REPORT

Validation of Two Quality of Care Measures: Results from a Longitudinal Study of Reversible Contraceptive Users in India

Aparna Jain, Kumudha Aruldas, Arupendra Mozumdar, Elizabeth Tobey, and Rajib Acharya

Bruce's quality of care framework, developed nearly three decades ago, brought needed international attention to family planning services. Various data collection efforts exist to measure the quality of contraceptive services. Our study validates two process quality measures and tests their predictive validity related to contraceptive continuation among 2,699 married women who started to use a reversible contraceptive method in India. We assessed four process quality domains with 22 items, which were reduced to 10 items using exploratory factor analysis. Weighted additive indices were calculated for the 22- and 10-item measures. Scores were trichotomized into high, medium, and low process quality received. The predictive validity of the two measures was assessed related to modern contraceptive continuation three months later. The adjusted odds of continuing a modern contraceptive three months later was nearly three times greater (AOR: 2.78; 95% CI: 1.83–4.03) for women who received high process quality at enrollment compared with low quality with the 22-item measure, and 2.2 times greater (95% CI: 1.46–3.26) with the 10-item measure. Results suggest that the 22- and 10-item measures are valid, and while the larger 22-item measure can be used in special studies, the 10-item measure is more suited for routine data collection and monitoring.

In 1990, Bruce articulated a framework to assess quality of care in family planning (FP) services (Bruce 1990). Since then, there have been many efforts to measure quality (Tumlinson 2016) and assess its effect on contraceptive uptake (Koenig, Hossain, and Whittaker 1997), contraceptive continuation (RamaRao et al. 2003; RamaRao and Mohanam,

Aparna Jain is Associate II and Deputy Technical Director of the Evidence Project, and Elizabeth Tobey is Research Specialist, Population Council, 4301 Connecticut Avenue NW, Suite 208,Washington, DC 20008. Email: apjain@popcouncil.org. Kumudha Aruldas is Implementation Science Coordinator, Christian Medical College, India. She was Associate I at the Population Council's India office when this study was undertaken. Arupendra Mozumdar is Senior Program Officer I and Rajib Acharya is Associate II, Population Council, New Delhi, India.

2003; Abdel-Tawab and RamaRao 2010), and other reproductive health outcomes, such as unintended and unwanted fertility (Jain et al. 2012) and fertility reduction (Jain 1989). Researchers have measured quality of FP programs using various indicators collected in facility audits, provider interviews, provider-client observations, client exit interviews, and cross-sectional surveys. Examples include the Situation Analysis (Miller et al. 1997), the Quick Investigation of Quality (MEASURE Evaluation 2016), and the Service Provision Assessment implemented by the Demographic and Health Survey (DHS) program. It has been nearly 30 years since the Bruce quality of care framework was published and no psychometric analysis has been applied to reduce the number of items measuring quality of care that could be replicated across countries or over time.

A variety of indicators have been used to assess quality of care, and different approaches have been used to combine the items into additive indices. Mensch, Arends-Kuenning, and Jain (1996) used 150 items to create an eight-domain index simplified into a three-category composite score in Peru. In Senegal, Sanogo and colleagues (2003) categorized 19 items in five domains—method choice, assessment of client needs, information client received, interpersonal relations, and continuity of services—and combined them into one index. In the Philippines, Costello and colleagues (2001) categorized 24 items into five domains—assessment of client needs, method choice, information client received, client treated well, and client felt she was connected to services. Using the same 24 items, RamaRao and colleagues (2003) created one composite score categorized as low, medium, and high quality. In Pakistan, Sathar and colleagues (2005) examined 32 items and grouped them into four domains of providers' salutation, assessment, help, and reassurance (SAHR). Despite this extensive body of research, there has been little agreement about how to combine the items to form overall indices to measure quality of care or in which contexts these items and indices should be used.

A small body of research, largely from the 1990s and early 2000s, looked at the effect of quality of care on contraceptive continuation or discontinuation with varying results. One of the earliest longitudinal studies that was conducted in Bangladesh found that clients who received medium and high quality of care were 22 percent and 72 percent, respectively, more likely to continue using any contraceptive method compared with women who received low quality of care (Koenig, Hossain, and Whittaker 1997). Another longitudinal study in Senegal found that clients who received higher quality of care were more likely to continue using any method of contraception approximately 16 months later (Sanogo et al. 2003). Two studies in the Philippines found that women who scored higher on a quality of care index were more likely to use a modern contraceptive method 16 months later (RamaRao et al. 2003) and 3 years later (Jain et al. 2012).

Other studies have shown no effect of quality of care on contraceptive continuation. In Nicaragua, an evaluation of an intervention consisting of a provider decision-making tool for FP counseling found that clients in the intervention group reported more positive counseling, but the intervention did not affect continuation rates (Chin-Quee, Janowitz, and Otterness 2007). In a longitudinal study in Honduras, service quality was not shown to influence contraceptive discontinuation 12 months after method initiation (Barden-O'Fallon et al. 2011).

Recognizing the need to facilitate measurement of common items and consistent definitions, Jain and Hardee proposed a modification to the Bruce framework (Jain 2017; Jain and Hardee 2018). The adapted framework more clearly maps the elements of quality into three

categories: structure, process, and outcome, categories first proposed by Donabedian (1988). Employing this adapted framework, Jain, Townsend, and RamaRao (2018) proposed metrics to measure quality that fall into these three categories: 1) service delivery point readiness (quality of services); 2) process quality (quality of care); and 3) client-level outcomes.

The purpose of this study is to validate process quality measures and test their predictive validity related to contraceptive continuation among married women who started to use a reversible contraceptive method (oral contraceptive pills, injectables, interval IUD/postpartum IUD) in Haryana and Odisha, India. This study reflects the current state of FP counseling in the selected areas. No intervention or provider trainings were conducted to improve counseling.

STUDY AREAS

With a population estimated at 1.37 billion in 2019 (UN 2017), India is the second most populous country in the world. The total fertility rate (TFR) is 2.2 children per woman, and slightly more than one in two (54 percent) married women use any type of contraceptive method to space or limit childbearing (IIPS and ICF 2017a). Contraceptive use of any method in both Haryana (64 percent) and Odisha (57 percent) is greater than the all-India proportion (IIPS and ICF 2017a).

Odisha, located on the eastern coast of India, had a population of 36.8 million in 2011 (Government of India 2011). Most people in Odisha live in rural areas (83 percent) and are Hindus (94 percent) followed by Christian (3 percent) and Muslim (2 percent) (Government of India 2011). Sixty-seven percent of women between the ages of 15 and 49 years are literate compared with 84 percent of males of the same age (IIPS and ICF 2017b). The total fertility rate (TFR) has declined from 2.9 children per woman in 1992–93 to replacement level of 2.1 children in 2015–16 (IIPS and ICF 2017b). Among married women between 15 and 49 years old, 45 percent used a modern contraceptive method in 2015–16, up from 35 percent in 1992–93 (IIPS and ICF 2017b). While the most commonly used reversible contraceptive method was the pill at 12 percent followed by the condom at 3 percent, unmet need was at 14 percent (IIPS and ICF 2017b). Nearly half (48 percent) of modern spacing method episodes of use in Odisha were discontinued within 12 months (IIPS and ICF 2017b).

Haryana, located in Northern India, has a smaller population than Odisha at 21.1 million in 2011 (Government of India 2011). One in three (35 percent) residents live in urban areas, and most are Hindus (87 percent) followed by Muslim (7 percent) and Sikh (5 percent) (Government of India 2011). More women and men are literate in Haryana compared with Odisha (75 percent of women 15–49 and 91 percent of men 15–49 are literate in Haryana) (IIPS and ICF 2017c). A faster decline in TFR was observed in Haryana for the same time period (4.0 children per woman in 1992–93 to 2.1 in 2015–16) (IIPS and ICF 2017c). Modern contraceptive use was at 59 percent among married women in 2015, up from 44 percent in 1993, with condoms (12 percent) being the most popular reversible contraceptive method followed by the IUD/PPIUD (6 percent) (IIPS and ICF 2017c). Unmet need was 9 percent while 12-month discontinuation rates among users of modern reversible methods was 41 percent (IIPS and ICF 2017c).

METHODS

Data

We conducted a longitudinal study of married women aged 15–49 who began a new episode of use of the IUD (interval and postpartum), injectables, or oral contraceptives pills (OCPs) in two states of India: Haryana and Odisha. A new episode of use is defined as a new user to FP or a past FP user who was not using a method right before the method that was selected at enrollment. In this study, postpartum IUD (PPIUD) is an insertion that occurs within 48 hours after delivery, whereas interval IUD refers to insertion at all other times and, for women who recently delivered, at least four weeks postpartum. These FP users began a new episode of use between December 2016 and October 2017 and were interviewed within one month of the start of this new episode of use (enrollment questionnaire) and at 3, 6, and 12 months following the first interview. They had to be married and between the ages of 15 and 49 years. Women were enrolled at government and private facilities as well as through accredited social health activists (ASHAs), who are frontline health workers at the community level. A total of 2,699 women were enrolled into the study and 2,306 were successfully reinterviewed three months later. This amounts to a loss-to-follow-up of approximately 14.6 percent. The current study uses data from enrollment and three-month follow-up interviews.

The enrollment questionnaire asked respondents for information that ranged from demographic data, fertility intentions, previous contraceptive use and birth history, counseling received at the time of method initiation, satisfaction with this visit, contact with frontline health workers, knowledge of contraceptive methods, and reproductive autonomy, to household decision-making, empowerment, attitudes toward domestic violence, and couple's communication about sex. Information sought in the three-month follow-up interviews included changes in family structure and employment, fertility intentions, changes in contraceptive use since enrollment, experiences and management of side effects, experiences obtaining pills and injectable doses, couple's communication about sex, and attitudes toward domestic violence. For those who discontinued, additional questions were asked about reasons for discontinuation, who respondents spoke to about the desire to discontinue, and counseling received if the respondent started a new method.

We obtained written consent from all respondents in the enrollment questionnaire and at each follow-up interview. The study received ethical approval from the Population Council Institutional Review Board, the Odisha state-level ethical committee, and district authorities in the districts in Haryana where the study took place.

Variables

Dependent Variable

Contraceptive continuation is defined as modern contraceptive use at the three-month follow-up interview. This includes both users of the same method adopted at enrollment and switchers who reported using a modern method at three months that was not the method initiated at enrollment. All nonusers at three months and traditional method users at the three-month interview are considered contraceptive discontinuers. A dichotomous variable

was constructed where 1 is coded as modern contraceptive continuers and 0 is contraceptive discontinuers.

Independent Variables

Process Quality Measure. Process quality captures the information exchange and interpersonal relations between a provider and a client. It measures the standard of care received and reported by clients. To address the lack of consistency and validity in measures of process quality, Jain, Townsend, and RamaRao (2018) proposed four domains to measure process quality in the modified framework: 1) respectful care, 2) method selection, 3) effective use of method selected, and 4) continuity of contraceptive use and care. Respectful care captures interpersonal relations between the provider and the client and includes treating clients with dignity and respect and ensuring audiovisual privacy and confidentiality. Method selection, effective use, and continuity of contraceptive use and care reflect the information exchange between the provider and the client. Method selection involves solicitation of information from the client about her reproductive intentions, family circumstances, previous contraceptive use and preferred method, and provision of information by the provider on various FP methods to meet the clients' needs. Effective use of the method involves information given by the provider to the client about how to use the method, the potential side effects, how to manage side effects if they occur, and warning signs of the method (severe adverse effects). Continuity of contraceptive use and care includes information given to clients about when to return for follow-up, other sources of FP supply, and the possibility of switching to another method if the current one becomes unsuitable.

We assessed the four domains with 22 questions (Appendix Table A1). These 22 items were selected based on earlier studies that had shown positive relationships between quality and contraceptive continuation (Costello et al. 2001; RamaRao et al. 2003; Sanogo et al. 2003). We used exploratory factor analysis (EFA) to examine the number of dimensions present in these 22 items and to identify items that could be omitted without substantial loss of information. The items were allowed to load across multiple domains. A scree plot of the eigenvalues against the factor number was obtained to determine the number of factors that account for the most variance. Oblique rotation was then applied assuming that the factors were correlated using the *promax* command in Stata (StataCorp 2013). Items were considered for removal if their factor loading was less than 0.55 (Matsunaga 2010). The reliability of the items was tested using Cronbach's alpha with a cutoff of 0.60 (Loewenthal 2001). The EFA reduced the 22 items to 10.

The 22 items and 10 items were combined into weighted additive indices where each domain had equal weight (Sanogo et al. 2003; Mallick, Wang, and Temsah 2017). This was done by adding all the items belonging to a domain, and then dividing this sum by the total number of items in that domain to create an average score for the domain. This calculation was carried out for each domain separately. Then, all domain averages were multiplied by 100 and divided by the total number of domains that comprise process quality. This yielded a quality score ranging from 0–100.

The quality score was then categorized into low, medium, and high levels of process quality. Categorization of the score was used instead of a continuous score because the continuous score implies that a one-unit increase in process quality is meaningful. The upper and lower

cutoffs were calculated as follows: low quality ranged from 0 to mean score minus half the standard deviation, while high quality ranged from the mean score plus half of the standard deviation to 100 (RamaRao et al. 2003; Jain et al. 2012).

Additional Independent Variables

Several covariates were included in the multivariate models including age, residence, education, religion, wealth tertile, number of living children, method selection at enrollment, previous modern method use, and state.

Analysis

Descriptive statistics were calculated for respondent characteristics, and dependent and independent variables. Bivariate analyses of contraceptive continuation were conducted using Pearson chi-square tests for proportions. We used analytical approaches applicable to longitudinal data and specifically applied multiple logistic regressions with random effects to model contraceptive continuation at the three-month follow-up interview adjusting for multiple respondent-level characteristics collected at enrollment. All statistical analyses were conducted in Stata Version 13 (StataCorp 2013).

RESULTS

Respondent Characteristics

All women enrolled in the study were married, and most were under the age of 30 (74 percent), had attended at least primary school (78 percent), lived in rural areas (82 percent), and were Hindu (84 percent) (see Table 1). An equal proportion of women fell into each of the wealth tertile categories. Nearly all women had at least one child (98 percent) and a quarter (25 percent) had three or more children. Thirty-eight percent had used a modern method previously. In our sample, at the time of enrollment, 40 percent were users of OCPs, 39 percent were IUD users (15 percent PPIUD and 24 percent interval IUD), and 22 percent were injectables users.

Process Quality Received

Figure 1 shows respondents' answers to the 22 process quality items. The 22 items are categorized into four key domains of respectful care, information exchange between the provider and the client for appropriate method selection, information given on the effective use of the method selected, and continuity of contraceptive use and care. Compared with the other three domains, the majority of women reported receiving respectful care across all six items. Proportions in the respectful care domain ranged from a high of 99 percent for being treated well by the provider to a low of 74 percent for visual privacy.

Fewer women reported that the provider obtained information from them for appropriate method selection. More than two-thirds of women reported that they were asked about their preferred FP method (75 percent), desire for another child (69 percent), told about other FP methods (66 percent), or asked about preferred timing of their next child (65 percent). Only 37 percent received information about methods that protect against HIV/AIDS and

TABLE 1 Respondent characteristics at enrollment survey (n = 2,699)

	%	n
Age		
Less than 24	39.5	1,066
25–29	34.6	935
30 and above	25.9	698
Education		
None	22.4	605
Primary	12.4	335
Middle	14.3	386
Secondary	29.6	798
Higher secondary	21.3	575
Residence		
Urban	18.0	487
Rural	82.0	2,212
Religion		
Hindu	84.2	2,272
Muslim	15.5	418
Other	0.3	9
Wealth tertile		
Lowest	33.3	900
Middle	33.3	900
Highest	33.3	899
Number of living children		
None	2.0	55
One	41.1	1,108
Two	32.4	874
Three or more	24.5	662
Previous modern method use		
No	61.6	1,662
Yes	38.4	1,037
Method selected at enrollment		
OCPs	39.5	1,066
PPIUD	15.3	412
Interval IUD	23.7	640
Injectables	21.5	581
State		
Haryana	33.6	908
Odisha	66.4	1,791

sexually transmitted infections (STIs), and 32 percent received information without any one method being promoted.

In terms of receiving information about the effective use of the method selected, most women were told how to use the method (86 percent) and how the chosen method works (79 percent), but less than half were told about side effects (47 percent), how to manage them (42 percent), or warning signs of the method (severe adverse effects) (37 percent).

About two in three (67 percent) women were told about the timing of their next visit (when to come back), whereas 61 percent and 57 percent were told about the possibility of switching to another method if the selected method was unsuitable or about other sources of FP supply, respectively. Just over a third of all women (37 percent) were given appointment cards for a follow-up visit.

Exploratory Factor Analysis

Table 2 shows the factor loadings from the EFA. The scree plot (not shown) suggested that three factors accounted for 87.3 percent of the total variance. The 22 process quality items reduced to 10 items across three factors: 1) 3 items from the effective use of method selected domain plus 1 item from the continuity of contraceptive use and care domain; 2) 4 items

FIGURE 1 Proportion of respondents who reported receiving information on four domains of process quality (n = 2,699)

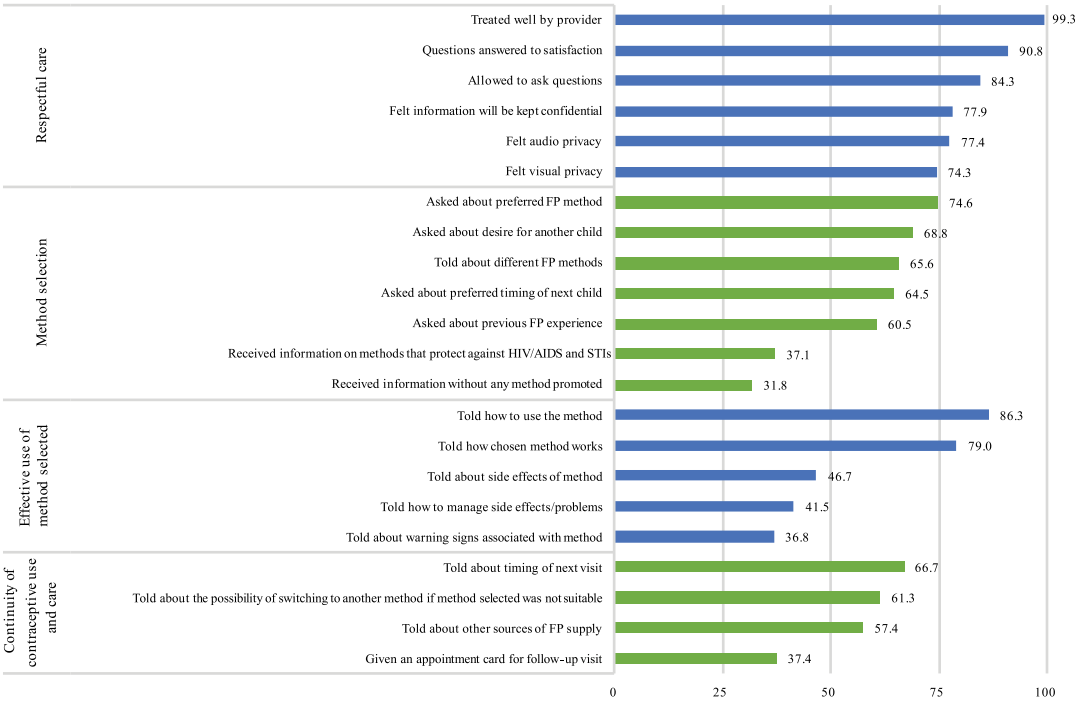

TABLE 2 Factor loadings of exploratory factor analysis results

		Exploratory Factor Analysis		
Quality domains	**Items**	**Factor A**	**Factor B**	**Factor C**
Respectful care	Treated well by provider			
	Questions answered to satisfaction			
	Allowed to ask questions			
	Felt information will be kept confidential			
	Felt audio privacy			0.8719
	Felt visual privacy			0.8579
Method selection	Asked about desire for another child		0.7611	
	Asked about preferred timing of next child		0.7566	
	Asked about preferred FP method		0.6904	
	Asked about previous FP experience		0.7034	
	Told about different FP methods			
	Received information without any method promoted			
	Received information on methods that protect against HIV/AIDS and STIs			
Effective use of method selected	Told how to use the method			
	Told how chosen method works			
	Told about side effects of method	0.8701		
	Told how to manage side effects/problems	0.9176		
	Told about warning signs associated with method	0.7370		
Continuity of contraceptive use and care	Told about timing of next visit			
	Told about the possibility of switching to another method if method selected was not suitable	0.5632		
	Told about other sources of FP supply			
	Given appointment card for follow-up visit			

NOTE: Factor loadings of less than 0.5500 are not shown.

TABLE 3 Correlation of three factors

	Factor A Effective use of method selected and continuity of contraceptive use and care	Factor B Method selection	Factor C Respectful care
Factor A: Effective use of method selected and continuity of contraceptive use and care	1.000		
Factor B: Method selection	0.4552	1.000	
Factor C: Respectful care	0.1261	0.1024	1.000

TABLE 4 Summary table of 22-item and 10-item process quality composite measures

Quality Composite Measures	Percentage distribution (n = 2,699)	Percent using a modern method 3 months later (n = 2,306)	Adjusted odds ratio of modern method continuation 3 months later (n = 2,306)[a]	
			AOR	95% CI
22-item measure (Cronbach's alpha = 0.84)				
Low	33.3	82.3***	(r)	
Medium	32.5	89.0	1.69***	(1.24–2.30)
High	34.2	93.7	2.71***	(1.83–4.03)
Total	100.0	—	—	—
10-item measure (Cronbach's alpha = 0.83)				
Low	29.3	83.4***	(r)	
Medium	38.5	87.7	1.49**	(1.09–2.03)
High	32.2	93.0	2.18***	(1.46–3.26)
Total	100.0	—	—	
Factor A: Effective use of method selected and continuity of contraceptive use and care (Cronbach's alpha = 0.87)				
<4 items	70.0	85.9***	(r)	—
All 4 items	30.0	93.7	1.88***	(1.31–2.70)
Total	100.0			
Factor B: Method selection (Cronbach's alpha = 0.85)				
<4 items	49.4	84.1***	(r)	—
All 4 items	50.6	92.3	2.13***	(1.59–2.85)
Total	100.0			
Factor C: Respectful care (Cronbach's alpha = 0.92)				
<2 items	27.0	87.6	(r)	—
Both items	73.0	88.3	0.86	(0.63–1.18)
Total	100.0			

[a] Adjusted for age, education, residence, religion, wealth, number of living children, previous modern method use, method selected at enrollment, and state.

*p-value ≤0.05; **p-value ≤0.01; ***p-value ≤0.001. (r) = Reference category.

from the method selection domain; and 3) 2 items from the respectful care domain. The correlations between factors ranged from 0.10 to 0.46 (see Table 3).

Process Quality Measure

Percentage distributions of the 22-item and 10-item process quality measures are presented in Table 4. There was an even distribution of the proportion of women who received low, medium, or high process quality at the time of method adoption for the 22-item measure. For the 10-item measure, there were slightly more women who received medium quality (39 percent) compared with low quality (29 percent) and high quality (32 percent).

Table 4 also shows the odds ratios (ORs) and adjusted odds ratios (AORs) of modern method continuation at the three-month follow-up interview for the 22-item and 10-item process quality measures. The adjusted odds of continuing a modern contraceptive three months later was nearly three times greater (AOR: 2.71; 95% CI: 1.83–4.03) for women who

received high levels of process quality at the time of method enrollment compared with low levels using the 22-item measure. Modern contraceptive continuation was also greater three months later for women who received medium levels of process quality (AOR: 1.69, 95% CI: 1.24–2.30).

Similar findings were observed for the 10-item process quality measure. Women who received high process quality at the time of enrollment were 2.18 (95% CI: 1.46–3.26) times more likely to be using a modern contraceptive method three months later. Medium levels of quality received also significantly increased the likelihood of modern method continuation three months later (AOR: 1.49; 95% CI: 1.09–2.03).

Additional independent variables that were significant in both the 22-item and 10-item process quality multivariate models include parity, method adopted at enrollment, and previous modern method use (data not shown). Women who had three or more children were significantly more likely to continue using a modern method three months later compared with women with one child (22-item measure: AOR: 1.98; 95% CI: 1.8–3.30 / 10-item measure: AOR: 2.00; 95% CI: 1.20–3.34). Injectable contraceptive users were less likely to continue using contraceptive methods three months later (22-item measure: AOR: 0.45; 95% CI: 0.31–0.65 / 10-item measure: AOR: 0.45; 95% CI: 0.31–0.66). Previous modern method users were significantly more likely to continue using three months later (22-item measure: AOR: 1.39; 95% CI: 1.04–1.87 / 10-item measure: AOR: 1.39; 95% CI: 1.04–1.86).

The three factors were also examined independently, and results are presented in Table 4. Women who reported receiving all information in Factor A (effective use of method selected and continuity of contraceptive use and care), were 1.88 (95% CI: 1.59–2.85) times more likely to continue using a modern contraceptive method three months later compared with those who reported receiving information on less than four questions that comprise this factor. Similar results were observed for Factor B (method selection) where women who reported receiving all information were 2.13 (95% CI: 1.59–2.85) times more likely to continue using modern contraception three months later. This relationship with Factor C (respectful care) and modern contraceptive use three months later did not hold, and no difference was observed between those who reported that their consultation was visually and auditorily private compared with everyone else.

Study Limitations

At the three-month follow-up interview, 14.6 percent were lost-to-follow-up (LTFU). These individuals could affect the association observed between process quality and contraceptive continuation at three months if LTFU was selected on characteristics associated with discontinuation. Using logistic regression of LTFU and non-LTFU respondents, most respondent characteristics were similar (Appendix Table A2). Religion and residence were significantly different for respondents who were LTFU, where the odds of LTFU at three months was significantly lower for Muslims compared with Hindus, and for women residing in rural areas compared with urban areas. This selectivity is unlikely to have a substantial effect on the conclusion because these respondent characteristics were not associated with modern contraceptive continuation. Moreover, respondent characteristics were adjusted for in the final regression models.

Another study limitation is that participant enrollment was not done at the same time, did not use the same enrollment strategy, and varied by state and FP method. For example, IUD users were enrolled at district hospitals, whereas pill users were enrolled at the community level through ASHAs. Injectables users were enrolled at NGO facilities. Since users of all methods were not recruited from all types of facilities, any differences observed in the quality of care received by specific method is likely attributable to enrollment strategy for the method, and hence the facility type (district hospital or NGO facility) or ASHA instead of the method itself.

DISCUSSION

This study demonstrates that 22 items that measure process quality can be reduced to 10 items when applying exploratory factor analysis. The 10 items span three factors that include four process quality domains: respectful care, method selection, effective use of method selected, and continuity of contraceptive use and care. The first factor includes three items from the effective use of method selected domain plus one item from the continuity of contraceptive use and care domain. The second factor includes four items from the method selection domain, and the third factor includes two items from the respectful care domain.

When combined to form the process quality measure, the 10-item measure predicts modern contraceptive continuation at the three-month follow-up interview, where women who received high process quality compared with low process quality were significantly more likely to be using a modern contraceptive method three months later. In addition, comparing women who received medium to low process quality also yielded a significant relationship suggesting that even improving process quality to a medium level has a beneficial effect on continued use. The Cronbach's α for the 10 items could increase to 0.86 by removing the two respectful care items. While this shows an increase in reliability, it would result in the exclusion of a critical domain of process quality and therefore the two items were kept in the overall 10-item process quality measure.

The 22-item measure of process quality also predicts modern contraceptive continuation three months later. When adjusting for respondent characteristics, previous method used, and method selected at enrollment, women who received high levels of process quality were nearly three times more likely to use a modern contraceptive method at the three-month follow-up interview compared with women who received low levels of process quality. Similarly, women who received medium levels of process quality were significantly more likely to continue using a modern contraceptive method three months later.

Receiving all information on the items in Factor A predicts modern contraceptive continuation three months later. Factor B also predicts modern contraceptive continuation three months later. Auditory and visual privacy during the counseling session (Factor C), however, does not. This finding should not be taken to imply that respectful care is not an important component of quality of care. On the contrary, respectful care is a key component of quality of care within a rights-based framework and should be included.

The relationships observed in this study between quality and contraceptive continuation are similar to findings shown in other studies (RamaRao et al. 2003; Sanogo et al. 2003; Jain

et al. 2012). This study goes one step further and provides a valid 10-item measure that predicts contraceptive continuation, and thus fills a gap in the literature by providing practical ways to measure and monitor quality of care. This measure could be used at national and subnational levels as well, as the MIIplus (Method Information Index plus a question about method switching) has been recommended for global tracking (Jain et al. 2019). The larger 22-item measure is especially important for training providers in offering services of good quality and can be used in special facility-based studies, while the 10-item measure, a proxy for 22 items, is more suited for routine data collection and monitoring.

Items that are not a part of the 10-item measure include those that had limited response variability (e.g., the provider treated you well) or items that may be more method-specific (e.g., told about other source of FP supply or given an appointment card for follow-up visit). Being told about different methods is also an item that was not included in the 10-item measure. While this item is one of the questions of the Method Information Index, it may be less critical in India where contraceptive knowledge is almost universal—99 percent of men and women know of at least one method of contraception (IIPS 2017a). Also, it is unclear the extent to which providers counsel women on different FP methods if a woman comes to the FP counseling session with a method she would like to use. Finally, with the impending results of the ECHO trial,[1] the item "received information about which FP methods protect against HIV/AIDS and STIs" was not included in the 10-item measure. Given the country context, this may be an additional question that policymakers and programmers add to monitor progress over time.

Although this study was conducted in two diverse states of India, the measures could be applied to other settings and used to monitor progress toward improving quality of care. Additional testing of the measures is needed, especially in terms of their feasibility in cross-sectional surveys. In addition, these measures could be applied to all levels of the health-care system because family planning respondents in this study obtained the method from various sources (government hospitals, community-level ASHAs, and NGO facilities). Building on the three decades of work since Bruce's framework, consensus on these quality of care measures is paramount to further advance the field and move beyond an important area that needs to be addressed to an area that can be consistently tracked over time and across settings.

REFERENCES

Abdel-Tawab, Nahla and Saumya RamaRao. 2010. "Do improvements in client-provider interaction increase contraceptive continuation? Unraveling the puzzle," *Patient Education and Counseling* 81(3): 381–387.

Barden-O'Fallon, Janine, Ilene S. Speizer, Javier Cálix, and Francisco Rodriguez. 2011. "Contraceptive discontinuation among Honduran women who use reversible methods," *Studies in Family Planning* 42(1): 11–20.

Bruce, Judith. 1990. "Fundamental elements of the Quality of Care: A simple framework," *Studies in Family Planning* 21(2): 61–91.

Chin-Quee, Dawn S., Barbara Janowitz, and Conrad Otterness. 2007. "Counseling tools alone do not improve method continuation: Further evidence from the decision-making tool for family planning clients and providers in Nicaragua," *Contraception* 76(5): 377–382.

1 The Evidence for Contraceptive Options and HIV Outcomes (ECHO) trial is an open-label, randomized, clinical trial comparing the risk of acquiring HIV infection among users of the progestogen-only injectable depot-medroxyprogesterone acetate (DMPA), a levonorgestrel implant, and the nonhormonal copper intrauterine device. (http://echo-consortium.com/).

Costello, Marilou, Marlina Lacuesta, Saumya RamaRao, and Anrudh Jain. 2001. "A client-centered approach to family planning: The Davao Project," *Studies in Family Planning* 32(4): 302–314.

Donabedian, Avedis. 1988. "The Quality of Care: How can it be assessed?" *Journal of the American Medical Association* 260(12): 1743–1748.

Government of India. 2011. "2011 Census Data." Data acquired from: http://censusindia.gov.in/Tables_Published/A-Series/pca_main.html. Accessed 26 February 2018.

International Institute for Population Sciences (IIPS) and ICF. 2017a. "National Family Health Survey (NFHS-4), 2015–16: India." Mumbai: IIPS.

———. 2017b. "National Family Health Survey (NFHS-4), India, 2015–16: Odisha." Mumbai: IIPS.

———. 2017c. "National Family Health Survey (NFHS-4), India, 2015–16: Haryana." Mumbai: IIPS.

Jain, Anrudh K. 1989. "Fertility reduction and the quality of family planning services." *Studies in Family Planning* 20(1): 1–16.

———. 2017. "Quality of Care in the Context of Rights-Based Family Planning." Policy Brief of the Measuring and Monitoring Quality of Services and Quality of Care Project. New York: Population Council.

Jain, Anrudh K. and Karen Hardee. 2018. "Revising the FP Quality of Care Framework in the context of rights-based family planning," *Studies in Family Planning* 49(2): 171–179.

Jain, Anrudh K., Saumya RamaRao, Jacqueline Kim, and Marilou Costello. 2012. "Evaluation of an intervention to improve quality of care in family planning programme in the Philippines," *Journal of Biosocial Science* 44(1): 27–41.

Jain, Anrudh K., John Townsend, and Saumya RamaRao. 2018. "Proposed metrics to measure quality: Overview." New York: *Population Council*.

Jain, Aparna, Kumudha Aruldas, Elizabeth Tobey, Arupendra Mozumdar, and Rajib Acharya. Forthcoming. "Adding a question about method switching to the Method Information Index is a better predictor of contraceptive continuation," *Global Health: Science and Practice*.

Koenig, Michael A., Mian Bazle Hossain, and Maxine Whittaker. 1997. "The influence of quality of care upon contraceptive use in rural Bangladesh," *Studies in Family Planning* 28(4): 278–289.

Loewenthal, Kate Miriam. 2001. *An Introduction to Psychological Tests and Scales*. East Sussex: Psychology Press.

Mallick, Lindsay, Wenjuan Wang, and Gheda Temsah. 2017. "A Comparison of Summary Measures of Quality of Service and Quality of Care for Family Planning in Haiti, Malawi, and Tanzania." Rockville, Maryland: ICF.

Matsunaga, Masaki. 2010. "How to factor-analyze your data right: Do's, don'ts, and how-to's," *International Journal of Psychological Research* 3(1): 98–111.

MEASURE Evaluation. 2016. "Quick investigation of quality (QIQ): A user's guide for monitoring quality of care in family planning (2nd edition)." University of North Carolina, Chapel Hill: MEASURE Evaluation.

Mensch, Barbara, Mary Arends-Kuenning, and Anrudh Jain. 1996. "The impact of the quality of family planning services on contraceptive use in Peru," *Studies in Family Planning* 27(2): 59–75.

Miller, Robert, Andrew Fisher, Kate Miller, Lewis Ndhlovu, Baker Ndugga Maggwa, Ian Askew, Diouratie Sanogo, and Placide Tapsoba. 1997. "The Situation Analysis Approach to Assessing Family Planning and Reproductive Health Services: A Handbook." New York: Population Council.

RamaRao, Saumya, Marlina Lacuesta, Marilou Costello, Blesilda Pangolibay, and Heidi Jones. 2003. "The link between quality of care and contraceptive use," *International Family Planning Perspectives* 29(2): 76–83.

RamaRao, Saumya and Raji Mohanam. 2003. "The quality of family planning programs: Concepts, measurements, interventions, and effects," *Studies in Family Planning* 34(4): 227–248.

Sanogo, Diouratie, Saumya RamaRao, Heidi Jones, Penda N'diaye, Bineta M'bow, and Cheikh Bamba Diop. 2003. "Improving quality of care and use of contraceptives in Senegal," *African Journal of Reproductive Health* 7(2): 57–73.

Sathar, Zeba, Anrudh Jain, Saumya RamaRao, Minhaj ul Haque, and Jacqueline Kim. 2005. "Introducing client-centered reproductive health services in a Pakistani setting," *Studies in Family Planning* 36(3): 221–234.

StataCorp. 2013. Stata Statistical Software: Release 13. College Station, Texas: StataCorp, LP.

Tumlinson, Katherine. 2016. "Measuring Quality of Care: A Review of Previously Used Methodologies and Indicators." Working Paper Two of the Measuring and Monitoring Quality of Services and Quality of Care Project. New York: Population Council.

United Nations (UN), Department of Economic and Social Affairs, Population Division. 2017. *World Population Prospects: The 2017 Revision*. Custom data acquired via website. Accessed 19 February 2019. https://population.un.org/wpp/DataQuery.

ACKNOWLEDGMENTS

The authors thank Michelle Hindin, Niranjan Saggurti, and Anrudh K. Jain for their helpful comments on earlier versions of the article. We also recognize the support received from Subrato Mandal and Amit Shah of USAID India, and Mihira Karra, Erika M. Martin, and Erika Houghtaling of USAID Washington. The authors acknowledge the dedication and commitment of the research assistants who collected these data in India. Finally, we are deeply grateful to the women who participated in the study and shared their time and experiences. The Evidence Project is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of cooperative agreement No. AIDOAA-A-13-00087. The contents of this article are the sole responsibility of the authors and do not necessarily reflect the views of USAID or the United States government.

APPENDIX

TABLE A1 22 and 10 process quality questions

- If questions are used in **a client exit interview,** ask: *During your consultation today [within the past month], did the provider:*
- If questions are used in a **household survey,** ask of current modern contraceptive users who initiated current method within the past year: *When you first adopted your current method, did the provider:*

1*	Ask about whether you would like to have a/another child?	Yes No
2*	Ask about when you would like to have a/another child?	Yes No
3*	Ask about your previous family planning experience?	Yes No
4*	Ask about your family planning method preference?	Yes No
5	Provide information about different family planning methods?	Yes No
6*	Talk about possible side effects or problems with the method you select?	Yes No
7*	Tell you what to do if you experience any side effects or problems with the method you selected?	Yes No
8*	Talk about warning signs associated with the method you selected?	Yes No
9*	Talk about the possibility of switching to another method if the method you selected was not suitable?	Yes No
10	Provide information while strongly encouraging one method?	Yes No
11	Talk about the methods that protect against HIV/AIDS and STIs?	Yes No
12	Talk about how to use the method you selected?	Yes No
13	Talk about how the method you selected works?	Yes No
14	Tell you when to return to the health facility for a follow-up visit?	Yes No
15	Tell you about other sources of family planning supply?	Yes No

(Continued on next page)

TABLE A1 (Continued)

16	Give you an appointment card for follow-up visit?	Yes No
17*	When meeting with the provider during your visit, do you think other clients could see you?	Yes No
18*	When meeting with the provider during your visit, do you think other clients could hear what you said?	Yes No
19	During your visit, would you say that you were treated well by the provider?	Yes No
20	Did the provider allow you to ask questions?	Yes No
21	Did the provider answer all of your questions to your satisfaction?	Yes No
22	Do you believe that the information that you shared about yourself with the provider will be kept confidential?	Yes No

*Items with an asterisk represent the 10-item measure of process quality that formed from the exploratory factor analysis results.

TABLE A2 Adjusted odds ratios of lost to follow-up at three-month interview (n = 2,699)

	AOR	95% CI
Age		
Less than 24	(r)	
25–29	0.86	(0.64–1.14)
30 and above	0.95	(0.67–1.32)
Education		
None	(r)	
Primary	0.70	(0.45–1.04)
Middle	0.88	(0.58–1.35)
Secondary	1.01	(0.69–1.49)
Higher secondary	0.79	(0.51–1.23)
Residence		
Rural	0.20	(0.15–0.25)
Urban	(r)	
Religion		
Hindu	(r)	
Muslim	0.34	(0.21–0.55)
Other	1.51	(0.34–6.62)
Wealth		
Lowest	(r)	
Middle	0.84	(0.62–1.14)
Highest	0.74	(0.52–1.04)
Number of living children		
None	2.25	(0.88–5.76)
One	(r)	
Two	0.80	(0.61–1.05)
Three or more	0.74	(0.50–1.10)
Previous modern method		
No	(r)	
Yes	0.97	(0.76–1.24)

(r) = Reference category.