there is a greater availability of methods in urban areas compared with rural, but fewer facilities.

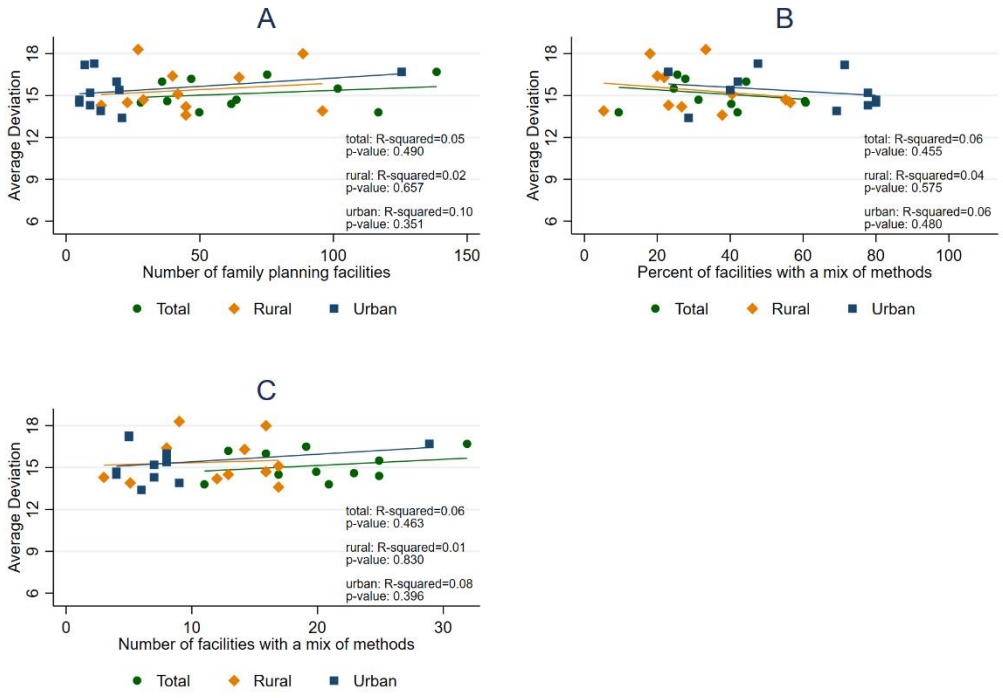
Figure 8 Contraceptive prevalence by average deviation and measures of method availability, Haiti



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

Figures 9A-9C show no significant relationship between AD and the number of facilities or percentages of facilities with a mix of methods. Therefore, the percentage of FP facilities with a mix of methods was associated with increase in mCP (Figure 8C), but was not associated with use of a more diverse or balanced use of methods (Figure 9C).

Figure 9 Average deviation by measures of method availability, Haiti



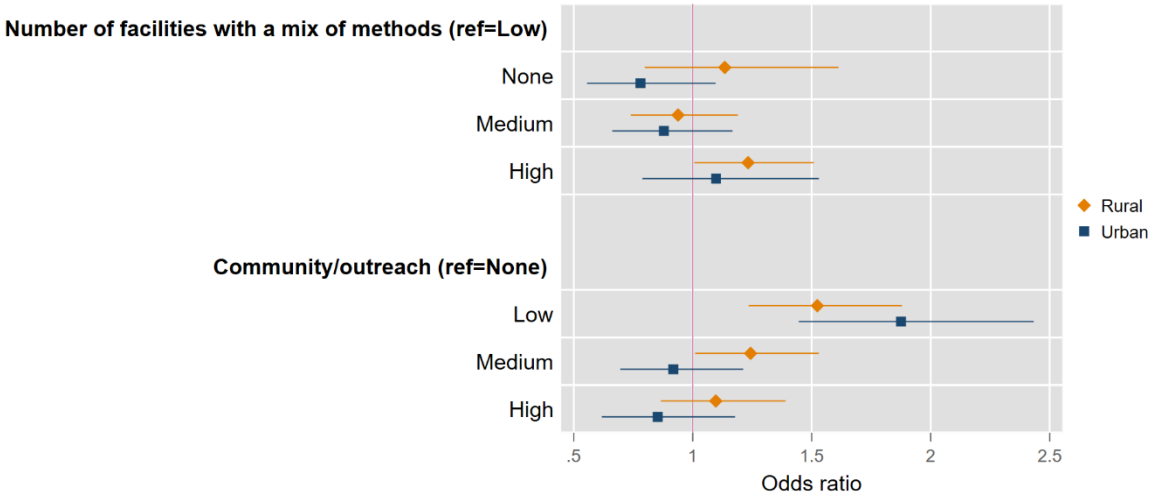
Note: A best-fit line is drawn separately for the total, urban, and rural areas.

In Haiti we conducted a multilevel, multivariable logistic regression to examine the determinants of contraceptive use according to individual and community-level factors among women aged 15-49. The characteristics of the women are described in Appendix Table 3. Two thirds (69%) of urban women and 42% of rural women had secondary or higher education, and 46% and 58% were currently married, respectively. Approximately three-quarters of urban (73%) and rural (79%) women had not had recent exposure to FP messaging. Only 20% of urban women and 13% of rural women lived in an area with no facilities that provide a mix of methods, while 42% and 37% lived in an area where no woman reported obtaining their most recent FP method from community outreach.

At the individual level, the regressions controlled for wealth, education, employment, marital status, age, and exposure to FP messaging, as well as community factors such as the number of facilities that provide FP with a mix of methods, community outreach for FP, population density, and department. Figure 10 presents the odds ratios of using contraception according to the service environment—number of facilities with a mix of methods and community outreach, as quantified by the multilevel regression models. After controlling for covariates, in rural clusters in Haiti, women who lived in areas with the greatest number of health facilities had a marginally significant, 20% increase in the odds of using contraception compared with women in clusters with a low number of facilities with mix of methods ($p < 0.05$; 95% CI: 1.0-1.5).

In both urban and rural areas, women who lived in clusters with low levels of community or outreach provision of FP were more likely to use contraceptive methods than women residing in clusters with no community or outreach provision. In urban areas, these women had a nearly twofold increase in the odds of using FP (adjusted odds ratio (AOR): 1.9; $p < 0.001$; 95% CI: 1.4-2.4) and in rural women, a 50% increase (AOR: 1.5; $p < 0.001$; 95% CI: 1.2-1.9).

Figure 10 Odds ratios of using modern contraception by family planning service environment factors, Haiti



Note: Models control for wealth, education, employment, marital status, age, exposure to FP messaging, population density, and department.

Appendix Table 4 shows the unadjusted odds ratios (UORs) and AORs for the full models. These models show a number of highly significant determinants that include marital status and age, as expected. Married women in both urban and rural areas were more likely to use FP compared with unmarried women (urban odds ratio: 2.6; $p < 0.001$; 95% CI: 1.9-3.6; rural odds ratio: 4.6; $p < 0.001$; 95% CI: 3.6-5.8). Women who were age 20-29 or 30-39 had two to three times the odds of using FP versus women age 15-19. For example, in both urban and rural areas, the odds were 2.6 ($p < 0.001$; 95% CI: 1.8-3.7) and 2.4 ($p < 0.001$; 95% CI: 1.8-3.1), respectively, when comparing women age 20-29 to women age 15-19. Overall, wealth, education, employment, and exposure to FP messages were not strong determinants of contraceptive use.

3.3 Malawi

Just under half (45%) of women age 15-49 use a modern contraceptive method (Appendix Table 5). This differed very little by the three regions in Malawi from 43% in the Southern and Northern regions to 48% in the Central Region. Half of modern users used injectables, followed by implants (20%) and female sterilization (18%). Figure 11 shows that injectables were also the most frequently used method for each region. The overall AD in Malawi was 12.9 with few differences by region.

Figure 12 shows that the majority of women obtain their contraceptive methods from public sources, which are either government health centers and clinics (52%) or government hospitals (16%). The "other" category is almost entirely composed of BLM, a form of outreach in Malawi. However, 90% of BLM outreach is situated within public facilities (Weinberger, Bietsch, and Williamson 2017). Only 6% of users obtain their method from a private medical source.

Figure 11 Method mix by region, Malawi

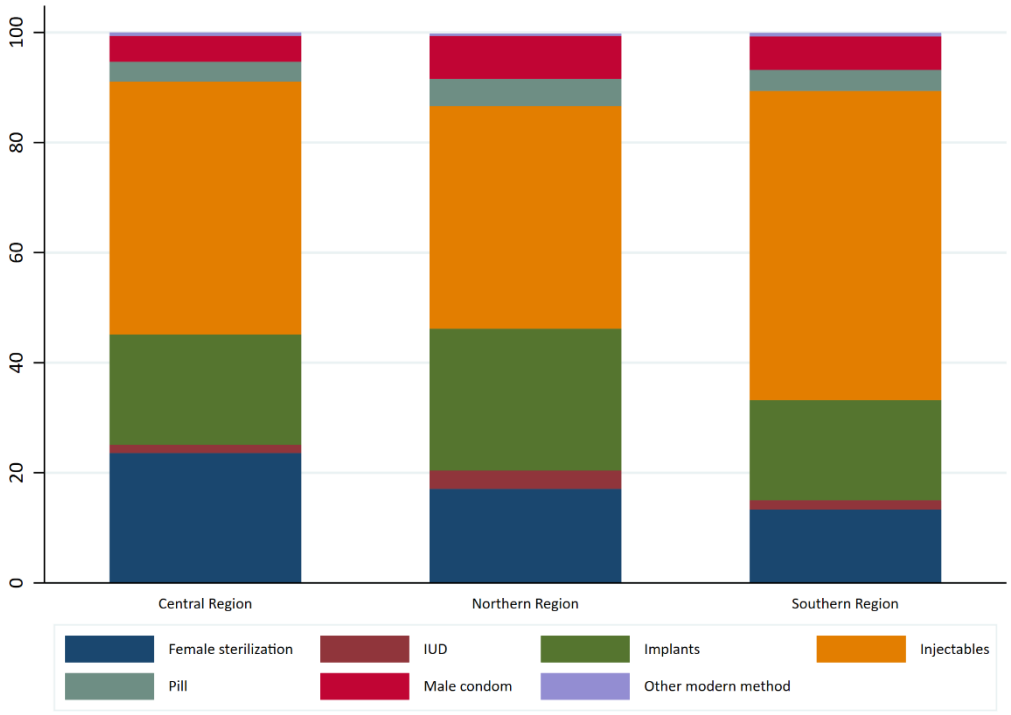
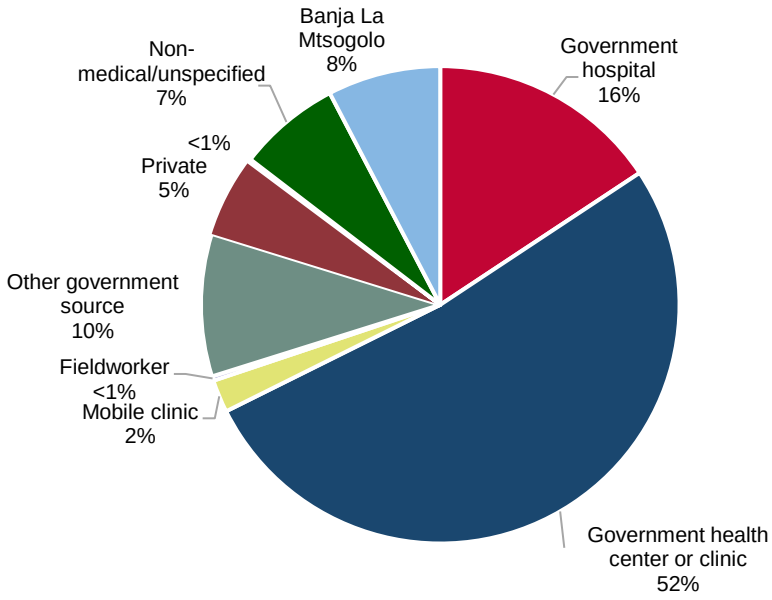


Figure 12 Most recent source of family planning method, Malawi



Note: Government health centers and clinics includes family planning clinics. Private includes private doctors, hospitals, clinics, and other private sources.

Table 5 shows the number of facilities nationally and by region with FP services, the percent with facilities with a mix of methods, and the total number with a mix of methods. At a national level, 53% of 809 facilities have a mix of methods, 65% of 140 facilities in the North Region have a mix of methods, and 46% of 307 facilities in the Central Region have a mix of methods. Figure 13 demonstrates that there is no evidence of any relationships between district level use of modern contraceptives and AD, number of FP facilities, aggregate availability of a mix of methods, or number of FP facilities with a mix of methods. Table 5 shows the values for each of these measures by region in Malawi.

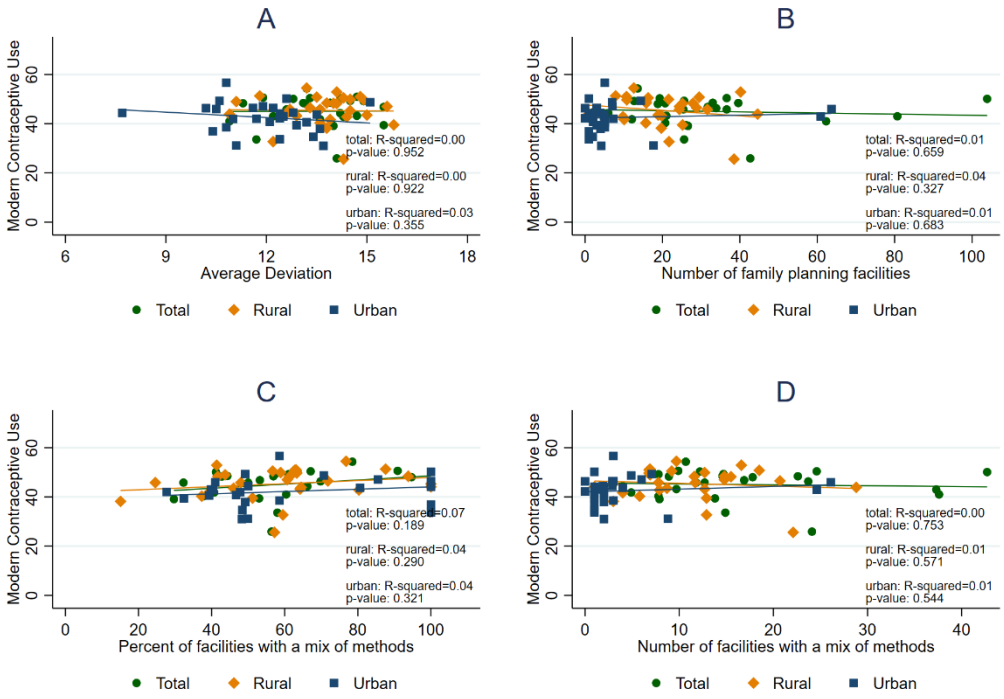
Table 5 Family planning facilities and availability of methods, Malawi SPA 2013-14

	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	809	53.2	430
North	140	64.9	91
Central	307	46.3	142
South	361	54.5	197

Note: CI = confidence interval; FP = family planning.

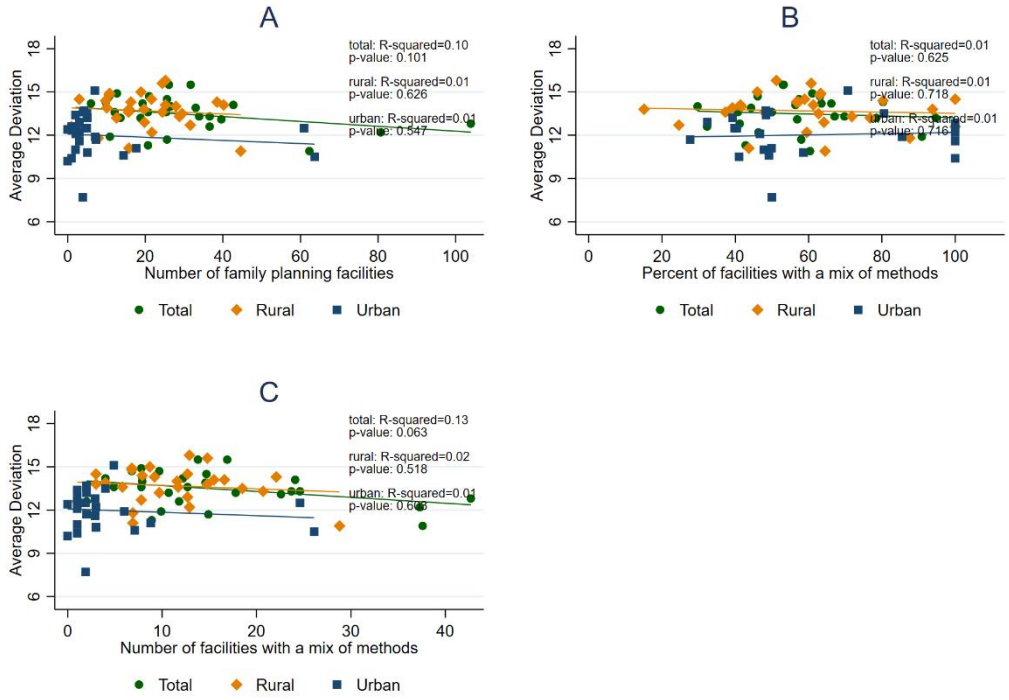
Similarly, there was no evidence of an association at the district level between AD and any health facility indicator examined such as access to FP facilities, access to facilities with a mix of method, or greater proportions of facilities with a mix of methods, as seen in Figure 14.

Figure 13 Contraceptive prevalence by average deviation and measures of method availability, Malawi



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

Figure 14 Average deviation by measures of method availability, Malawi



Note: A best-fit line is drawn separately for the total, urban, and rural areas

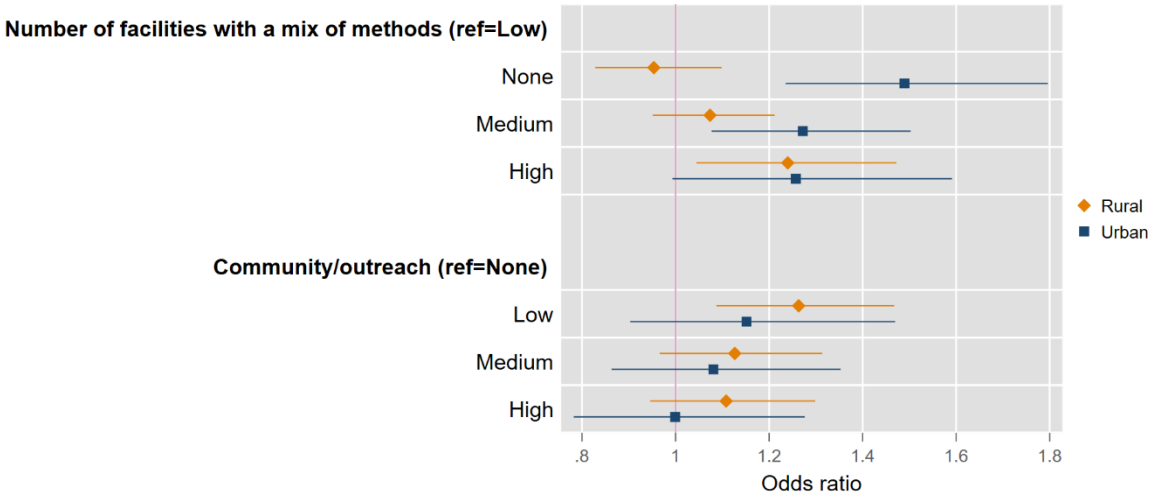
As in Haiti, the SPA is a census in Malawi, which enables a linked analysis to examine cluster-level health facility data with contraceptive use at the individual level. Appendix Table 6 shows the background characteristics of women analyzed in Malawi. This shows that most of these women were married—58% of urban women and 67% of rural women. In urban areas, 59% of women have a secondary or higher education whereas in rural areas, only 18% do, while 68% have only primary education. Although both urban and rural women commonly work in agriculture or other fields, the proportion is twice as high among rural women (63% compared with 29%). Urban-rural differences are also seen in exposure to FP messaging: 66% of urban women versus 40% of rural women. There are also notable differences in the FP service environment. Fewer than 1% of women in urban areas live in a cluster with no facilities that provide at least three types of methods, unlike 16% of rural women. In addition, 12% and 20% of women of urban and rural women live in a cluster with no community outreach for provision of FP methods, according to the women's report of FP sources.

Figure 15 and Appendix Table 7 show the odds of using modern contraceptives among urban and rural women by the FP service environment. In rural Malawi, women have 20% greater odds of using modern FP if they live in an area with the greatest number of facilities that offer FP with a mix of methods (AOR: 1.2; $p < 0.05$; 95% CI: 1.0-1.5). Conversely, among urban women who live in an area with no facilities with a mix of methods, there is a 50% increase in the odds of using FP (AOR: 1.5; $p < 0.001$; 95% CI: 1.2-1.8). However, the none category includes only 11 women surveyed in three clusters which were all within one district. Nonetheless, urban women in clusters with medium and high availability of methods were more likely to use contraceptives, which was significant for women in medium clusters (AOR: 1.3; $p < 0.01$; 95% CI: 1.1-1.5). In rural Malawi, women in clusters with low community or outreach provision of FP were more likely to use a method compared with women in areas where no women reported using

community or outreach outlets for their most recent method (AOR 1.3; p < 0.01; 95% CI 1.1-1.5). Together, these two variables explained 69% of the between-cluster variation in the use of contraceptives in urban areas and 20% in the rural areas.

As seen in Appendix Table 7, the odds of using FP were 8 to 9 times higher among currently married women (urban AOR 8.9; p < 0.001; 95% CI 6.5-12.3; rural AOR 8.3; p < 0.001; 95% CI 6.9-10.0) and 3 to 4 times higher among formerly married women (urban AOR 3.6; p < 0.001; 95% CI 2.3-5.7; rural AOR 3.3; p < 0.001; 95% CI 2.7-4.2) and compared with never married women. Age was also strongly associated with contraceptive use, with women age 30-39 having the highest odds of using contraception of any age group compared with women age 15-19 (urban AOR 2.5; p < 0.001; 95% CI 1.7-3.6; rural AOR 2.8; p < 0.001; 95% CI 2.4-3.3). Employment was significantly associated with contraceptive use in rural, but not urban Malawi. The odds were 40% higher among both professionally and agriculturally employed women compared with the unemployed women (professional AOR 1.4; p < 0.01; 95% CI 1.1-1.6; agricultural AOR 1.4; p < 0.001; 95% CI 1.2-1.5). Wealth was also positively associated in rural but not urban areas, as was population density. There was no evidence of an association between contraceptive use and either education or exposure to FP messaging.

Figure 15 Odds ratios of using modern contraception by family planning service environment factors, Malawi

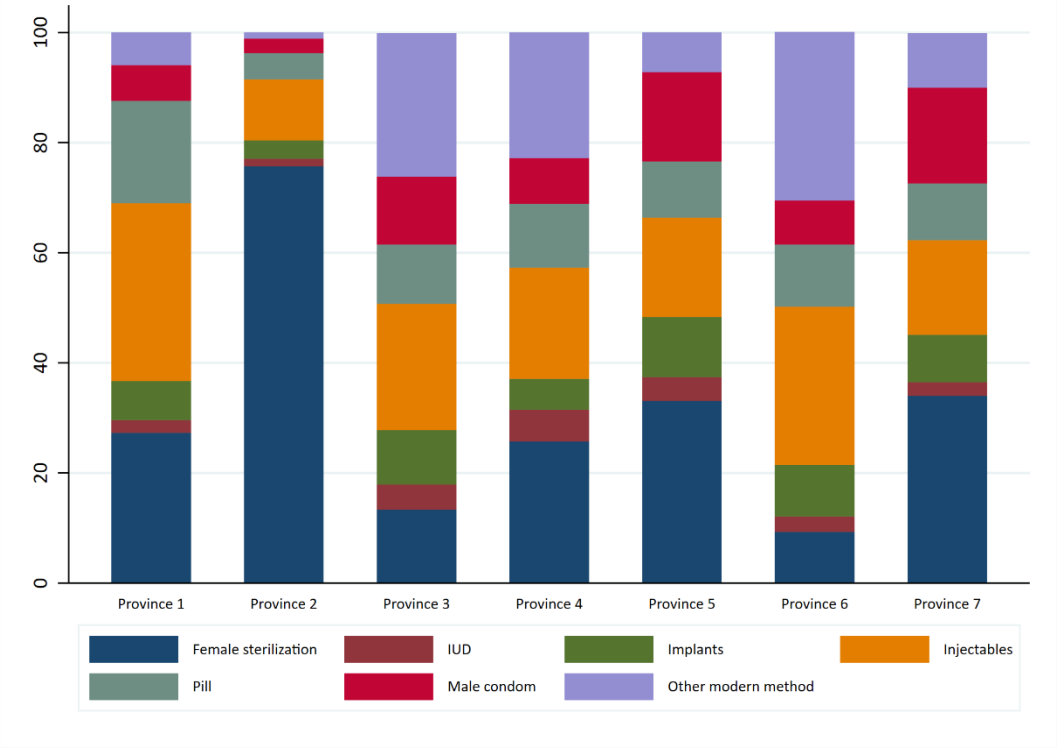


Note: Models controlled for wealth, education, employment, marital status, age, exposure to FP messaging, population density, and region.

3.4 Nepal

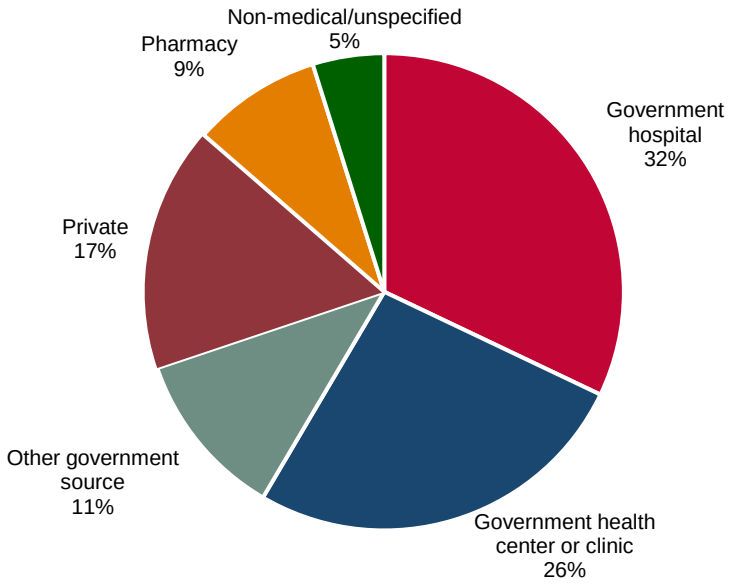
One in three (33%) women age 15-49 in Nepal use a modern contraception method (Appendix Table 8). There were few differences in mCP by region with ranges from 29% in Province 4 to 37% in Province 7. Overall, the most prevalent method in Nepal among women using a modern method was female sterilization (35%). Injectables were the second most used method (21%). Approximately 13% of women in Nepal used another modern method, mostly male sterilization (12.8%, results not shown). The method mix differed by province, as shown in Figure 16. One-third of modern users in Province 1 used injectables, followed by 29% of modern users in Province 6. However, in Province 2, only 11% of modern users used injections and approximately three-fourths (76%) used female sterilization. Provinces 3 and 6 had the lowest percentage of female sterilization (13% and 9%, respectively), but the highest use of other modern methods (26% and 31% respectively), which is predominately male sterilization. The overall AD in Nepal was 7.7, which ranged from 7.0 in Province 5 to 17.6 in Province 2.

Figure 16 Method mix by region, Nepal



As Figure 17 shows, the public sector serves nearly seven of ten (69%) users, while private medical sources serve one-fourth of users. Government hospitals provide nearly one-third (32%) of FP methods, which is a relatively large share for FP. Female sterilization and long-acting methods are common (Figure 16) and require higher levels of care. Government health centers and clinics provide another quarter of methods (26%) and private facilities another 17%.

Figure 17 Most recent source of family planning method, Nepal



Note: Government health centers and clinics includes family planning clinics. Private includes private doctors, hospitals, clinics, and other private sources.

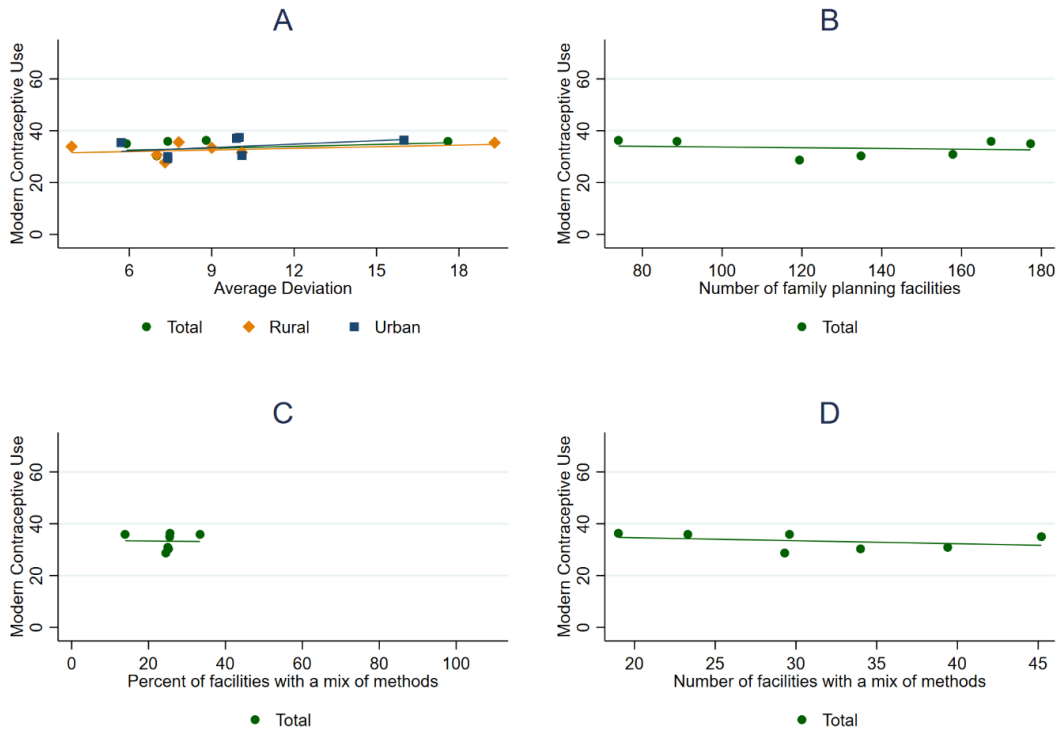
Table 6 shows the facility variables by region in Nepal. Figure 18 plots the relationships between provincial-level contraceptive prevalence and AD, number of facilities with FP, percentages of facilities with a mix of methods, and number of facilities with a mix of methods. There were too few points to test a relationship, although these plots show that contraceptive use does not vary by any of these factors. Figure 19 plots AD against the number of facilities with FP, percentages of facilities with a mix of methods, and number of facilities with a mix of methods at the provincial level. Although a line of best fit is included, Province 2 is an outlier in AD (17.9) and its presence distorts these lines. Among the other provinces, AD varies little and there is no apparent evidence of a correlation between AD and FP facility factors.

Table 6 Family planning facilities and availability of methods, Nepal SPA 2015

	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	919	23.9 [20.7,27.4]	220
Province 1	158	25.0 [17.4,34.5]	39
Province 2	167	13.9 [8.6,21.6]	23
Province 3	177	25.5 [18.6,34.0]	45
Province 4	119	24.5 [15.2,37.2]	29
Province 5	135	25.2 [18.0,34.2]	34
Province 6	74	25.6 [15.6,39.1]	19
Province 7	89	33.4 [23.4,45.1]	30

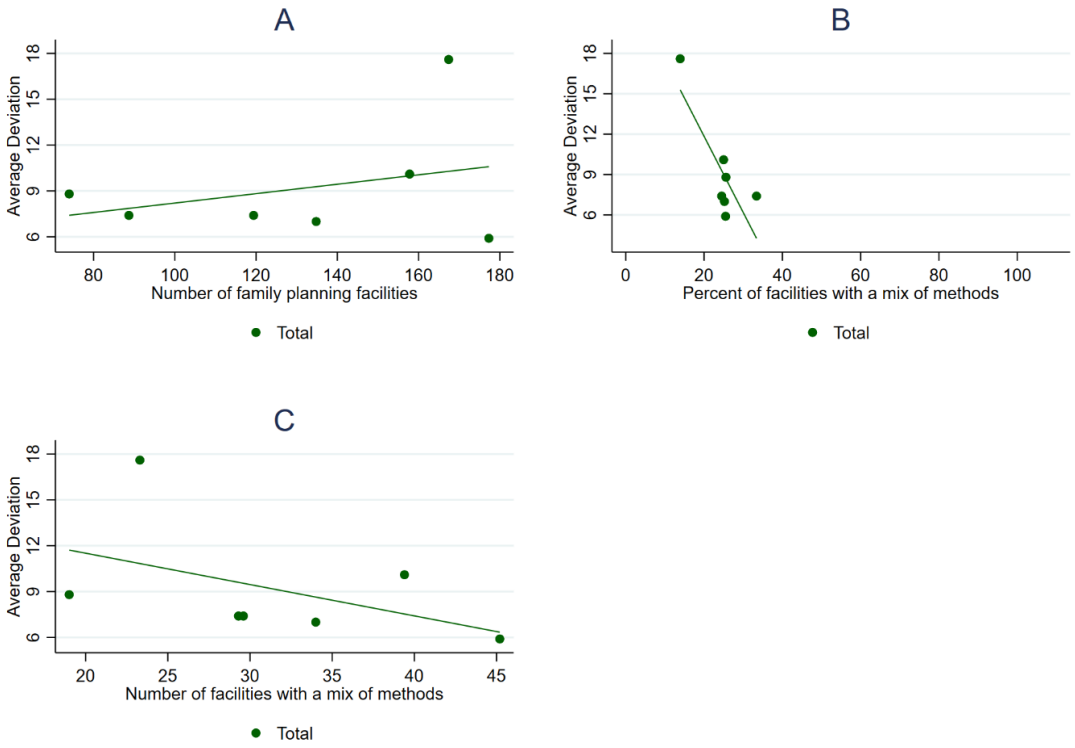
Note: CI = confidence interval; FP = family planning.

Figure 18 Contraceptive prevalence by average deviation and measures of method availability, Nepal



Note: A best-fit line is drawn separately for the total, urban, and rural areas in A and for only the total in B-D.

Figure 19 Average deviation by measures of method availability, Nepal



Note: A best-fit line is drawn separately for the total, urban, and rural areas in A and for only the total in B-D.

3.5 Senegal

Only 19% of women age 15-49 in Senegal use a modern contraceptive method (Appendix Table 9). This differed greatly by region, from 8% in Matam to 25% in Dakar. Among modern users, injectables were the most prevalent method (38%), followed by implants (31%). As shown in Figure 20, the regions fluctuated between injectables and implants as the most used method. In Fatick and Matam, more than half of women used injectables (50% and 59%, respectively), and in Kolda, 53% of women used implants. The overall AD in Senegal was 11.9, which ranged from 9.0 in Dakar to 18.4 in Kolda.

Figure 20 Method mix by region, Senegal

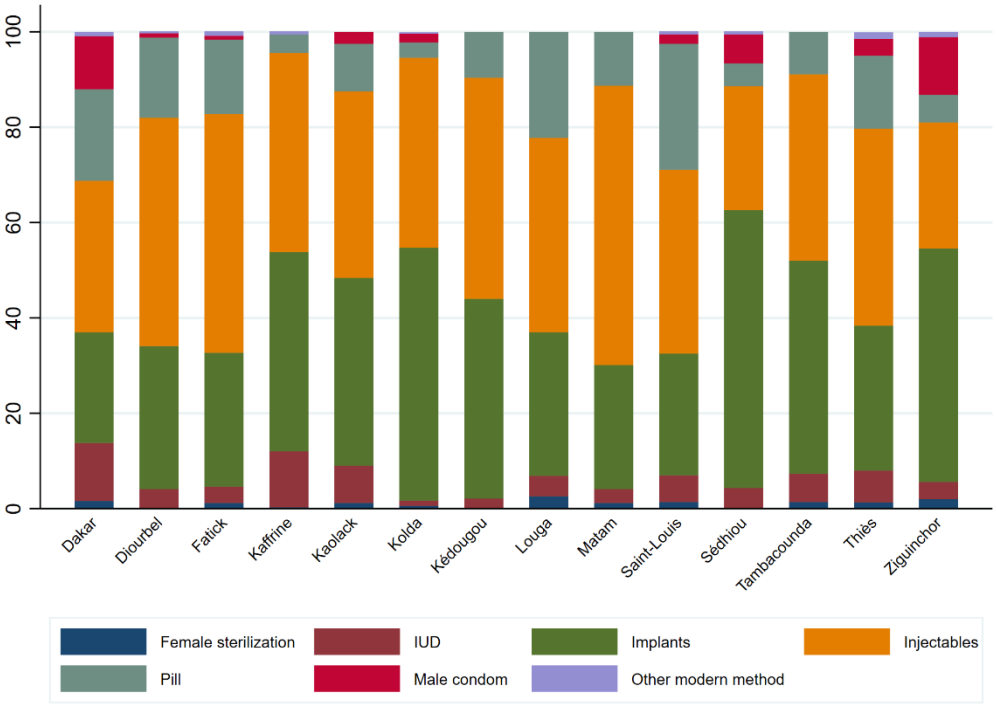
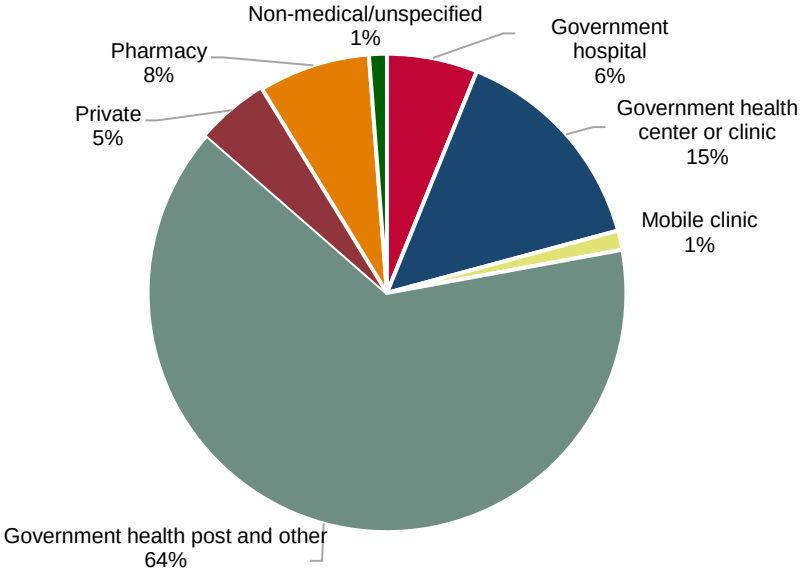


Figure 21 shows that the large majority of women obtain their methods from government facilities, and among those, government health posts (60.6%) and other government facilities (3.5%) supply a total of 64% of all sources. Pharmacies serve 8% of users.

Figure 21 Most recent source of family planning method, Senegal



Note: Government health centers and clinics includes family planning clinics. Other public sources include health posts and health huts. Private includes private doctors, hospitals, clinics, and other private sources.

Table 7 shows that Thiès had 100 sampled FP facilities, followed by Kolda (70) and Louga (59). Fewer than 50 FP facilities were sampled in 9 of the 14 regions in Senegal. The capital, Dakar, had 53 FP facilities, and the largest percentage of facilities with a mix of methods (74%). However, this left 39 FP facilities with a mix of methods for the entire Dakar Region. Although Thiès had the largest number of FP facilities sampled, only one-third of these facilities had a mix of methods. Similarly, Kolda had the second largest number of FP facilities (70), and the lowest percentage of facilities with a mix of methods (22%).

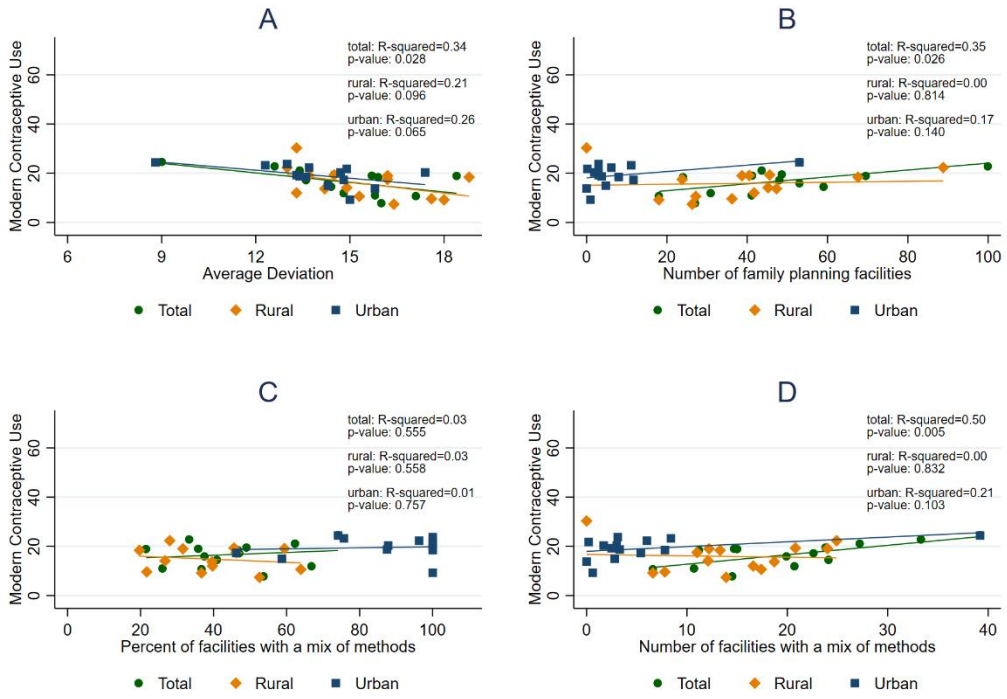
Table 7 Family planning facilities and availability of methods, Senegal SPA 2017

	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	657	43.2 [41.1,45.2]	283
Dakar	53	74.1 [54.0,87.4]	39
Ziguinchor	44	62.3 [55.0,69.1]	27
Diourbel	31	66.8 [59.3,73.5]	21
Saint-Louis	48	47.0 [38.4,55.9]	23
Tambacounda	41	26.0 [16.8,38.0]	11
Kaolack	53	37.5 [36.9,38.0]	20
Thiès	100	33.3 [29.6,37.3]	33
Louga	59	40.9 [34.9,47.2]	24
Fatick	49	49.0 [48.5,49.5]	24
Kolda	70	21.5 [18.9,24.5]	15
Matam	27	53.7 [39.9,66.9]	14
Kaffrine	41	35.8 [35.0,36.5]	15
Kédougou	18	36.7 [32.3,41.2]	7
Sédhiou	24	46.7 [45.7,47.7]	11

Note: CI = confidence interval; FP = family planning.

Figure 22A indicates that there is significant negative relationship between mCP and AD. The higher the AD, the lower the mCP, which is in the expected direction. The R-squared value also shows that AD explains 34% of the variance in mCP. This relationship was not found to be significant when assessed by urban and rural areas. Figures 22B and 22D show that mCP was also significantly associated with the number of facilities and number of facilities with a mix of methods and that these indicators explained 35% and 50% of the variance of mCP, respectively. The association was also in the expected direction with an increase in mCP with increasing number of facilities. This relationship was not significant in urban or rural areas. In Figure 22C, we see no significant association between mCP and the percentage of facilities with a mix of methods.

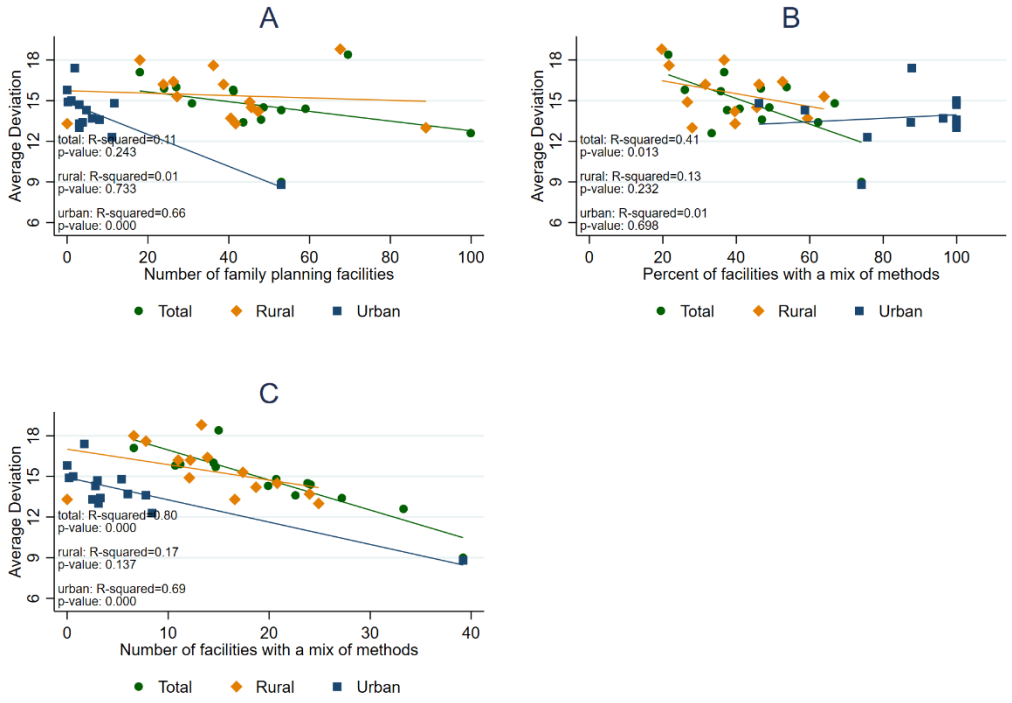
Figure 22 Contraceptive prevalence by average deviation and measures of method availability, Senegal



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

Figure 23A shows a significant negative relationship between AD and the number of FP facilities, but only for urban areas. Here we see that AD decreases (more balanced mix of methods) with an increase in number of FP facilities for urban areas. In addition, 66% of the variance in AD was explained by this number at the regional level. Therefore, in addition to the positive association of the number of FP facilities with mCP we observed in Figure 22A, this indicator also seems to be associated with a greater mix of methods. In Figure 23B, overall AD was significantly associated with the percentage of facilities with a mix of methods, although this was not significant for urban and rural areas. Figure 23C also shows that AD was significantly associated with the number of facilities with a mix of methods overall and in urban areas. The relationship was in the expected direction with a decrease in AD (larger mix of methods) observed with an increase in the number of facilities with a mix of methods. This number also explained 80% of the variance in AD overall and 69% of the variance in AD for urban areas at the regional level.

Figure 23 Average deviation by measures of method availability, Senegal



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

3.6 Tanzania

Slightly more than a quarter (27%) of women age 15-49 in Tanzania used a modern contraceptive method (Appendix Table 10). This ranged from only 9% in Zanzibar to 48% in Lindi. The most common modern method used was injectables (37%) followed by implants (21%). As shown in Figure 24, injectables were the most used method in most regions with implant usually a close second. The male condom was highly used in Dar es Salaam (37%), Iringa (24%), Mbeya (25%) and Mara (22%). The overall AD in Tanzania was 8.4. This ranged from 7.4 in Iringa to 14.1 in Lindi.

Figure 25 shows 61% of users receive their method from a public source, with 37% provided by dispensaries or clinics; 12% of users obtain their methods from a private source. Despite the dominance of long-acting or permanent methods, one-fifth of women obtain their method from a pharmacy. However, it should be noted that outreach or mobile clinics were not provided as a response option in this DHS survey.

Figure 24 Method mix by region, Tanzania

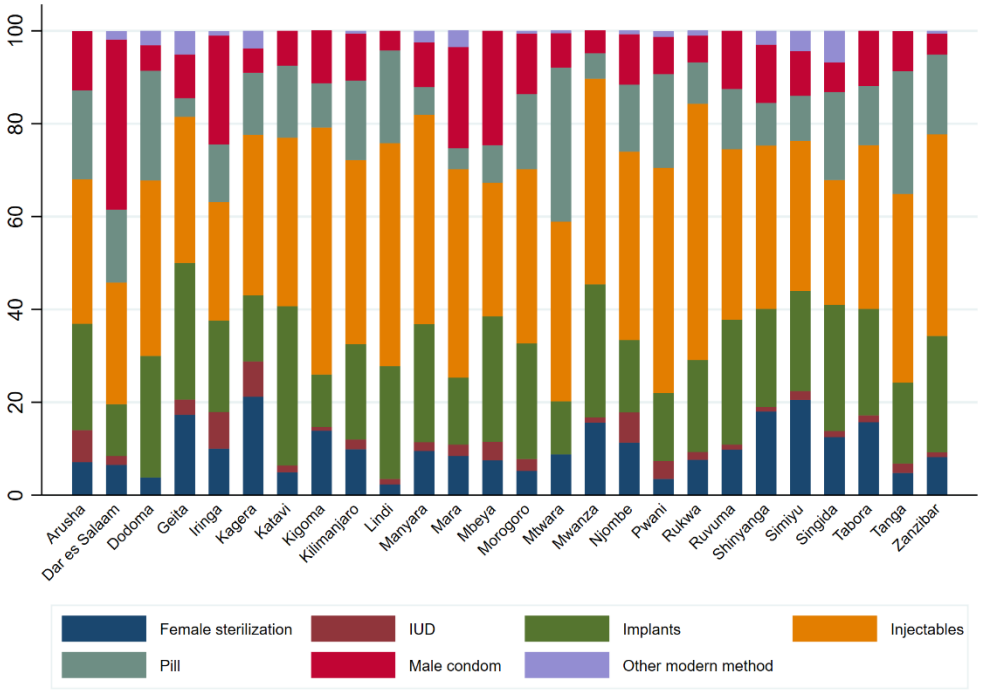
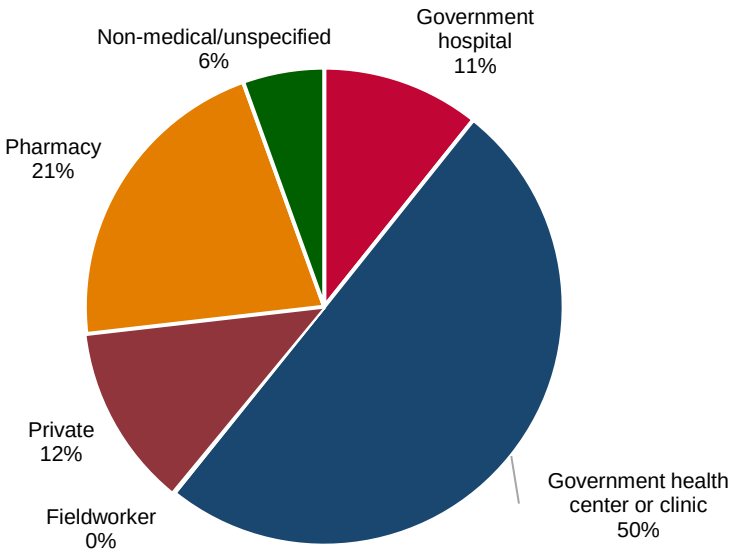


Figure 25 Most recent source of family planning method, Tanzania



Note: Government health centers and clinics includes FP clinics or dispensaries. Private includes private doctors, hospitals, clinics, and other private sources.

In Tanzania, there are 947 sampled facilities that provide FP, 41% (384) of which have a mix of methods available (Table 8). Mbeya had the greatest number of sampled facilities (67), Manyara had the highest percentage of facilities with a mix of methods (78% of 22 facilities), and Dar es Salaam had the greatest number of sampled facilities with a mix of methods (31). In contrast, Katavi had only 10 sampled facilities with FP services among which only 3 had a mix of methods.

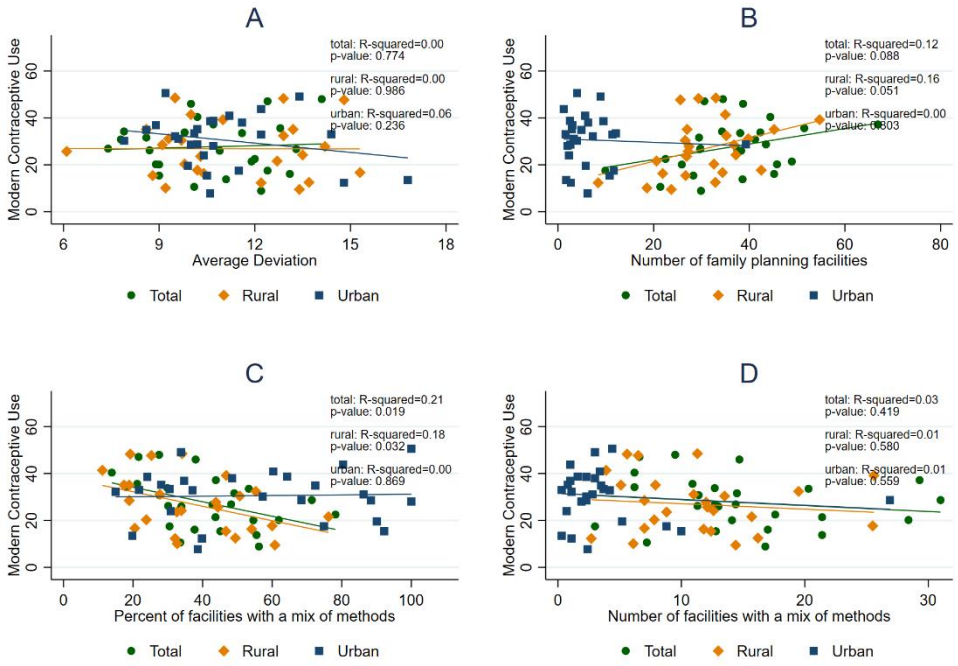
Table 8 Family planning facilities and availability of methods, Tanzania SPA 2014-15

	Number of FP facilities	Percentage of facilities with a mix of method types, % [95% CI]	Number of FP facilities with a mix of method types
Total	947	40.6 [36.4,44.9]	384
Dodoma	51	21.2 [9.5,40.7]	11
Arusha	37	30.1 [13.6,54.1]	11
Kilimanjaro	42	29.9 [12.9,55.1]	13
Tanga	49	43.7 [23.4,66.4]	21
Morogoro	44	13.9 [10.5,18.2]	6
Pwani	38	53.3 [30.8,74.4]	20
Dar es Salaam	43	71.4 [45.6,88.2]	31
Lindi	35	27.5 [12.4,50.4]	10
Mtwara	31	21.6 [8.3,45.6]	7
Ruvuma	39	38.0 [18.8,61.8]	15
Iringa	30	48.2 [24.6,72.7]	14
Mbeya	67	43.8 [23.5,66.4]	29
Singida	30	49.1 [25.6,73.0]	14
Tabora	46	61.9 [40.4,79.6]	28
Rukwa	30	42.8 [22.6,65.7]	13
Kigoma	39	55.5 [33.5,75.5]	21
Shinyanga	26	54.6 [29.8,77.3]	14
Kagera	41	27.6 [11.2,53.7]	11
Mwanza	45	37.7 [16.9,64.3]	17
Mara	38	33.9 [15.0,60.0]	13
Manyara	22	78.2 [45.2,94.0]	18
Njombe	34	18.1 [6.4,41.5]	6
Katavi	10	30.5 [15.9,50.5]	3
Simiyu	28	45.1 [24.6,67.4]	13
Geita	21	33.6 [15.9,57.6]	7
Zanzibar	30	56.2 [42.9,68.6]	17

Note: CI = confidence interval; FP = family planning.

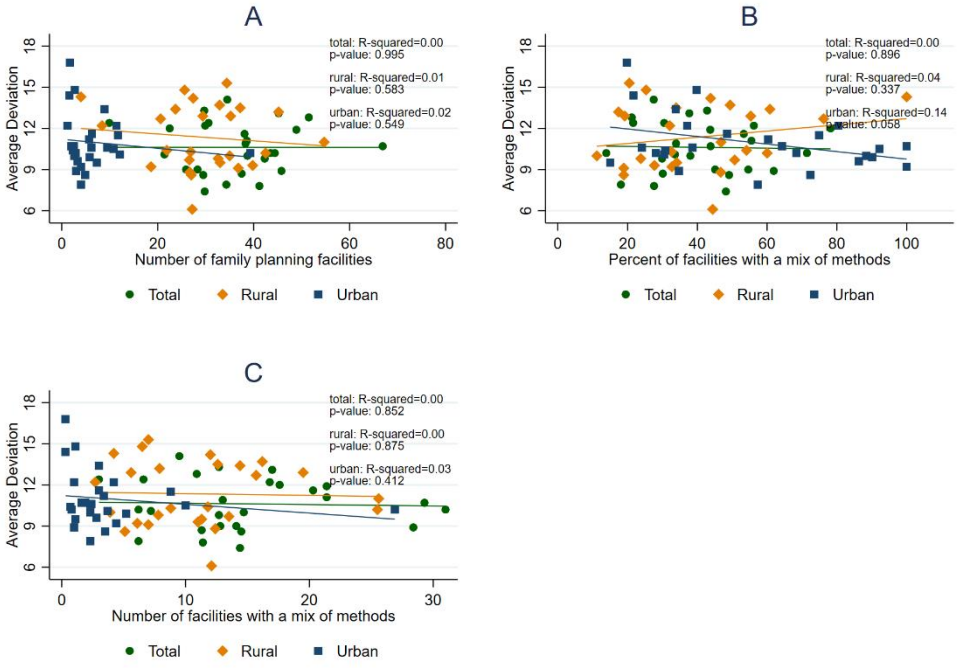
Figure 26 shows the relationship between contraceptive prevalence and AD, as well as health facility measures (number of FP facilities, percent with a mix of methods, and number with a mix of methods), overall and by urban and rural residences among the regions. There is no evidence of a correlation between contraceptive use and AD (26A), number of facilities (26B), or number of facilities with a mix of methods (26D). Urban Dar es Salaam stands out as an urban area with an exceptionally large number of facilities, which is understandable given the population of the capital of Tanzania. Contrary to what was expected, there is some evidence of a negative relationship between contraceptive prevalence and the percentage availability of a mix of methods (26C) for the total and for rural areas. These relationships were only marginally significant ($p < 0.05$) and do not control for other potentially important factors. The R-squared values show that the percent of facilities with a mix of methods explains 21% of the variance in mCP overall and 18% in rural areas. Finally, Figure 27 shows no evidence of a correlation between total, urban, or rural AD and any factor related to availability of FP services or availability of a mix of methods by region.

Figure 26 Contraceptive prevalence by average deviation and measures of method availability, Tanzania



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

Figure 27 Average deviation by measures of method availability, Tanzania



Note: A best-fit line is drawn separately for the total, urban, and rural areas.

4 DISCUSSION

This analysis examined the relationship between contraceptive use (measured by mCP), the diversity of method mix (measured by AD), and availability of methods at facilities (measured by three indicators related to the number and share of facilities with contraceptive methods available) across six countries. Overall, there are noticeable differences across these measures by country. The mCP ranged from 19% of all women in Senegal to 45% in Malawi; AD ranged from 7.7 in Nepal to 15.3 in Haiti, and the percentage of facilities with a mix of method types ranged from 24% in Nepal to 53% in Malawi. The analysis explored subnational differences within each country. In some countries, there was very little variation in these indicators across subnational areas, while other countries demonstrated much more diversity in one or more indicators. For example, in Tanzania, there is nearly a 40-percentage point spread in mCP between the regions with the lowest and highest level of contraceptive use, while Haiti, Malawi, and Nepal all have spreads of fewer than 12 percentage points.

In terms of method mix, there was a spread of only 2-3 points between the lowest and highest AD scores by subregion in Bangladesh, Haiti, and Malawi compared to spreads of 7 in Tanzania, 9 in Senegal, and 12 in Nepal. The spread between the lowest and highest percent of facilities with a mix of method types ranged from a 19-percentage point difference (Malawi) to greater than 50-percentage point difference in Haiti, Senegal, and Tanzania. This analysis found that the relationships between contraceptive use, method mix, and method availability vary considerably across the countries studied. In most cases, the analysis by subnational area found no significant relationships between contraceptive use and either AD or FP services or method availability at the facility level, or between AD and services or method availability at the facility level. The following section reviews these relationships in each country.

4.1 Country-specific findings in context

Bangladesh showed a potentially positive relationship between mCP and the percentage of facilities with a mix of methods at the regional level. However, too few data points meant that significance could not be tested. There was no clear relationship between AD and any of the availability measures. However, in Bangladesh, only a small number of facilities offer a mix of methods, and this is coupled with high use of short-term methods, and most notably, pills. Sylhet is somewhat of an outlier in the analysis in Bangladesh. This is the division with the lowest mCP (over 20 percentage points lower than the highest division), one method that dominates the mix (the pill), and the lowest percent and number of facilities with a mix of methods. Sylhet also has the lowest AD score, which indicates that AD, while assessing balance, is not necessarily the opposite of skew. It is important to note that in Bangladesh, the most common source for FP methods are pharmacies (38% of all users, 48% of pill users), which are not captured by the SPA surveys (NIPORT/Bangladesh, Mitra Associates, and ICF International 2016). This may attenuate the relationship between availability of methods at formal health facilities surveyed in the SPA and contraceptive use.

Haiti showed a positive significant relationship between mCP and the percentage of facilities with a mix of methods (overall and rural). There was no clear relationship between AD and any of the availability measures. Regression analysis in Haiti showed that women living in the rural areas with the greatest number of health facilities with a mix of methods had a marginally significant higher use than women living in areas with low numbers of facilities with a mix of methods. Community distribution or outreach (low versus

none) was also significant. Use of injectables dominates the method mix in almost all subnational areas with no clear relationship with method availability at facilities. For example, injectables comprise 61% of the method mix in both Nord and Nippes, while the percent of facilities with a mix of method types is only 40% in Nord compared to 61% in Nippes. This may be partly due to a high reliance on community-based sources for injectables that are not captured in the facility accessibility measures. These findings only somewhat align with another study that examined an earlier round of DHS and SPA data collected in Haiti. Wang and Mallick (2019) found that women in both urban and rural areas had greater odds (twice as high or 75% higher, respectively) of using FP in areas with high availability compared with areas with low availability. However, in this study that used earlier data, the service environment variables were defined somewhat differently, which may explain some of the discrepancy.

In Malawi, no significant findings were found in the association between with mCP or AD and method availability measures at the district level. However, regression analysis did highlight significant findings for rural women both in terms of facility method mix and community outreach (low versus none). While injectables largely dominate the method mix in Malawi, this presents an interesting case with a fairly high use of female sterilization relative to other countries in the region as well as relatively high levels of use of implants. Mobile outreach services play a key role in providing these methods, and even tubal ligations are provided by the BLM outreach teams (Chipeta-Khonje et al. 2009; USAID 2012), which may not be captured in facility-based availability measures. In agreement with this study, a separate analysis (Weinberger, Bietsch, and Williamson 2017) found a significant relationship between proximity to BLM outreach sites and mCP.

In Nepal, there were too few data points at the regional level to test for relationships, although among the available data, there were no clear relationships between either CP or AD and method availability measures. However, the high use of both male and female sterilization in the country may distort findings because this influences both the timing of services (sterilization may have occurred much before the time of the Nepal survey) and the types of facilities utilized for services (higher-level only).

Senegal showed multiple significant relationships. There was an overall significant relationship between mCP and AD, as well as mCP and both the number of facilities that offer FP and the number of facilities that offer a mix of method types. In addition, AD decreased significantly with the number of facilities that offer FP in urban areas and was significantly associated with the number of facilities with a mix of methods overall and in urban areas. In Senegal, as a low mCP country with a relatively high total fertility rate (4.6 in 2017 (ANSD/Sénégal and ICF 2018)) that has recently experienced rapid increases in contraceptive use, the increased availability of methods may be playing a clearer role in influencing contraceptive use than in countries that have already reached higher levels of mCP (Adetunji, Feyisetan, and Starbird 2017).

In Tanzania, despite wide variations in measures across regions, no clear patterns were seen in the relationships of these measures to one another. Further, an unexpected result was seen in which mCP decreased as the percentage of facilities with a mix of methods increased (overall and in rural areas). However, this relationship was only marginally significant. One-fifth of women reported obtaining their most recent method from a pharmacy; the situation in Tanzania may be further complicated by the large role of mobile outreach services, especially in the provision of implants (Duvall et al. 2014; Wickstrom et al. 2013). Facility-based measures of method availability may not capture the full extent of availability,

especially when outreach teams provide services within public facilities, a practice that is supported in Tanzania (Jarvis, Wickstrom, and Shannon 2018).

4.2 Contextualizing results across countries

In summary, across the six countries, no conclusive or consistent relationships between the contraceptive use (mCP), the balance of a method mix (AD), and the availability of methods at facilities were found. This lack of consistency of findings may not be unexpected given the diversity of contexts across these countries, as well as the fact that a wide range of factors beyond availability of methods at facilities on both the supply-side and demand-side influence method choice. This includes familiarity with methods, prevailing social norms, contraceptive preferences, provider bias, program and policy structures, and affordability of methods, as well as availability of methods outside of facilities (such as provision by community health workers, drug shops, or mobile outreach teams as above). The findings of this report highlight a point noted in an analysis of 123 countries that found an association between lower AD values and higher contraceptive prevalence, and also noted that the same AD can occur in settings with both high and low contraceptive prevalence (Ross, Keesbury, and Hardee 2015). The inconclusive relationship is also consistent with a study that found no relationship between method skew and mCP (Bertrand et al. 2014).

Only in Haiti and Malawi could analysis be done at the individual level or in a way that controlled for factors that are likely to confound the relationships between these measures. In Malawi, the analyses that examined bivariate relationships between mCP, AD, and method availability produced no significant results, although the regressions were able to identify significant relationships in rural areas. This suggests that it is possible that significant relationships may exist in the other countries, but that available data (at the subnational, administrative 1 level) is not granular enough to reveal such relationships. Further, it may be that the relationship between contraceptive use, method mix, and method availability changes over time in a country as contraceptive use increases, and that changes in demand for family planning may also play a role (Weinberger, Sonneveldt, and Stover 2017). The findings from Senegal, the lowest mCP country included in this analysis, may point to this fact. For the higher prevalence countries, it may be that there is enough availability of methods that these measures no longer mediate contraceptive use. Future research could examine these relationships over time where there have been multiple rounds of DHS and SPA surveys such as Bangladesh, Haiti, Senegal, Tanzania.

Despite the lack of consistent relationships across countries, it would be a misuse of these findings to suggest that making a wide range of methods available and accessible is not important. Earlier work using more aggregated measures like the FPE have shown relationships between the number of methods available and mCP. It was worthwhile to explore the relationship between method availability and balance of method mix (measured here through AD), but as has been shown earlier, method skew can exist across many contexts and greater method availability may not inherently lead to a more balanced method mix. Although researchers may be tempted to use method mix as a proxy for method availability (Sullivan et al. 2006), results from this study indicate that this measure of balance in a method mix, the AD, should therefore not be used in such a manner without first assessing these assumptions. Future research should continue to examine supply-side measures to understand availability. Availability of a mix of methods is indeed a prerequisite for a more balanced method mix, and thus measures of availability should continue to be monitored. Ensuring women are able to choose from a wide range of methods is critical to a successful FP program and a rights-based approach.

4.3 Strengths and limitations

A key strength of this paper is the multilevel approach to furthering our understanding of the complex relationships between contraceptive use, method mix, and access to FP methods. Community-level factors that reflect access to a diverse range of methods is a research area that has not been widely studied at lower than subnational levels. Our literature review identified only a small number of countries studied at these lower levels (Hong, Montana, and Mishra 2006; Shiferaw et al. 2017; Sullivan et al. 2006; Tumlinson et al. 2015; Wang and Mallick 2019). The multivariable, multilevel approach is novel. By applying a new method to approximate cluster weights, we have more precisely estimated the relationship between community-level factors and contraceptive use.

By linking SPA data to DHS data, while also considering factors such as community distribution or mobile outreach distribution at FP facilities, we added to the field of research that accounts for multiple levels within the health system. By using SPA data, we can gauge the relationship between supply-side factors such as method availability and demand or use factors such as contraceptive use and method mix balance. Without such well-timed, geographically linkable data sources, research is typically left to assume that demand factors such as method mix balance are related to supply. However, our research shows this is not always the case, at least at subnational levels. Our analysis at more granular (cluster) levels in Haiti and Malawi reveals that method availability is modestly associated with an increase of contraceptive use, although there are other, highly relevant determinants of contraceptive use such as age and marital status. With our analysis of Haiti and Malawi, we also provide evidence that there is an association that shows that at least some level of outreach, especially compared to areas where there is none, can help meet women's demand for FP and can increase contraceptive use. This adds new, novel information to the body of literature.

One limitation of this analysis is that for most countries analyzed, we were only able to examine relationships at the first administrative unit. When SPA surveys are sample surveys, samples may not capture all facilities—especially the lower-level facilities important in rural areas—that are within proximity to each DHS cluster, which is a requisite for ecologically linking data (Burgert and Prosnitz 2014). Further, SPA surveys do not capture all sources where women obtain their FP methods, such as pharmacies or community health workers. In these subnational analyses, many important confounders were omitted, such as consideration of the facility to population ratio, or population density. However, we controlled for population density in our analysis in Haiti and Malawi, and found that in rural Malawi, population density does appear to play a role in contraceptive use.

In the individual-level analysis, where linkage between household and facility level data is possible down to the cluster level, we did not include potentially important confounders, such as quality of care, which are known to influence or be associated with contraceptive behaviors at both the aggregate and individual levels (Jain et al. 2019; RamaRao et al. 2003; Staveteig, Mallick, and Winter 2015; Tumlinson et al. 2015). While the SPA surveys also include an observation of FP services, there are important limitations to these indicators that prohibited our inclusion of the indicators in our analysis, such as biases in the sample of clients and limitations to the observation protocol (Mallick, Temsah, and Wang 2019; Mallick, Benedict, et al. 2020). In addition, we did not present an analysis of the relationship between provider training and either mCP or AD, because in an initial exploration, we found no conclusive evidence of relationships at subnational levels (results not shown). Nevertheless, provider counseling, high quality of counseling, and

access to multiple methods may not necessarily yield an increase in contraceptive prevalence at the population level. These aspects of quality of care may help current users find a method more suitable for their needs and the overall prevalence may remain the same. Future research could use a more focused, targeted approach to better understand these relationships at more granular levels.

Finally, both the DHS and the SPA surveys are cross-sectional surveys that reflect point-in-time contraceptive use and point-in-time availability of methods. Since methods may come in and out of stock frequently, future research could examine data from health or logistics management information systems (Mallick, Temsah, et al. 2020). The more frequent data points could be used to assess the extent of stockouts, with averages in availability calculated over time, to explore how changes in or relative stability of method availability over time may influence both contraceptive use and measures of method mix, such as AD. More in-depth analysis of the contraceptive calendar may provide further insights, for example, into reasons for discontinuation among women who had used a method and stopped in the 5 years before the survey, as found in previous research (Bradley, Schwandt, and Khan 2009; Finnegan, Sao, and Huchko 2019; Staveteig, Mallick, and Winter 2015), and linking more detailed information about contraceptive behavior to supply-side factors that are measurable by available data.

4.4 Recommendations

In addition to the future research noted above, immediate actions can be undertaken based on the results of this study. These include ensuring that more facilities provide a variety of FP methods to meet women's diverse contraceptive needs. In addition, a straightforward analysis of the level of outreach by cluster or region can help to identify areas where scale-up of outreach can help target FP programs to best meet the demand for FP. Finally, additional supply-side factors should be explored to motivate service delivery interventions such as strengthening supply chains, task sharing, and provider training. With rights-based FP, if method skew is driven by user preference, then efforts can be made to ensure a consistent supply of common methods, rather than diversifying methods and drawing users away from the methods they prefer.

4.5 Conclusions

This analysis, which explored the relationships between contraceptive use, method mix, and method availability, capitalized on the unique opportunity to join nationally and subnationally representative household and health facility data. This paper examined whether method availability also relates to method mix. Without a consistent or clear picture across countries, it is important to examine every country's unique context related to the FP environment. Women in Haiti and Malawi showed modest increases in use of modern methods in areas with both greater method availability and outreach, but there was no aggregate association with method balance. Meanwhile, in Senegal, there were very strong regional relationships between greater contraceptive use and a more balanced mix, while more balanced mix was also strongly associated with greater availability of methods. This relationship in Senegal, a low-prevalence country, suggests that investments in expanding availability of a range of methods are important as countries shift from low to high mCP. From this analysis, we recommend that method balance, as assessed by the AD, cannot be used as a household-level proxy for method availability. Nonetheless, method choice should continue to be a central tenet of rights-based FP to ensure that women have access to the methods that meet their unique reproductive needs.

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APPENDIX

Appendix Table 1 **Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Bangladesh DHS 2014**

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	54.1 [52.7,55.4]	16,858	8.5 [7.7,9.4]	1.2 [0.9,1.6]	3.2 [2.5,3.9]	23.0 [21.1,25.0]	49.9 [48.0,51.9]	11.9 [10.9,13.1]	2.3 [1.8,3.0]	12.7
Barishal	54.6 [51.5,57.6]	1,051	5.7 [4.1,7.8]	0.3 [0.1,0.8]	3.4 [2.2,5.2]	31.5 [25.0,38.9]	49.8 [45.8,53.7]	8.1 [5.3,12.2]	1.3 [0.7,2.3]	15.1
Chattogram	47.2 [44.4,50.0]	3,121	7.7 [5.9,10.0]	1.6 [1.0,2.5]	2.6 [1.5,4.5]	25.4 [20.9,30.6]	51.0 [46.5,55.4]	10.3 [8.3,12.7]	1.5 [0.9,2.4]	13.7
Dhaka	54.2 [51.3,57.2]	5,857	7.3 [6.0,8.9]	1.1 [0.6,1.8]	3.3 [2.0,5.5]	19.8 [15.8,24.6]	50.6 [46.0,55.2]	15.7 [13.5,18.3]	2.1 [1.3,3.6]	12.4
Khulna	56.4 [54.1,58.7]	1,729	10.9 [8.6,13.7]	0.9 [0.5,1.6]	3.6 [2.1,6.0]	24.5 [20.7,28.7]	46.5 [42.2,50.8]	12.2 [9.9,14.9]	1.5 [0.9,2.4]	12.1
Rajshahi	60.7 [58.2,63.1]	2,007	9.3 [7.4,11.7]	1.1 [0.6,2.0]	3.1 [2.1,4.7]	26.2 [21.3,31.8]	46.0 [42.2,49.7]	12.2 [10.0,14.8]	2.0 [1.1,3.6]	12.5
Rangpur	63.0 [60.3,65.7]	1,946	8.2 [6.2,10.8]	1.8 [0.7,4.7]	3.5 [2.4,5.1]	22.5 [18.7,26.9]	52.7 [48.7,56.6]	6.2 [4.6,8.2]	5.1 [3.2,8.0]	13.3
Sylhet	40.9 [36.5,45.4]	1,147	16.3 [13.0,20.3]	0.7 [0.3,1.8]	1.9 [1.0,3.8]	15.8 [12.4,20.0]	52.3 [47.0,57.6]	9.7 [6.7,13.8]	3.2 [2.0,5.0]	11.9

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.

Appendix Table 2 **Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Haiti DHS 2016-17**

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	22.3 [21.2,23.4]	14,371	3.2 [2.5,4.0]	0.3 [0.1,0.6]	6.1 [5.0,7.5]	54.1 [51.0,57.1]	6.3 [5.3,7.5]	28.0 [24.9,31.4]	2.1 [1.5,2.8]	15.3
Aire Metropolitaine	24.0 [21.4,26.8]	3,632	0.8 [0.3,2.0]	0.2 [0.1,1.0]	3.0 [1.7,5.1]	40.9 [33.2,49.2]	8.0 [5.8,10.9]	46.0 [37.4,54.8]	1.1 [0.5,2.4]	16.7
Rest-Ouest	16.3 [13.7,19.4]	2,285	4.9 [2.3,10.2]	0.6 [0.1,4.5]	6.8 [3.9,11.5]	54.4 [46.7,61.8]	8.6 [5.1,14.3]	22.4 [16.3,30.1]	2.3 [0.8,6.4]	13.8
Sud-Est	19.6 [16.1,23.7]	756	3.5 [1.7,7.3]	0	11.4 [5.9,21.0]	40.3 [31.9,49.5]	4.7 [2.5,8.7]	36.6 [25.0,50.0]	3.3 [1.4,8.0]	13.8
Nord	23.7 [20.3,27.4]	1,559	3.9 [1.9,7.6]	0.2 [0.0,1.6]	6.7 [3.8,11.7]	61.2 [52.9,68.8]	5.5 [2.7,10.9]	17.7 [12.7,24.2]	4.8 [2.5,9.2]	14.4
Nord-Est	27.4 [24.6,30.4]	516	4.5 [2.8,7.3]	0.5 [0.1,3.5]	3.2 [1.4,7.0]	56.0 [45.4,66.1]	5.4 [3.1,9.2]	28.6 [19.2,40.3]	1.8 [0.7,4.3]	16.0
Artibonite	22.1 [18.7,25.9]	2,090	2.0 [1.0,4.1]	0	9.6 [5.8,15.6]	68.3 [62.2,73.9]	5.0 [3.2,7.8]	13.1 [9.4,18.1]	1.8 [0.7,4.6]	15.5
Centre	27.8 [24.9,30.8]	918	5.5 [3.2,9.4]	0.7 [0.2,2.5]	7.8 [4.2,14.1]	57.4 [50.4,64.1]	4.4 [2.4,7.8]	22.4 [16.2,30.1]	1.9 [0.9,4.0]	14.6
Sud	19.2 [16.5,22.3]	951	6.1 [3.3,10.9]	0	7.3 [3.9,13.4]	48.1 [40.3,56.1]	5.3 [3.2,8.7]	31.7 [25.1,39.2]	1.4 [0.5,4.3]	14.7
Grand'Anse	23.3 [20.2,26.6]	532	3.7 [2.0,6.7]	0.6 [0.1,4.5]	2.7 [1.3,5.4]	66.0 [55.3,75.4]	5.4 [2.9,9.9]	19.2 [11.7,30.0]	2.4 [0.9,6.0]	16.2
Nord-Ouest	21.5 [17.9,25.6]	703	4.9 [2.9,8.2]	0.2 [0.0,1.8]	3.1 [1.5,6.5]	65.6 [56.5,73.6]	3.9 [2.0,7.4]	20.8 [14.7,28.7]	1.5 [0.5,4.1]	16.5
Nippes	27.9 [23.1,33.2]	427	3.1 [1.6,6.0]	0	9.9 [6.1,15.7]	61.3 [52.1,69.8]	6.8 [4.4,10.4]	17.8 [12.5,24.8]	1.0 [0.3,3.5]	14.5

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.

Appendix Table 3 Background characteristics of women, Haiti DHS 2016-17

	Urban		Rural	
	%	N	%	N
Number of family planning facilities with a mix of methods				
None	19.8	614	13.4	939
Low	38.5	1,192	48.2	3,371
Medium	21.4	663	11.8	824
High	20.3	629	26.5	1,854
Community-level outreach				
None	41.6	1,289	37.3	2,605
Low	21.2	656	21.2	1,483
Medium	19.7	611	21.7	1,513
High	17.5	543	19.8	1,387
Wealth quintile				
Lowest	0.7	20	28.9	2,022
Second	5.4	168	30.2	2,112
Middle	19.2	595	24.2	1,694
Fourth	43.3	1,342	11.4	799
Highest	31.4	973	5.2	361
Education				
None	6.8	209	20.1	1,403
Primary	24.1	748	38.1	2,664
Secondary +	69.1	2,141	41.8	2,920
Employment				
Not employed	47.1	1,459	43.3	3,023
Professional	45.2	1,402	45.0	3,143
Agricultural, other	7.7	238	11.8	822
Marital status				
Never married	45.7	1,415	35.5	2,479
Currently married	45.7	1,417	57.8	4,037
Formerly married	8.6	267	6.7	471
Age				
15-19	24.0	743	23.1	1,616
20-29	35.4	1,098	33.5	2,340
30-39	25.0	776	25.0	1,747
40-49	15.6	482	18.4	1,284
Exposure to family planning media				
No	73.1	2,265	79.5	5,554
Yes	26.9	834	20.5	1,434
Department				
Rest-Ouest	9.5	296	19.1	1,336
Sud-Est	4.0	124	9.1	633
Nord	23.0	712	12.1	847
Nord-Est	8.8	274	3.5	242
Artibonite	27.1	840	17.9	1,250
Centre	7.6	234	9.8	684
Sud	6.5	201	10.7	750
Grand'Anse	5.2	161	5.3	371
Nord-Ouest	6.3	195	7.3	508
Nippes	2.0	61	5.2	366
Total	**100.0**	**3,098**	**100.0**	**6,987**

Note: due to rounding, percentages may not add up to 100.

Appendix Table 4 **Unadjusted odds ratios, adjusted odds ratios, and 95% confidence intervals of using modern contraceptives, Haiti DHS 2016-17**

	Urban				Rural			
Variable	**UOR**	**95% CI**	**AOR**	**95% CI**	**UOR**	**95% CI**	**AOR**	**95% CI**
Number of family planning facilities with a mix of methods (ref=none)								
None	0.8	[0.5,1.1]	0.8	[0.6,1.1]	1.0	[0.7,1.3]	1.1	[0.8,1.6]
Medium	0.8	[0.5,1.3]	0.9	[0.7,1.2]	1.0	[0.8,1.2]	0.9	[0.7,1.2]
High	0.9	[0.7,1.2]	1.1	[0.8,1.5]	1.3*	[1.1,1.5]	1.2*	[1.0,1.5]
Community-level outreach (ref=none)								
Low	1.9***	[1.5,2.4]	1.9***	[1.4,2.4]	1.7***	[1.4,2.0]	1.5***	[1.2,1.9]
Medium	1.1	[0.8,1.5]	0.9	[0.7,1.2]	1.3*	[1.1,1.6]	1.2*	[1.0,1.5]
High	1.1	[0.8,1.4]	0.9	[0.6,1.2]	1.2	[1.0,1.5]	1.1	[0.9,1.4]
Wealth quintile (ref=lowest)								
Second	1.4	[0.4,4.4]	1.0	[0.3,3.0]	1.0	[0.8,1.2]	1.1	[0.9,1.3]
Middle	1.5	[0.5,4.4]	1.2	[0.4,3.2]	1.3*	[1.0,1.6]	1.4**	[1.2,1.8]
Fourth	1.2	[0.4,3.3]	0.9	[0.3,2.4]	1.1	[0.8,1.5]	1.2	[0.8,1.7]
Highest	0.7	[0.3,2.1]	0.6	[0.2,1.5]	1.2	[0.8,1.7]	1.3	[0.8,2.0]
Education (ref=none)								
Primary	1.0	[0.6,1.7]	1.0	[0.6,1.6]	1.0	[0.8,1.1]	1.1	[0.9,1.4]
Secondary +	0.8	[0.5,1.3]	0.9	[0.6,1.3]	0.7***	[0.6,0.8]	1.0	[0.8,1.3]
Employment (ref=not employed)								
Professional	1.8***	[1.4,2.2]	1.1	[1.0,1.4]	2.2***	[1.8,2.5]	1.1	[1.0,1.4]
Agricultural, other	1.2	[0.9,1.6]	0.8	[0.5,1.3]	1.9***	[1.5,2.3]	1.1	[0.9,1.4]
Marital status (ref=never married)								
Currently married	3.0***	[2.1,4.2]	2.6***	[1.9,3.6]	6.0***	[4.8,7.4]	4.6***	[3.6,5.8]
Formerly married	1.1	[0.6,1.8]	1.0	[0.7,1.5]	1.8**	[1.3,2.6]	1.5*	[1.0,2.2]
Age(ref=15-19)								
20-29	3.8***	[2.7,5.3]	2.6***	[1.8,3.7]	5.5***	[4.4,6.8]	2.4***	[1.8,3.1]
30-39	3.9***	[2.3,6.7]	1.9*	[1.1,3.3]	7.0***	[5.4,8.9]	2.1***	[1.6,2.9]
40-49	1.9**	[1.2,3.0]	0.9	[0.5,1.3]	3.9***	[2.9,5.3]	1.2	[0.8,1.7]
Exposure to family planning media (ref=no)								
Yes	1.2	[0.9,1.5]	1.1	[0.9,1.5]	1.2*	[1.0,1.4]	1.1	[0.9,1.3]
UN population density								
Medium	0.7**	[0.5,0.9]	0.9	[0.7,1.2]	1.1	[0.9,1.3]	0.9	[0.8,1.1]
High	0.3***	[0.3,0.4]	0.8	[0.6,1.1]	0.3***	[0.2,0.3]	1.1	[0.9,1.4]
Department (ref=Rest-Ouest)								
Sud-Est	1.6	[0.8,3.3]	0.9	[0.4,2.2]	1.0	[0.7,1.4]	1.3	[0.8,2.0]
Nord	1.3	[0.6,2.6]	1.0	[0.5,2.0]	1.5*	[1.1,2.1]	1.7**	[1.1,2.5]
Nord-Est	2.0*	[1.0,4.0]	1.4	[0.6,3.2]	1.4*	[1.0,2.1]	1.8*	[1.1,2.8]
Artibonite	1.1	[0.5,2.3]	0.9	[0.4,1.8]	1.4*	[1.1,1.9]	1.6*	[1.1,2.3]
Centre	1.5	[0.8,2.9]	1.3	[0.6,2.9]	1.9***	[1.4,2.6]	2.5***	[1.7,3.6]
Sud	1.3	[0.6,2.8]	1.1	[0.5,2.5]	1.0	[0.7,1.4]	1.4	[0.9,2.0]
Grand'Anse	1.4	[0.7,3.0]	1.0	[0.5,2.2]	1.5*	[1.1,2.1]	2.0**	[1.3,3.1]
Nord-Ouest	1.3	[0.6,2.7]	1.0	[0.5,2.0]	1.2	[0.9,1.8]	1.6*	[1.1,2.5]
Nippes	1.3	[0.6,3.1]	1.0	[0.4,2.4]	1.9***	[1.3,2.6]	2.1**	[1.4,3.3]

Note: adjusted odds ratios = AOR; confidence intervals = CI; unadjusted odds ratios = UOR.

Appendix Table 5 **Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Malawi DHS 2015-16**

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	45.2 [44.2,46.1]	24,562	18.4 [17.3,19.6]	1.8 [1.5,2.2]	19.8 [18.7,21.1]	49.8 [48.3,51.4]	3.9 [3.4,4.4]	5.7 [5.1,6.3]	0.6 [0.4,0.8]	12.9
Northern Region	42.9 [40.6,45.2]	2,838	17.1 [14.7,20.0]	3.3 [2.3,4.8]	25.8 [22.8,29.1]	40.4 [37.1,43.8]	5.0 [3.7,6.8]	7.8 [6.2,9.8]	0.4 [0.2,0.9]	11.6
Central Region	48.0 [46.4,49.6]	10,529	23.6 [21.5,25.8]	1.5 [1.0,2.2]	20.0 [18.1,21.9]	46.0 [43.3,48.8]	3.6 [2.8,4.5]	4.7 [3.9,5.8]	0.6 [0.4,1.0]	13.4
Southern Region	43.0 [41.8,44.3]	11,194	13.3 [12.1,14.7]	1.7 [1.3,2.1]	18.2 [16.5,20.0]	56.2 [54.1,58.3]	3.8 [3.2,4.6]	6.1 [5.3,7.1]	0.6 [0.4,0.9]	13.1

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.

Appendix Table 6 Background characteristics of women, Malawi DHS 2015-16

	Urban		Rural	
	%	N	%	N
Number of family planning facilities with a mix of methods				
None	0.3	11	15.8	3,174
Low	33.6	1,511	35.2	7,066
Medium	35.4	1,593	32.4	6,496
High	30.7	1,380	16.6	3,331
Community-level outreach				
None	12.0	542	20.4	4,094
Low	31.9	1,432	26.6	5,345
Medium	28.1	1,261	27.1	5,448
High	28.0	1,261	25.8	5,180
Wealth quintile				
Lowest	1.7	77	23.3	4,668
Second	1.7	77	23.0	4,615
Middle	4.1	185	22.2	4,449
Fourth	13.4	604	20.3	4,077
Highest	79.0	3,553	11.3	2,257
Education				
None	3.4	153	14.1	2,824
Primary	37.2	1,672	67.6	13,574
Secondary +	59.4	2,671	18.3	3,669
Employment				
Not employed	41.2	1,850	31.0	6,227
Professional	29.9	1,346	5.8	1,165
Agricultural, other	28.9	1,300	63.2	12,674
Marital status				
Never married	30.4	1,366	19.0	3,804
Currently married	58.1	2,612	67.4	13,518
Formerly married	11.5	518	13.7	2,744
Age				
15-19	20.4	918	21.7	4,345
20-29	41.0	1,844	36.2	7,268
30-39	26.9	1,209	26.8	5,382
40-49	11.7	524	15.3	3,071
Exposure to family planning media				
No	34.2	1,536	60.2	12,074
Yes	65.8	2,960	39.8	7,992
Population density				
Low	34.0	1,531	33.4	6,698
Medium	32.7	1,469	33.5	6,717
High	33.3	1,497	33.1	6,651
Region				
Northern	11.4	514	11.6	2,325
Central	44.8	2,016	42.4	8,514
Southern	43.7	1,967	46.0	9,227
Total	**100.0**	**4,496**	**100.0**	**20,066**

Note: due to rounding, percentages may not add up to 100.

Appendix Table 7 **Unadjusted odds ratios, adjusted odds ratios, and 95% confidence intervals of using modern contraceptives, Malawi DHS 2015-16**

	Urban				Rural			
Variable	**UOR**	**95% CI**	**AOR**	**95% CI**	**UOR**	**95% CI**	**AOR**	**95% CI**
Number of family planning facilities with a mix of methods (ref=low)								
None	1.3*	[1.0,1.6]	1.5***	[1.2,1.8]	1.0	[0.8,1.1]	1.0	[0.8,1.1]
Medium	1.2	[1.0,1.5]	1.3**	[1.1,1.5]	1.0	[0.9,1.2]	1.1	[1.0,1.2]
High	1.2*	[1.0,1.5]	1.3	[1.0,1.6]	1.2*	[1.0,1.4]	1.2*	[1.0,1.5]
Community-level outreach (ref=none)								
Low	1.1	[0.9,1.5]	1.2	[0.9,1.5]	1.3***	[1.1,1.5]	1.3**	[1.1,1.5]
Medium	0.9	[0.7,1.2]	1.1	[0.9,1.4]	1.2*	[1.0,1.4]	1.1	[1.0,1.3]
High	0.9	[0.6,1.2]	1.0	[0.8,1.3]	1.1	[0.9,1.3]	1.1	[0.9,1.3]
Wealth quintile (ref=lowest)								
Second	2.3*	[1.2,4.7]	1.6	[0.8,3.3]	1.3***	[1.1,1.4]	1.2**	[1.1,1.4]
Middle	1.3	[0.8,2.1]	1.2	[0.7,2.3]	1.2***	[1.1,1.3]	1.2**	[1.1,1.4]
Fourth	1.3	[0.8,2.2]	1.1	[0.6,2.1]	1.2**	[1.0,1.3]	1.2**	[1.1,1.4]
Highest	1.0	[0.6,1.6]	1.2	[0.6,2.1]	1.0	[0.9,1.2]	1.2*	[1.0,1.5]
Education (ref=none)								
Primary	0.8	[0.5,1.3]	0.9	[0.6,1.5]	0.9**	[0.8,0.9]	1.1	[1.0,1.2]
Secondary +	0.5**	[0.3,0.8]	0.6	[0.4,1.1]	0.6***	[0.6,0.7]	1.0	[0.8,1.1]
Employment (ref=not employed)								
Professional	2.1***	[1.7,2.6]	1.2	[0.9,1.5]	2.2***	[1.9,2.6]	1.4**	[1.1,1.6]
Agricultural, other	1.9***	[1.5,2.3]	1.0	[0.8,1.2]	2.0***	[1.8,2.2]	1.4***	[1.2,1.5]
Marital status (ref=never married)								
Currently married	14.0***	[10.3,19.0]	8.9***	[6.5,12.3]	16.0***	[13.6,18.9]	8.3***	[6.9,10.0]
Formerly married	6.0***	[3.8,9.3]	3.6***	[2.3,5.7]	6.4***	[5.3,7.8]	3.3***	[2.7,4.2]
Age (ref=15-19)								
20-29	5.7***	[4.5,7.2]	2.0***	[1.5,2.6]	6.5***	[5.8,7.4]	2.4***	[2.1,2.8]
30-39	11.4***	[8.5,15.3]	2.5***	[1.7,3.6]	8.6***	[7.6,9.8]	2.8***	[2.4,3.3]
40-49	7.3***	[5.2,10.3]	1.6*	[1.1,2.3]	5.5***	[4.8,6.3]	1.8***	[1.5,2.2]
Exposure to family planning media (ref=no)								
Yes	1.0	[0.9,1.2]	1.0	[0.8,1.2]	1.3***	[1.2,1.4]	1.1	[1.0,1.2]
UN population density								
Medium	1.0	[0.8,1.2]	0.9	[0.8,1.1]	1.0	[0.9,1.1]	0.9	[0.8,1.0]
High	1.0	[0.8,1.2]	0.9	[0.7,1.1]	1.0	[0.9,1.1]	1.3**	[1.1,1.5]
Region (ref=Northern)								
Central	1.5**	[1.1,1.9]	1.5***	[1.2,1.8]	1.2**	[1.0,1.3]	1.3**	[1.1,1.4]
Southern	1.3*	[1.0,1.7]	1.3*	[1.1,1.6]	1.0	[0.9,1.1]	0.9	[0.8,1.1]

Note: adjusted odds ratios = AOR; confidence intervals = CI; unadjusted odds ratios = UOR.

Appendix Table 8 **Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Nepal DHS 2016**

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	33.2 [31.9,34.5]	12,862	34.9 [32.3,37.6]	3.3 [2.6,4.1]	7.7 [6.5,9.0]	20.7 [18.9,22.5]	10.7 [9.5,12.0]	9.8 [8.7,11.1]	12.9 [11.2,14.9]	7.7
Province 1	30.9 [27.8,34.2]	2,173	27.3 [19.0,37.5]	2.3 [1.2,4.6]	7.1 [4.4,11.4]	32.3 [25.6,39.8]	18.6 [14.7,23.3]	6.5 [4.5,9.3]	5.9 [3.8,9.1]	10.1
Province 2	35.9 [32.9,39.0]	2,563	75.7 [71.0,79.8]	1.4 [0.6,3.2]	3.3 [2.0,5.6]	11.1 [8.5,14.5]	4.8 [3.2,7.0]	2.6 [1.6,4.1]	1.1 [0.5,2.3]	17.6
Province 3	35.0 [32.4,37.7]	2,732	13.3 [9.1,19.1]	4.6 [2.7,7.8]	9.9 [7.3,13.3]	22.9 [19.3,27.1]	10.8 [8.0,14.4]	12.3 [9.2,16.3]	26.1 [21.0,31.9]	5.9
Province 4	28.7 [25.7,31.9]	1,249	25.7 [20.0,32.5]	5.8 [3.6,9.3]	5.6 [3.7,8.4]	20.2 [16.0,25.1]	11.6 [8.4,15.7]	8.3 [5.7,11.9]	22.8 [16.7,30.4]	7.4
Province 5	30.3 [26.8,34.0]	2,274	33.1 [28.1,38.5]	4.3 [2.8,6.6]	10.9 [7.4,15.7]	18.1 [14.6,22.3]	10.2 [7.7,13.3]	16.2 [13.1,20.0]	7.2 [4.8,10.6]	7.0
Province 6	36.3 [33.5,39.2]	724	9.3 [6.4,13.2]	2.8 [1.7,4.6]	9.4 [6.0,14.4]	28.7 [21.9,36.6]	11.3 [7.2,17.1]	8.0 [4.9,12.8]	30.6 [24.3,37.6]	8.8
Province 7	35.9 [32.0,40.1]	1,145	34.0 [28.1,40.5]	2.5 [1.3,4.6]	8.6 [5.6,13.0]	17.2 [13.8,21.3]	10.3 [7.3,14.4]	17.4 [13.7,21.9]	9.9 [6.1,15.6]	7.4

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.

Appendix Table 9 **Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Senegal DHS 2017**

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	18.9 [17.8,20.0]	16,787	1.3 [0.8,2.1]	7.9 [6.6,9.4]	31.2 [29.2,33.2]	37.6 [35.2,40.1]	15.6 [14.2,17.2]	5.7 [4.3,7.5]	0.7 [0.4,1.2]	11.9
Dakar	24.6 [21.9,27.6]	4,640	1.6 [0.6,4.1]	12.2 [9.2,16.0]	23.2 [19.7,27.1]	31.8 [27.2,36.8]	19.2 [16.2,22.5]	11.1 [7.4,16.3]	0.9 [0.3,2.3]	9.0
Ziguinchor	21.1 [18.1,24.5]	607	2.0 [0.7,5.5]	3.6 [1.7,7.6]	49.0 [40.1,57.9]	26.4 [18.5,36.2]	5.8 [3.9,8.5]	12.1 [7.6,18.7]	1.1 [0.3,4.8]	13.4
Diourbel	11.9 [9.9,14.3]	1,864	0	4.1 [2.1,7.8]	30.0 [22.2,39.0]	47.9 [38.4,57.6]	16.8 [12.6,22.1]	1.0 [0.2,4.5]	0.2 [0.0,1.8]	14.8
Saint-Louis	17.2 [14.3,20.5]	1,082	1.4 [0.4,4.7]	5.6 [3.1,9.8]	25.5 [19.7,32.3]	38.6 [31.2,46.6]	26.4 [20.1,33.7]	2.0 [0.8,5.2]	0.6 [0.1,4.5]	13.6
Tambacounda	11.0 [8.1,14.7]	836	1.4 [0.3,5.7]	5.9 [2.6,12.7]	44.7 [31.6,58.6]	39.1 [28.1,51.3]	8.9 [4.9,15.6]	0	0	15.8
Kaolack	15.9 [13.2,19.2]	1,094	1.2 [0.3,4.9]	7.8 [5.0,12.0]	39.4 [31.8,47.5]	39.1 [32.7,46.0]	10.0 [5.9,16.6]	2.5 [0.9,6.4]	0	14.3
Thies	22.8 [19.4,26.5]	2,198	1.3 [0.5,3.6]	6.7 [4.6,9.7]	30.4 [24.6,36.9]	41.3 [34.0,49.0]	15.3 [12.3,18.9]	3.5 [1.5,8.1]	1.4 [0.5,3.8]	12.6
Louga	14.5 [12.0,17.6]	1,055	2.6 [1.1,6.1]	4.3 [2.0,9.0]	30.1 [23.3,37.8]	40.8 [34.8,47.2]	22.2 [17.1,28.3]	0	00.0 [..0,..0]	14.4
Fatick	19.5 [16.6,22.6]	806	1.2 [0.4,3.6]	3.4 [1.6,7.4]	28.1 [22.2,34.7]	50.1 [43.1,57.0]	15.6 [10.0,23.5]	0.8 [0.2,3.0]	0.9 [0.2,4.0]	14.5
Kolda	18.9 [16.0,22.3]	729	0.6 [0.1,4.0]	1.1 [0.3,4.1]	53.0 [47.5,58.5]	39.9 [34.2,46.0]	3.2 [1.3,8.0]	1.8 [0.5,6.9]	0.3 [0.0,2.6]	18.4
Matam	7.8 [6.1,9.9]	606	1.2 [0.2,8.2]	2.9 [0.8,10.1]	26.0 [18.4,35.5]	58.6 [46.6,69.7]	11.3 [6.5,19.0]	0	0	16.0
Kaffrine	19.0 [15.4,23.3]	651	0.3 [0.0,2.2]	11.7 [6.1,21.3]	41.8 [32.2,52.0]	41.8 [33.6,50.4]	3.9 [1.9,7.9]	0	0.6 [0.1,3.9]	15.7
Kédougou	10.7 [6.8,16.4]	158	0	2.1 [0.6,7.1]	41.9 [27.9,57.4]	46.4 [33.8,59.5]	9.6 [3.9,21.5]	0	0	17.1
Sédhiou	18.4 [15.0,22.3]	460	0	4.3 [2.0,8.9]	58.3 [50.9,65.3]	26.0 [18.8,34.7]	4.8 [2.3,9.6]	6.1 [3.2,11.3]	0.6 [0.1,4.5]	15.9

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.

Appendix Table 10 Percentage and 95% confidence interval of overall modern contraceptive use, method distribution, and average deviation among modern users, Tanzania DHS 2015-16

			Among women age 15-49 using a modern contraceptive method							
	mCP	N	Female sterilization	IUD	Implants	Injectables	Pill	Male condom	Other modern method	AD
Total	27.1 [25.7,28.6]	13,266	9.4 [8.0,10.9]	2.5 [1.9,3.3]	20.5 [18.6,22.5]	36.6 [34.4,38.8]	15.2 [13.6,17.0]	14.4 [12.6,16.3]	1.5 [1.0,2.1]	8.4
Dodoma	35.6 [27.9,44.2]	572	3.8 [1.6,8.6]	0	26.2 [16.0,39.6]	37.8 [28.7,47.8]	23.6 [14.5,36.0]	5.5 [2.5,11.8]	3.1 [1.1,8.9]	12.8
Arusha	26.2 [19.1,34.8]	508	7.1 [3.4,14.5]	6.9 [2.7,16.8]	22.9 [13.8,35.6]	31.1 [21.0,43.4]	19.2 [11.3,30.8]	12.7 [6.2,24.3]	0	8.7
Kilimanjaro	33.8 [28.9,38.9]	361	9.9 [5.4,17.4]	2.1 [0.6,6.7]	20.5 [13.9,29.1]	39.7 [30.0,50.3]	17.1 [9.6,28.4]	10.1 [5.9,16.8]	0.6 [0.1,4.9]	9.8
Tanga	21.4 [15.8,28.4]	706	4.8 [1.1,18.5]	2.0 [0.5,8.3]	17.4 [10.8,27.0]	40.7 [31.4,50.8]	26.4 [17.7,37.5]	8.6 [4.2,16.6]	0	11.9
Morogoro	40.4 [33.8,47.5]	636	5.2 [2.2,11.9]	2.6 [0.6,11.7]	24.9 [16.7,35.4]	37.5 [27.8,48.2]	16.2 [9.7,25.8]	13.0 [7.3,22.1]	0.6 [0.1,4.7]	10.2
Pwani	33.5 [27.5,40.1]	285	3.5 [1.0,11.2]	3.8 [1.5,9.4]	14.7 [9.1,22.9]	48.5 [37.9,59.3]	20.2 [13.9,28.4]	8.0 [4.2,14.7]	1.2 [0.2,8.5]	11.6
Dar es Salaam	28.7 [25.8,31.8]	1,536	6.5 [3.6,11.4]	1.9 [0.7,4.9]	11.2 [7.8,15.9]	26.2 [21.1,31.9]	15.7 [12.0,20.4]	36.6 [30.8,43.0]	1.8 [0.7,4.4]	10.2
Lindi	48.0 [41.4,54.7]	288	2.3 [0.8,6.3]	1.2 [0.3,5.0]	24.3 [17.0,33.5]	48.0 [38.3,57.9]	20.0 [13.1,29.3]	4.2 [2.2,7.9]	0	14.1
Mtwara	47.1 [40.4,53.8]	412	8.8 [4.2,17.8]	0	11.4 [6.6,18.9]	38.7 [29.7,48.5]	33.2 [25.0,42.5]	7.4 [3.1,16.4]	0.6 [0.1,4.5]	12.4
Ruvuma	46.0 [39.9,52.3]	360	9.8 [5.5,17.0]	1.1 [0.2,4.4]	26.9 [18.5,37.4]	36.7 [26.8,47.8]	13.0 [8.0,20.4]	12.5 [7.9,19.2]	0	10.0
Iringa	26.9 [21.4,33.2]	245	10.0 [4.2,21.9]	7.9 [2.8,20.5]	19.7 [10.9,33.0]	25.5 [18.2,34.5]	12.4 [7.5,19.9]	23.5 [16.9,31.6]	0.9 [0.1,7.0]	7.4
Mbeya	37.2 [29.7,45.5]	828	7.5 [2.4,21.1]	4.0 [1.8,8.9]	27.0 [17.7,39.0]	28.8 [21.4,37.5]	8.1 [4.7,13.5]	24.6 [17.4,33.5]	0	10.7
Singida	31.6 [23.5,40.9]	370	12.5 [5.8,24.8]	1.3 [0.3,5.7]	27.2 [17.6,39.5]	26.9 [18.4,37.5]	18.9 [13.9,25.1]	6.4 [2.9,13.7]	6.8 [3.9,11.8]	8.6
Tabora	20.2 [14.8,26.8]	737	15.7 [9.9,24.0]	1.5 [0.3,6.9]	22.9 [14.9,33.4]	35.3 [26.2,45.7]	12.7 [6.8,22.5]	11.9 [7.2,18.9]	0	8.9
Rukwa	26.7 [22.8,31.0]	288	7.6 [2.3,21.9]	1.7 [0.4,7.1]	19.8 [11.4,31.9]	55.2 [43.3,66.5]	8.9 [5.1,15.1]	5.8 [2.2,14.3]	1.1 [0.1,8.1]	13.3
Kigoma	13.8 [9.6,19.5]	542	13.9 [4.8,33.7]	0.8 [0.1,6.4]	11.3 [5.0,23.7]	53.2 [36.8,69.0]	9.5 [3.9,21.3]	11.4 [4.5,26.1]	0	11.1
Shinyanga	20.1 [15.6,25.5]	504	18.0 [10.6,29.0]	1.0 [0.1,7.4]	21.1 [14.6,29.5]	35.2 [25.9,45.9]	9.2 [3.9,19.9]	12.5 [7.1,21.2]	3.0 [0.9,8.9]	9.0
Kagera	30.8 [22.8,40.2]	612	21.2 [12.7,33.3]	7.6 [3.5,15.6]	14.2 [8.8,22.3]	34.6 [22.2,49.5]	13.4 [6.0,27.2]	5.2 [2.0,13.0]	3.8 [0.8,15.8]	7.8
Mwanza	16.1 [12.2,20.8]	859	15.6 [9.7,24.1]	1.1 [0.1,8.1]	28.7 [17.5,43.2]	44.3 [32.1,57.2]	5.5 [1.3,20.6]	4.9 [1.2,17.3]	0	13.1
Mara	26.0 [22.4,29.9]	523	8.4 [5.2,13.1]	2.5 [0.7,8.4]	14.4 [8.5,23.3]	44.9 [33.2,57.2]	4.5 [1.8,11.0]	21.8 [14.7,31.1]	3.6 [1.1,10.8]	10.9
Manyara	22.5 [17.4,28.7]	394	9.5 [4.9,17.7]	1.9 [0.4,7.8]	25.4 [15.6,38.6]	45.1 [32.0,58.8]	6.0 [2.0,16.4]	9.6 [4.2,20.4]	2.5 [0.5,10.5]	12.0
Njombe	34.2 [28.9,39.9]	203	11.3 [6.2,19.6]	6.5 [2.7,15.2]	15.6 [9.7,24.1]	40.6 [29.2,53.1]	14.4 [8.1,24.3]	10.9 [4.8,22.5]	0.8 [0.1,5.9]	7.9
Katavi	17.5 [11.3,26.1]	130	4.9 [1.6,14.2]	1.5 [0.2,10.2]	34.3 [25.4,44.4]	36.3 [25.8,48.3]	15.5 [8.7,26.0]	7.5 [3.1,17.1]	0	12.4
Simiyu	15.4 [12.7,18.4]	479	20.5 [13.5,30.0]	1.9 [0.4,8.1]	21.6 [14.9,30.2]	32.3 [20.9,46.2]	9.7 [3.3,25.2]	9.6 [5.1,17.2]	4.4 [1.2,15.0]	9.0
Geita	10.6 [7.2,15.2]	485	17.3 [8.1,32.9]	3.3 [0.9,11.6]	29.4 [18.6,43.2]	31.5 [20.5,45.1]	4.0 [1.1,13.4]	9.4 [4.4,19.2]	5.0 [1.2,19.2]	10.1
Zanzibar	8.9 [7.6,10.5]	404	8.2 [4.6,14.2]	1.0 [0.1,6.8]	25.1 [19.4,31.8]	43.4 [36.0,51.1]	17.2 [10.6,26.7]	4.5 [2.3,8.6]	0.6 [0.1,4.6]	12.2

Note: mCP = modern contraceptive prevalence; IUD = intrauterine device; AD = average deviation.