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THE IMPACT OF A QUALITY IMPROVEMENT PACKAGE ON THE QUALITY OF REPRODUCTIVE HEALTH SERVICES DELIVERED BY PRIVATE PROVIDERS IN UGANDA

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THE IMPACT OF A QUALITY IMPROVEMENT PACKAGE ON THE QUALITY OF REPRODUCTIVE HEALTH SERVICES DELIVERED BY PRIVATE PROVIDERS IN UGANDA

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ACRONYMS

COPE	Client-Oriented, Provider-Efficient services
FP	family planning
HIV	Human Immunodeficiency Virus
IMCI	Integrated Management of Childhood Illnesses
IRB	Institutional Review Board
IUD	intrauterine device
MCH	maternal and child health
NGO	nongovernmental organization
PMTCT	prevention of mother-to-child transmission
PSP-One	Private Sector Partnerships-One
QI	Quality Improvement
RH	reproductive health
STI	sexually transmitted infection
UPMA	Uganda Private Midwives Association
VDRL	Venereal Disease Research Laboratory

ABSTRACT

Objective: To determine whether a Quality Improvement (QI) package designed to enable small-scale commercial reproductive health (RH) service providers to improve the quality of services provided through self-assessment, action-planning, and supervisors' support is effective in improving service quality.

Methods: The study was conducted among private midwives who are members of the Uganda Private Midwives Association (UPMA). A pre-test post-test quasi-experimental panel study design was used to assess the impact of the QI package developed by Private Sector Partnerships-One (PSP-One). Midwife clinics were allocated to two experimental groups and one control group. Baseline and follow-up measurements on structural attributes of quality were taken at midwife clinics using a facility inventory and midwife interview. Baseline and follow-up measurements on process attributes of quality, including the quality of counseling and the technical aspects of family planning (FP), antenatal care, and postnatal care services, were taken during service delivery through observations of client-provider interactions. A fixed effects estimator was used with a *difference-in-differences* model on data from the panel of midwives. Data on client observations were treated as cross-sectional and a Huber-White sandwich estimator was used to provide robust standard errors using a *difference-in-differences* model.

Results: Nearly 70 percent of midwives who were trained to use the tool reported that the tool was somewhat easy or very easy to use. As QI tool use increased, so did the proportion of midwives who found meetings with their supervisors to be very helpful. Structural and process attributes of quality improved at clinics in which midwives received training in the use of the self-assessment tool and in developing action plans and their supervisors received training in finding solutions to the problems identified through midwife self-assessments. Improvements did not occur at clinics in which midwives received training in self-assessment and action planning, but their supervisors were not trained in supporting midwives to find solutions to the problems identified.

Conclusions: The QI package is ready to be rolled out to small-scale private providers of RH services who are part of a professional association, network, or franchise. Programs should continue efforts to design effective tools to improve quality of service delivery among small-scale private providers who are not supported by supervisors.

INTRODUCTION

The quality of health care provided by the private commercial sector in developing countries is highly variable (Brugha and Zwi 1998), and little documentation exists concerning the effectiveness of efforts to improve the quality of service delivery in this sector. The growing consensus that facilitative supervision is effective in improving the quality of reproductive health (RH) service delivery in developing countries (Marquez and Kean 2002) is based on assessments of tools used in the public sector (Marquez and Kean 2002; Suh et al. 2007; Reynolds et al. 2008). Tools that have been shown to be effective in improving the quality of RH services delivered in the private commercial sector are not available.

In developing countries, traditional approaches to ensuring quality in RH services have been applied in the public sector. These approaches have relied on a model of supervision where an external supervisor visits health facilities regularly to “inspect” and “control” performance (Garrison et al. 2004). A traditional model with the supervisor in an authoritative role is unlikely to apply to the private sector where regulations regarding the provision of health care and services are either weak or remain unenforced (Kumaranayake et al. 2000). Unlike public sector providers whose salaries are paid by ministries of health or nongovernmental organization (NGO) providers whose salaries are paid by NGOs, commercial health providers generate profits to sustain the delivery of services and are not dependent on an owner for their salary.

A relatively new approach relying on evidence from the field of organizational development and participatory action research has been developed for quality improvement (QI) in the public sector in developing countries. This approach, called Client-Oriented, Provider-Efficient services (COPE), is based on the assumption that by identifying and taking ownership of a problem, providers are more likely to take effective action to improve quality of care than if they are subject to the inspect-and-control approach used in traditional supervision. The COPE approach encourages health facility staff to identify and prioritize quality of care problems and to find their own solutions to problems through subsequent actions. It uses self-administered guides with trigger questions that enable staff to identify problems along different dimensions of quality to develop time-bound action plans to solve those problems. Action plans are reviewed every three to four months, during which time providers have the opportunity to implement changes to improve the quality of care provided. External resources are used to conduct short, on-site trainings on the topics identified by the exercise. This approach has been shown to have a positive impact on the quality of child health services in public sector clinics with about 10 providers (Bradley and Igras 2005). Evidence from six countries—Bangladesh, Brazil, Honduras, Kenya, Nepal, and Tanzania—shows that supportive supervision was associated with improvements in service quality, open dialogue between supervisors and supervisees, and better performance (Marquez and Kean 2002). Provider self-assessment and supportive supervision (Kim et al. 2002) or provider self-assessment combined with peer review (Kim et al. 2000) have also been shown to improve providers’ interpersonal communication skills.

The scale of operation of certain types of private commercial providers is much smaller than that of public sector clinics. Private providers such as midwives, for example, either may be the only service providers in their clinic or may have an assistant to help provide services. Because of the small size of their practices and relative isolation from other providers, private midwives cannot use QI tools that rely on peer assessments. Tools that rely on the authority of an external supervisor who sets performance standards, assesses performance, and implements solutions to those problems are also not applicable to the private health sector. A tool, however, that relies on a provider's self-assessment of quality to influence behavior and is supported by a supervisor who helps find solutions to problems identified by the provider through the self-assessment may be effective in improving quality of care in the private sector.

This study examines the impact a QI package has on the quality of RH services provided by private midwives. The development of the package was based on the assumption that empowering providers to self-assess the quality of services they delivered and enabling supervisors to help solve the problems identified by the provider would result in improvements in the quality of services delivered. The study also tests whether the self-assessment tool alone (i.e., without supervisor support) is likely to result in improved quality of services. Because many developing country private providers are not part of any professional association, a self-assessment tool that does not rely on supervision and that providers can use to improve the quality of care delivered is likely to be useful in improving the quality of services offered.

The effectiveness of the QI package was tested among midwives who are part of a midwives association in Uganda, the Uganda Private Midwives Association (UPMA). In many developing countries, private providers may choose to improve the quality of care they provide by voluntarily participating in a provider association or a franchise where they pay a membership fee and agree to be supervised as a condition of their participation. These associations or franchises provide a convenient context in which supervisory tools suitable for the private sector may be tested.

DATA AND METHODS

THE QUALITY IMPROVEMENT PACKAGE

PSP-One developed the QI package for use with independent private practitioners who receive facilitative supervision for quality assurance or for use with independent private practitioners who do not receive facilitative supervision (Segall and Levin 2006). The package comprises the following elements: a form to review service statistics, a provider self-assessment tool, a linked action plan to help solve issues identified by the self-assessment, and a tool to enable the supervisor to find solutions to problems identified by the provider.

The service statistics form comprises 13 FP and maternal and child health (MCH) indicators to help providers track changes in service utilization. The self-assessment tool enables providers to determine gaps in the quality of care they provide and track changes in quality over time. Providers assess quality of care along six dimensions that are relevant to the provision of services in the commercial sector: physical environment, technical competence, continuity of care, management, marketing, and business practices. A provider conducts the self-assessment by responding to a series of questions along each dimension of quality. Response options are “yes,” “yes, needs improvement,” “no,” and “not applicable.” For each question, a maximum score of 2 points is given to a “yes” response, a score of 1 point is given for a “yes, needs improvement” response, and a score of 0 is given for a “no” response. These scores can be added to give a total score for a particular dimension of quality. To complete the self-assessment, providers must answer 266 questions, with the majority of questions (67 percent) focusing on technical competence. The package is consistent with Avedis Donabedian’s (1988) approach to quality as a multidimensional concept whose dimensions can vary in composition depending on the context.

Following the self-assessment, the provider completes an action plan to facilitate problem solving. An action plan is simply the planning of next steps or actions to be taken to find solutions to the causes of the problems identified. Midwives developed the action plan after conducting a root cause analysis to determine the main reasons behind quality performance gaps. They conducted the root cause analysis by asking why the clinic faced a certain problem or issue. Providers were trained to keep asking “why” until they were able to identify all possible causes of the problem. This process helped the provider identify the cause(s) of a specific shortcoming, list possible solutions or actions required to solve the problem, and assign a deadline and the name of a person (which could be the provider) responsible for solving the problem. Providers are encouraged to complete the self-assessment and action plan on a quarterly basis.

The supervisory tool is designed to take advantage of the supervisory support available to private providers. The supervisor’s role is to discuss causes of the shortcomings identified by the provider, to help in finding solutions to the problems identified, and to mobilize external resources (either those of the association or of the Ministry of Health). Optimally, a supervisor should visit a clinic on a quarterly basis to monitor progress toward completing the action plan.

TRAINING IN THE QI PACKAGE

A one-day training workshop using adult-learning principles focusing on learning through practice was provided to private midwives in the use of the QI package. The training was limited to one day to honor the work commitments of small commercial providers who find it difficult to be away from their businesses for several days. Midwives completed and analyzed the data compiled in the statistics form, completed the QI self-assessment tool, and developed an action plan to make improvements in the quality of service delivery. They learned to prioritize the problems they had identified, develop approaches to eliminate performance gaps, and monitor progress in resolving problems. Brainstorming sessions to identify problems commonly faced in providing high-quality services and their solutions helped engage midwives in the learning exercise. The one-day workshops were conducted at designated midwife branches in November 2006 and in January and February 2007 to ensure that midwives had several opportunities to attend a workshop and that class sizes did not exceed 20 participants. Sixteen workshops were held at different UPMA branches.

Supervisors trained in the QI package attended the one-day training with midwives and received a separate additional one and one-half days of training. Supervisors were trained to transfer scores from the midwives' self-assessment tool to their own scoring sheet and to convert raw scores on individual items in the midwives' self-assessment into scores for each dimension of quality. This enabled supervisors to measure improvements in midwives' performances and in the persistence of problems over time. Supervisors practiced assisting midwives to identify root causes of quality problems and brainstormed about resources that would help improve the quality of care provided. They discussed ways of engaging the public sector (e.g., district resource teams, district public-private partnerships health officers) to assist in solving selected problems. Supervisors also practiced leading a branch meeting on quality of care. All 14 supervisors who were to support midwives participated in the first round of training in November 2006.

STUDY DESIGN

A pre-test post-test quasi-experimental panel study design was used to assess the impact of the QI package. A panel design avoids many of the threats to validity inherent to studies based on independent cross-sectional samples. The study design comprised three trial arms: two experimental groups and one control group. The first experimental group (Intervention A) consisted of midwives who received training in the self-assessment tool and in completing an action plan, but their supervisors were not trained in problem solving and mobilizing external resources. The second experimental group (Intervention B) consisted of midwives who received training in self-assessment and action planning and whose supervisors received training in solving problems identified by the midwives. The control group consisted of midwives and supervisors who were not trained in the QI package.

More than 500 private midwives are members of the UPMA. Each member is associated with one of 12 UPMA branches spread across Kampala and the Eastern, Western, and Central regions of Uganda. More than 45 regional representatives/supervisors make quarterly supervisory visits to UPMA members. Because a particular regional representative supervises multiple midwives at a particular UPMA branch, randomization of individual midwives to experimental groups would have resulted in significant contamination. Instead, randomization was conducted at the branch level: UPMA branches were grouped within geographic region (Western, Eastern, and Central) and randomly allocated to be

part of the first or second experimental group. Because of their location in the capital city, midwives in Kampala have greater access to training opportunities and counseling materials. In addition, findings from a previous study suggested that higher levels of motivation to improve quality of care existed among midwives in Kampala when compared with midwives in other parts of Uganda (Agha et al. 2004). To guard against improvements in quality of care that may occur in Kampala because of these factors (higher level of midwives' participation in nonintervention trainings and higher level of motivation), a conservative design was chosen by assigning midwives in the Kampala branch of the UPMA to the control group.

A sample size of 300 midwives was considered practical in terms of budgetary resources and appropriate in terms of detecting changes over time. Approximately 100 midwives were assigned to each of the two intervention groups and the control group, with observations of three client-provider interactions to be conducted per midwife. A systematic random sample of midwives was selected from a list of midwives obtained from the UPMA. The study was approved after Institutional Review Board (IRB) review by the Tulane University Health Sciences Center.

The baseline data collection was conducted in October and November 2006, after the principal investigator for the study and a senior researcher at Research International (a private research firm headquartered in Kenya that has substantial experience with data collection in Uganda) provided a one-week training to interviewers and data collection supervisors. Interviewers were midwives or nurses working in the Ugandan public sector who were knowledgeable about quality standards used for RH service delivery in Uganda. Data collection supervisors were employees of Research International who regularly conducted survey research in Uganda. The follow-up data collection was conducted by the same interviewers and supervisors in May and June 2007. A refresher training of one-week was conducted in May 2007 prior to the follow-up data collection.

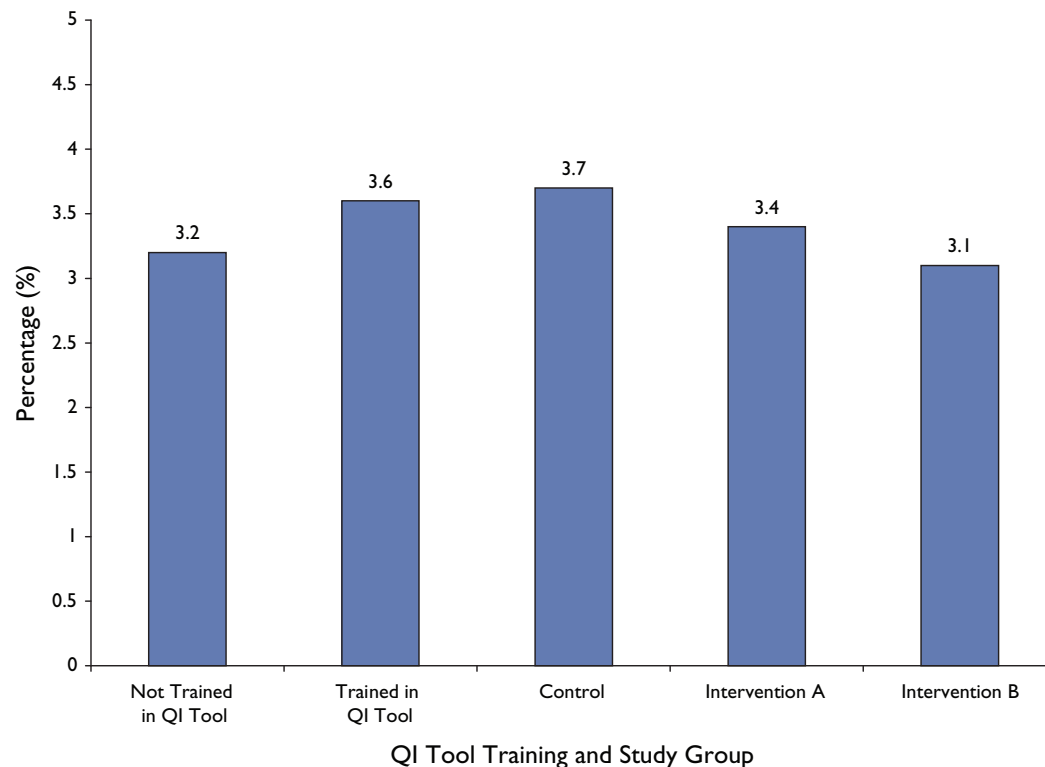
Although the UPMA had requested an updated list of midwives, incomplete addresses and changes in the location of midwife clinics posed challenges to locating midwives doing fieldwork. Baseline interviews were conducted with 276 UPMA midwives. Follow-up interviews were conducted with 248 midwives, or 90 percent of the midwives interviewed at baseline. About 754 observations of client-provider interactions were conducted at baseline and 776 at follow-up.

Despite the intention to train all midwives who were part of interventions A and B in the use of self-assessment and action planning, not all midwives in each of these trial arms were able to participate in the training: 72 percent of midwives who were to receive training as part of Intervention A actually received the training; 59 percent of midwives who were to receive training as part of Intervention B actually received the training. In addition, some contamination occurred: about 12 percent of midwives in the control group received training in the QI tool. Midwives who were to be part of each trial arm were kept in that arm based on the original intention, whether or not they actually received training in the QI tool. This strategy was adopted to avoid possible selection bias arising from more motivated providers selecting themselves for training. Consistent with this approach, midwives in the control group who received training in the QI tool were retained in the control group to honor the original intention that they be part of that group.

Figure 1 shows the motivation scores of providers, based on whether or not they received QI tool training and whether they were part of the intervention or control groups. The motivation variable

consisted of a simple count of whether the provider (1) paid UPMA dues for 2006, (2) obtained in-service training in the last two years, (3) obtained the maximum score on the marketing variable, (4) had financial and other goals for the facility for the next three months, and (5) had ever obtained a loan to expand the facility. The analysis showed that providers who did receive training in use of the QI tool were more motivated than providers who did not ($p=0.002$). In addition, providers in the control group (those based in Kampala) were the most motivated while providers from the two intervention groups were less motivated ($p=0.011$). These findings confirmed the need to take a conservative approach in the evaluation by including all providers in each of the intervention and control groups based on their intention to participate in the study.

FIGURE 1: PROVIDER MOTIVATION SCORES BY QI TOOL TRAINING AND BY INTERVENTION AND CONTROL GROUPS



INSTRUMENTS AND MEASURES

Instruments were modeled on those used for the Service Provision Assessments conducted by Macro International (Calverton, Maryland). A facility resource questionnaire was used to obtain information on infrastructure and equipment, availability of services, organization and management, continuity of care, marketing, and business practices. Observations on FP, antenatal, and postnatal care services were conducted to assess providers' adherence to accepted standards of quality during service provision. Exit interviews were conducted with clients who received services to collect information on client characteristics. Indicators for structural and process attributes of quality of care are shown in Table I.

TABLE I: INDICATORS OF QUALITY OF CARE

	Definition of indicators
STRUCTURE	
Infrastructure & Equipment	
<i>Equipment and supplies</i>	Number of following items present: sterile syringes, examination gloves, fetoscope, sphygmomanometer, bleach/jik, sharps box, delivery bed, tape measure, sink for staff to wash hands, soap, wastebasket for disposal of gauze and contaminated bandages, spotlight light source, three separate containers for decontamination, bed with plastic cover for adults, boiler or steam sterilizer, stool for examination table, examination couch with plastic cover and sheet to cover patient, vaginal specula of different sizes, tetanus vaccination supply, medications used during delivery, and resuscitation equipment for adults and babies (out of 20)
<i>Physical infrastructure</i>	Number of amenities at facility: facility has windows/shutters for ventilation, running water, electricity, toilet and place for washing hands, clean toilet area, separate place for disposal of placenta, waiting area with chairs or bench (out of 7)
Availability of Services	
<i>Number of days services provided</i>	Number of days per week that midwife works at facility
<i>Number of FP methods available</i>	Number of methods available: combined oral pill, progesterone only pill, IUD, injectable/Depro-Provera, Norplant, male condom (out of 6)
<i>Number of other services provided</i>	Number of services in addition to FP, antenatal care, and postnatal care provided: sexually transmitted infection (STI) services, immunization, delivery, adolescent reproductive health, prevention of mother-to-child transmission (PMTCT), HIV testing, child health, adult health (out of 8)
<i>Waiting time</i>	Number of minutes client had to wait before being examined by a provider

Counseling	
<i>Number of guidelines and job aids</i>	Number of guidelines (guidelines for cleaning clinic, guidelines for decontamination and cleaning equipment, current midwifery handbook, Guide to Practice in Uganda, Uganda clinical guidelines) and job aids (partograph, active management of third stage of labor, management of postnatal hemorrhage, warning signs during pregnancy) (out of 9)
<i>Number of educational materials</i>	Number of educational materials for clients: FP, safe motherhood, infant care/integrated management of childhood illnesses (IMCI), diarrhea, malaria prevention and treatment, STIs, HIV, immunization, wall chart listing services provided, health education material on wall in good condition (out of 10)
Continuity of Care	
<i>Continuity of care score</i>	Use Health Management Information System referral note, request outcome of referral from referral facility, contact client to find out about referral visit, follow-up on HIV-positive pregnant women to ensure delivery at facility with PMTCT services, contact client about follow-up visit, seek out and encourage collaboration with traditional birth attendants (out of 6)
Organization & Management	
<i>Organization and management score</i>	Midwife makes arrangements to cover facility when away, facility has updated stock card of drugs/supplies and updated inventory of medical equipment/furniture, client records are maintained, midwife reports regularly asking clients what they think about services provided, midwife is wearing neat and clean clothing, separate area exists for counseling with table/desk and two chairs (out of 6)
Marketing	
<i>Marketing score</i>	Regularly ask clients what they think of services provided, act on feedback received from clients and community, usually discuss additional services other than what client requests, market services to the community, use the opportunity of clinic visit to discuss additional health issues (out of 5)
Business Practices	
<i>Business practices score</i>	Have financial goals for next three months, have financial goals for next six months, keep track of monthly expenditures, keep track of monthly earnings, keep track of what people owe, plan to collect payment from clients who owe, plan how much money needed to earn to cover operating expenses, know cost of each type of service provided, review clinic budget at least quarterly, know how to price products and services to cover costs, made profit in last three months, made profit in last six months, know where to get loan to improve/expand clinic, have obtained loan to improve/expand clinic (out of 14)

	Definition of indicators
PROCESS	
Interpersonal	
<i>Counseling</i>	<p>Provider did the following during the consultation: informed the client of his/her right to privacy and confidentiality, asked client questions regarding how he/she felt and listened attentively, encouraged client to ask questions, provided client relevant information to make health-related decisions, ensured that client understood the information provided by asking follow-up questions, asked client what he/she thought about the services provided, used opportunity to discuss additional health issues with client, discussed additional services provided at clinic with client (out of 8)</p>
Technical	
<i>Family planning</i>	<p>Provider explained how the reproductive systems works, discussed clients' needs, counseled clients based on their unique needs, explained which contraceptive methods are available, provided information on where to obtain desired method if unavailable at midwife clinic, explained benefits of selected method, explained risks of selected method, explained contraindications of selected method, explained side effects of selected method, discussed how selected method works, discussed how to use selected method, explained what to do in case of side effects, discussed resupply of selected method, explained when client should return for follow-up, discussed option of changing method if it does not work for client, recommended use of condom for dual protection, encouraged client to have partner come for counseling and be involved in FP decision making (out of 17, rescaled to be out of 30)</p>

	Definition of indicators
STRUCTURE	
<i>Antenatal care</i>	<p>Provider discussed need for four spaced antenatal visits, informed client about due date, explained importance of personal hygiene and nutrition during pregnancy, discussed how to prevent malaria, discussed how to avoid exposure to STI/HIV by being faithful and asking partner to use condom, discussed how client can involve partner in prevention of HIV/STIs, reviewed danger signs of pregnancy, encouraged pregnant woman and partner to come for HIV counseling and testing, provided information about health problems and appropriate treatment, discussed need to develop a birth plan including arrangements for emergency transportation, discussed need and options for FP, discussed what client should bring to clinic for delivery, discussed unsafe traditional practices, discussed signs and symptoms of labor and what to expect during labor.</p> <p>Provider did the following during the first antenatal visit: recorded height, weight, and blood pressure; determined expected date of delivery; performed or referred clients for syphilis blood test [Venereal Disease Research Laboratory (VDRL)] and hemoglobin cross matching; listened to fetal heart tone and recorded results; inspected and palpated breasts; prescribed/dispensed iron and folic acid tablets and other preventive medication; determined tetanus toxoid status, and vaccinated for tetanus toxoid or referred for vaccination.</p> <p>Provider did the following during a repeat antenatal visit: recorded weight and noted changes; recorded fundal height and noted changes; recorded blood pressure and noted changes; listened for and recorded presence of fetal heart beat; and checked for the following danger signs: vaginal bleeding, severe headache, visual changes or epigastric pain, swelling of the face or the hands, leaking amniotic fluid, severe nausea or vomiting, high temperature, severe abdominal pain, lack of fetal movement.</p> <p>(out of 30)</p>

	Definition of indicators
<i>Postnatal care</i>	<p>Provider discussed personal hygiene, nutrition, and infant feeding, care of perineum and breasts, family support, FP, how to avoid unwanted pregnancy, and benefits of exclusive breastfeeding</p> <p>Provider assessed mother's knowledge of and ability to breastfeed</p> <p>Provider asked client about postpartum danger signs, including excessive vaginal bleeding, vaginal discharge with odor, severe abdominal pain, worsening perineal pain, high temperature, continuous nausea and vomiting, redness or pain in breasts, pain in urination, or difficulty in voiding</p> <p>Provider asked client if she had noticed danger signs in the infant, including not sleeping well, sleeping all the time, vomiting or spitting, having watery, dark green stool, breathing too fast, having stiffness or convulsions, having yellow skin and eyes, having redness around or foul discharge from umbilicus or from the eyes (out of 30)</p>
<i>FP, antenatal care, and postnatal care</i>	Summary score across FP, antenatal, and postnatal clients (out of 30)

STATISTICAL ANALYSIS

A fixed effects estimator was used to exploit the main advantage of panel data: eliminating unobserved heterogeneity that might be associated both with the propensity to be in a treatment arm and with an outcome under study (Wooldridge 2003; Brüderl 2005). Failing to account for factors that both determine or influence which research arm a provider is assigned to (or self-selects) and an outcome will potentially lead to biased estimates of an intervention's effect. For example, the control group used in this study includes providers from the Kampala region, who were previously shown to have higher levels of training and motivation. If such differences also influence the study outcomes, namely structural and process indicators of quality, and these differences cannot be adequately measured and controlled for thorough appropriate statistical methods, then the effects of the QI tool may be misestimated. In contrast, in a true experimental design, such concerns do not arise because the random assignment of participants into treatment and control arms ensures that all measurable and un-measurable differences are on average negligible and any remaining differences are due solely to chance.

In our study, we assume that unobserved heterogeneity across treatment and control providers is fixed and time invariant within providers. As shown in equation (1), we specify an individual-specific-effects model with an outcome y_{it} (for individual i at time t), a set of control variables x_{it} , a set of variables that represent the QI arm into which a provider has been randomized (Intervention A or B), a time variable ($t=0$ for baseline; $t=1$ for follow-up), a set of terms interacting time with the control variables and with the QI variables, and an error term ε_{it} .

$$(1) \quad y_{it} = \alpha_i + x_{it}'\beta_1 + t\beta_2 + x_{it}' \cdot t \cdot \beta_3 + QI_{it} \cdot \beta_4 + QI_{it} \cdot t \cdot \beta_5 + \varepsilon_{it}$$

In equation (1), the term α_i represents an individual-specific time-invariant fixed effect. We hypothesize that this unobserved fixed effect is correlated with selection into the QI arms, thereby potentially biasing the estimates of the effectiveness of the QI interventions. To ameliorate this problem, we specify a fixed effects model, as indicated below:

$$(2) (y_{it} - \bar{y}_i) = (x_{it}^i - \bar{x})\gamma_1 + (t - \bar{t})\gamma_2 + (x_{it}^i - \bar{x}_i) \cdot (t - \bar{t}) \cdot \gamma_3 + QI_{it} \cdot (t - \bar{t}) \cdot \gamma_5 + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

With the fixed effects model, the person-specific time-constant unobserved heterogeneity is “differenced out,” as are all other time-invariant variables, including QI_{it} . The variable QI_{it} now appears only in its interacted form with the time variable. We make use of the fixed effects estimator to measure the effect of the intervention on all indicators measuring structural attributes of quality.

Tables 3 and 4 show scores on structural and process attributes of quality at baseline and follow-up for the three groups of clinics (control, Intervention A, and Intervention B). Tables 3 and 4 also illustrate p -values showing differences in trends between the control group and Intervention A clinics, between the control group and Intervention B clinics, and between Intervention A and B clinics.

Data on process attributes of quality, measured through observations of interactions of providers and clients at baseline and follow-up, were treated as representative of client-provider interaction at baseline and follow-up and pooled across the pre-test and post-test survey rounds. A difference-in-differences model is used with the Huber-White sandwich estimator to provide robust standard errors. Client characteristics including age, marital status, education, and employment are included as independent variables in the difference-in-differences models. In addition, models that contained clinic and midwife characteristics, including the total number of staff at the midwife clinics; whether the midwife owned the clinic, land, and equipment; whether the midwife was a registered midwife; the midwife’s years of experience; and whether the midwife worked outside the clinic, were run. The clinic- and midwife-level variables did not influence findings and were dropped from the final models.

RESULTS

CHARACTERISTICS OF CLINICS AND CLIENTS

As indicated in Table 2, midwife clinics had an average number of 2.5 staff. In addition to the midwife, the most common type of staff member was the nursing assistant (not shown). On average, midwives had about 30 years of experience after obtaining their qualifications. Approximately one-half of midwives owned the building, land, and equipment of the clinic where they worked. Slightly more than two-thirds of midwives worked outside the clinic. This consisted primarily of taking care of their families and farming or raising poultry (not shown). More than one-quarter of midwives were registered midwives. No significant changes occurred in clinic or midwife characteristics between the baseline and follow-up surveys.

TABLE 2: CLINIC, MIDWIFE, AND CLIENT CHARACTERISTICS AT BASELINE AND FOLLOW-UP

	Baseline	Follow-up	p-value of difference between baseline & follow-up
Clinic and Midwife Characteristics			
Mean number of staff at midwife clinic	2.5	2.6	0.427
Mean number of years of experience of midwife	30.4	30.9	0.680
Percentage of midwives who own building, land, and equipment	52.8	50.4	0.590
Percentage of midwives who do other types of work than at the clinic	67.3	68.1	0.848
Percentage of clinics with registered midwives	26.2	31.4	0.198
Client Characteristics			
Mean age of client	25.0	25.7	0.006
Percentage of women	98.7	98.1	0.349
Percentage married	84.6	87.4	0.120
Percentage with secondary/higher education	57.2	63.3	0.015
Percentage currently employed	39.3	36.3	0.239

Table 2 also shows characteristics of clients attending midwife clinics. As indicated, two statistically significant differences existed in the characteristics of clients who visited the clinics at baseline and follow-up: the mean age of clients who received RH services from midwives was 25 years at baseline and 25.7 years at follow-up ($p=0.006$); the percentage of clients who had secondary or higher education was 57 percent at baseline and 63 percent at follow-up ($p=0.015$). Other client characteristics did not change

over time: about 98 percent of clients were women, more than 85 percent of clients were married, and more than one-third of clients were currently employed.

PROCESS EVALUATION

Overall, 123 out of 248 midwives were trained in the use of the QI tool. About 5 percent of midwives who were trained in its use did not use the tool after their training. Of the midwives who used the tool after training ($n=111$), about one-half used the tool quarterly and the other one-half used it more than quarterly (not shown). Midwives did not find the tool difficult to use: 6 percent found the tool very easy to use, 62 percent found it somewhat easy to use, 17 percent found it neither easy nor difficult to use, 13 percent found it somewhat difficult to use, and 1 percent found it very difficult to use (not shown).

At follow-up, midwives were asked how helpful they found meetings with their supervisors in terms of solving problems in service delivery. Figure 2 shows the percentage of midwives who reported finding meetings with their supervisor to be very helpful, based on their use of the QI tool. There was a dose-response relationship between use of the QI tool and midwives' reports of the degree of usefulness of their meetings with supervisors: 54 percent of midwives who were not trained in the use of the QI tool found meetings with their supervisors were very helpful; 58 percent of midwives who were trained in the tool but did not use it found meetings with their supervisors to be very helpful; 70 percent of midwives who used the tool quarterly found meetings with their supervisors to be very helpful; 83 percent of midwives who used the tool more often than quarterly found meetings with their supervisors to be very helpful in solving problems in service delivery.

FIGURE 2: PERCENTAGE OF MIDWIVES WHO FOUND MEETINGS WITH THEIR SUPERVISOR HELPFUL IN SOLVING PROBLEMS, BY USE OF QI TOOL

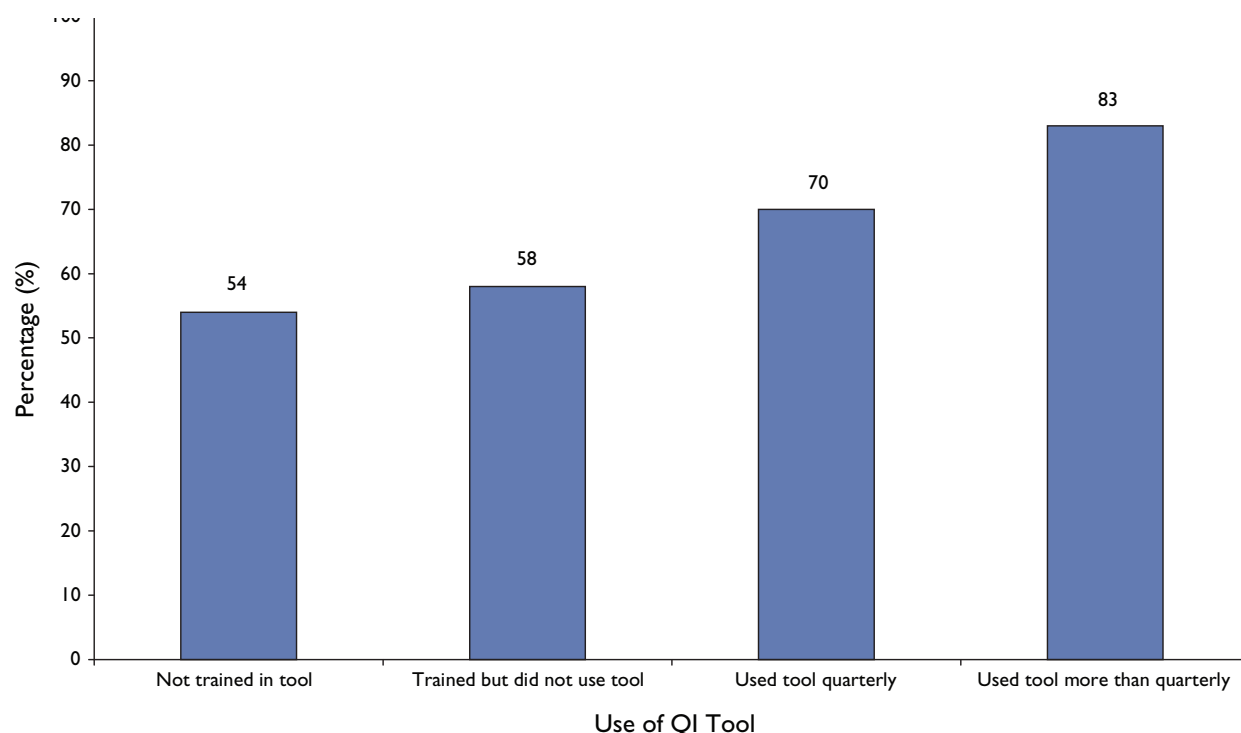


TABLE 3: CHANGES IN STRUCTURAL ATTRIBUTES OF QUALITY AT INTERVENTION AND CONTROL GROUP CLINICS

	Control Group		Intervention A		p-value of difference in trend (A & Control)	Intervention B		p-value of difference in trend (B & Control)	p-value of difference in trend (A & B)
	Baseline (n=74)	Follow-up (n=74)	Baseline (n=85)	Follow-up (n=85)		Baseline (n=89)	Follow-up (n=89)		
Infrastructure and Equipment									
<i>Equipment and supplies (out of 20)</i>	13.1	15.3	11.1	12.7	0.502	9.5	13.7	0.019	0.002
<i>Physical infrastructure (out of 7)</i>	6.7	6.7	6.2	6.4	0.243	5.7	6.3	0.001	0.024
Availability of Services									
<i># of days services provided (out of 7)</i>	6.8	6.7	6.5	6.6	0.425	6.2	6.6	0.005	0.036
<i>FP methods available (out of 6)</i>	3.6	3.7	2.9	3.2	0.576	2.7	3.0	0.428	0.814
<i>Other services provided (out of 8)</i>	4.8	5.4	4.7	5.2	0.801	4.2	4.8	0.987	0.805
<i>Waiting time¹ (minutes)</i>	10.4	6.7	9.1	8.7	0.078	8.1	6.2	0.248	0.413
Counseling Materials									
<i>Guidelines and job aids (out of 9)</i>	4.7	5.4	3.9	4.5	0.861	4.1	3.9	0.021	0.027
<i>Education materials (out of 10)</i>	4.8	6.6	4.8	6.8	0.658	4.4	5.7	0.373	0.166
<i>Continuity of care (out of 6)</i>	4.9	5.1	4.3	4.7	0.422	4.2	4.8	0.115	0.427
<i>Organization & management (out of 6)</i>	3.9	4.4	3.3	3.8	0.919	2.9	3.4	0.996	0.910
<i>Marketing (out of 5)</i>	4.5	4.7	4.1	4.2	0.723	3.8	4.2	0.289	0.142
<i>Business practices (out of 14)</i>	11.7	11.8	10.2	11.0	0.125	9.4	10.5	0.026	0.483

¹Based on 754 observations at baseline and 776 observations at follow-up

IMPACT ON STRUCTURAL ATTRIBUTES OF QUALITY

Table 3 shows baseline and follow-up scores on structural attributes of quality at the control group, Intervention A, and Intervention B clinics. *P*-values show whether trends in scores were significantly different between (1) Intervention A clinics and control group clinics, (2) Intervention B clinics and control group clinics, and (3) Intervention A and Intervention B clinics.

At control group clinics, the score on the quality of equipment and supplies and physical infrastructure was 13.1 at baseline and 15.3 at follow-up. At Intervention A clinics, the score was 11.1 at baseline and 12.7 at follow-up. There was no significant difference in changes over time between Intervention A and the control group clinics on the equipment and supplies scores. At Intervention B clinics, the equipment and supplies score was 9.5 at baseline and 13.7 at follow-up. The improvement in the equipment and supplies score was significantly greater at Intervention B clinics than at control group clinics ($p=0.019$). The improvement in the equipment and supplies score was also significantly greater at Intervention B clinics compared to Intervention A clinics ($p=0.002$).

The physical infrastructure score for control group clinics was 6.7 at baseline and remained at this level at follow-up. The physical infrastructure score for Intervention A clinics was 6.2 at baseline and 6.4 at follow-up. There was no significant difference in trends between Intervention A and the control group clinics on the physical infrastructure score. The physical infrastructure score at Intervention B clinics was 5.7 at baseline and 6.3 at follow-up. The improvement in the physical infrastructure score at Intervention B clinics was significantly greater than at control group clinics ($p=0.001$). The improvement in the physical infrastructure score at Intervention B clinics was also greater than the change in this score at Intervention A clinics ($p=0.024$).

In terms of availability of services, Table 3 shows scores on the number of days per week services were provided; the number of FP methods available; the number of services other than FP, antenatal care, and postnatal care available; and the waiting time for a client to see a provider. The number of days per week services were provided at control group clinics was 6.8 at baseline and 6.7 at follow-up. Services were provided at Intervention A clinics 6.5 days per week at baseline and 6.6 days per week at follow-up. There was no significant difference in trends between Intervention A and control group clinics on the number of days per week services were provided. Services were provided at Intervention B clinics 6.2 days per week at baseline and 6.6 days per week at follow-up. The increase in the number of days services were provided was significantly greater at Intervention B clinics compared with control group clinics ($p=0.005$) and compared with Intervention A clinics ($p=0.036$). Trends in the number of FP methods available and in the number of other services provided were not significantly different between intervention and control group clinics.

In terms of the availability of counseling materials, Table 3 shows scores for the number of guidelines and job aids and for the number of educational materials available at clinics. The average number of guidelines and job aids available at control group clinics was 4.7 at baseline and 5.4 at follow-up. The average number of guidelines and job aids available at Intervention A clinics was 3.9 at baseline and 4.5 at follow-up. The average number of guidelines and job aids available at Intervention B clinics was 4.1 at baseline and 3.9 at follow-up. The increase in the number of guidelines and job aids available at control group clinics was significantly greater than at Intervention B clinics ($p=0.021$). The increase in the number of guidelines and job aids available at Intervention A clinics was also significantly greater than at

TABLE 4: CHANGES IN PROCESS ATTRIBUTES OF QUALITY AT INTERVENTION AND CONTROL GROUP CLINICS

	Control Group		Intervention A		p-value of difference in trend (A & control)	Intervention B		p-value of difference in trend (B & control)	p-value of difference in trend (A & B)
	Baseline	Follow-up	Baseline	Follow-up		Baseline	Follow-up		
Interpersonal									
<i>Counseling¹ (out of 8)</i>	6.7	6.9	6.2	6.5	0.591	5.3	6.4	0.002	0.011
Technical									
<i>Family planning² (out of 30)</i>	26.4	26.0	24.5	25.5	0.156	23.2	25.1	0.042	0.432
<i>Antenatal care³ (out of 30)</i>	23.9	24.7	21.3	23.4	0.348	18.7	21.9	0.047	0.271
<i>Postnatal care⁴ (out of 30)</i>	23.6	23.3	22.6	23.4	0.493	20.7	19.9	0.736	0.345
<i>Family planning, antenatal care, and postnatal care⁵ (out of 30)</i>	24.7	24.6	22.7	24.2	0.093	20.8	22.2	0.103	0.894

¹Based on 754 observations at baseline and 776 observations at follow-up

²Based on 251 observations at baseline and 239 observations at follow-up

³Based on 274 observations at baseline and 323 observations at follow-up

⁴Based on 229 observations at baseline and 214 observations at follow-up

⁵Based on 754 observations at baseline and 776 observations at follow-up

Intervention B clinics ($p=0.027$). Trends in the number of educational materials available at intervention and control group clinics did not differ significantly.

Indicators of structural attributes of quality shown in Table 3 include scores for continuity of care, organization and management, marketing, and business practices. Trends in continuity of care scores, organization and management scores, and marketing scores were not significantly different between intervention and control group clinics. However, significant differences occurred in trends for the business practices scores. At control group clinics, the business practices score was 11.7 at baseline and 11.8 at follow-up. At Intervention A clinics, the business practices score was 10.2 at baseline and 11 at follow-up. At Intervention B clinics, the business practices score was 9.4 at baseline and 10.5 at follow-up. The improvement in the business practices score at Intervention B clinics was significantly greater than the improvement in this score at control group clinics ($p=0.026$).

IMPACT ON PROCESS ATTRIBUTES OF QUALITY

Table 4 shows baseline and follow-up provider scores on process attributes of quality, by intervention and control group clinics. Interpersonal aspects of quality address scores on counseling; technical aspects of quality indicate FP, antenatal care, and postnatal care scores, and a summary score across all three types of services.

At the control group clinics, the provider counseling score was 6.7 at baseline and 6.9 at follow-up. At Intervention A clinics, the counseling score was 6.2 at baseline and 6.5 at follow-up. There was no difference in trends in counseling scores between Intervention A and control group clinics. At Intervention B clinics, the counseling score was 5.3 at baseline and 6.4 at follow-up. The improvement in the provider counseling score at Intervention B clinics was significantly greater than the improvement in this score at control group clinics ($p=0.002$) and at Intervention A clinics ($p=0.011$).

The score for the quality of FP service delivery at the control group clinics was 26.4 at baseline and 26.0 at follow-up. At Intervention A clinics, this score was 24.5 at baseline and 25.5 at follow-up. There was no significant difference in trends between Intervention A and control group clinics in the FP service delivery quality score. At Intervention B clinics, the family planning quality score was 23.2 at baseline and 25.1 at follow-up. The improvement in the FP service delivery score at Intervention B clinics was significantly greater than the improvement in this score at control group clinics ($p=0.042$).

At the control group clinics, the antenatal care score was 23.9 at baseline and 24.7 at follow-up. At Intervention A clinics, the antenatal care score was 21.3 at baseline and 23.4 at follow-up. Changes in antenatal care scores did not differ significantly between Intervention A clinics and control group clinics. At Intervention B clinics, the antenatal care score was 18.7 at baseline and 21.9 at follow-up. The improvement in the antenatal care score at Intervention B clinics was significantly greater than at control group clinics ($p=0.047$). There were no significant differences in trends in postnatal care scores between intervention and control group clinics.

The summary score for overall quality of care across FP, antenatal care, and postnatal care at control group clinics was 24.7 at baseline and 24.6 at follow-up. At Intervention A clinics, this summary score was 22.7 at baseline and 24.2 at follow-up. The improvement in the summary score for quality of care across the three services was greater at Intervention A clinics than at control group clinics, at borderline levels of significance ($p=0.093$). At Intervention B clinics, the summary score for quality was 20.8 at baseline and 22.2 at follow-up. The improvement in the summary score for quality of care score across these three services was greater at Intervention B clinics than at control group clinics, at borderline levels of significance ($p=0.103$).

CONCLUSIONS

To the authors' knowledge, this study represents one of the first systematic efforts to assess the impact of a tool in improving the quality of RH care delivered by commercial health providers in a developing country. The combination of provider self-assessment and supportive supervision impacted both the structural and process attributes of quality. The main structural attributes that the intervention impacted were infrastructure, the availability of services, and business practices. Process attributes that improved as a result of the intervention included counseling and technical aspects of service provision in FP and antenatal care.

Prior to the start of the intervention, providers were asked to identify areas that needed improvement. A higher proportion of providers identified the clinic's physical environment (including the infrastructure and equipment) of the clinic, (27 percent) and their technical competence (34 percent) as areas that needed much improvement. Providers perceived areas such as business practices (20 percent) and management (16 percent) as having a lower need for improvement. An earlier study with Ugandan midwives also showed that when given small loans, midwives tend to prioritize improvements in the physical infrastructure of the clinic and in equipment (Agha et al. 2004). The findings of this assessment are consistent with the need perceived by midwives for improving the clinic's physical environment and their technical competence.

One factor that is noteworthy about the intervention was that no specific training was conducted to improve providers' technical competence or to improve their marketing or business skills. This is in contrast to the COPE approach where external resources are used to provide trainings in areas identified for improvements. The study findings suggest that the premise of the intervention—that providers have the resources to make improvements in the quality of care—was correct. The findings suggest that changes failed to occur where providers did not have the resources available to make the necessary improvements. For example, Ugandan midwives generally do not receive training in postnatal care. Their lack of training in this area most likely resulted in their self-assessment being insufficient to help midwives identify actions to improve the quality of postnatal care services. Future interventions that employ the QI package should consider having resources available to provide training in areas that the self-assessment has identified as weak. Such an approach is likely to increase the impact of the intervention.

An important study objective was to test whether provider self-assessment alone would be sufficient to produce improvements in the quality of care. No significant improvements were reported in structural or process attributes of quality among midwives who conducted the self-assessment but did not receive supportive supervision from a UPMA supervisor. Thus, becoming aware of problems in the quality of services delivered was not sufficient to produce changes in structural or process attributes of quality. The findings highlight the supervisor's important role in helping private sector providers improve service delivery.

Supervisors monitored midwives' performance by summarizing and recording midwives' self-assessment scores during their visits and monitoring progress against their initial scores. They assisted midwives in correctly identifying the root cause of the performance problem and helped them find solutions to the problems identified. It is not possible to determine from this study, however, which aspect of the supervisor's role was most important in enabling midwives to improve the quality of care. It would be useful to know whether the supervisor's problem-solving approach was more important or his/her availability to discuss with midwives their root cause analysis and action plans.

Improvements in continuity of care and marketing practices scores failed to reach statistically significant levels. The package appears to have had no effect on the organization and management score, which includes items such as stock inventory and maintenance of client records. Private midwives do not perceive management as an area that needs substantial improvements. Future interventions with midwives in Uganda should consider raising their awareness of the importance of both management and organization.

That several positive effects of the intervention emerged over a relatively short period of implementation (six months) suggests that the QI package holds promise. Monitoring the use of the package over a six-month period showed that 47 percent of providers trained in the package completed one self-assessment exercise and 43 percent completed two self-assessment exercises. If use of the self-assessment tool is maintained, it is plausible that stronger effects will be observed: providers who used the QI package more frequently also found supervisors' visits more helpful in solving problems with service delivery. Although no formal assessment was conducted of whether the QI tool continued to be used following the study period, we speculate that use of the tool is likely among midwives who continue to receive supervisor support in its use. Providers who join professional associations or franchises see training as an important benefit of belonging to such associations or franchises (Montagu 2002). Because implementers of the training were interested in assessing how often the self-assessment tool would be used in actual field conditions, external trainers made no effort to ensure that midwives would actually use the self-assessment tool after the training. No incentive was given to midwives or their supervisors to participate in this intervention. Midwives' participation in QI tool training reflects their interest in improving the quality of service delivery.

A panel design that followed the same midwives over time and had experimental and control arms enabled the authors to reach conclusions regarding the effectiveness of training midwives and their supervisors in the QI package. Loss to follow-up was low, with 90 percent of midwives successfully interviewed in the follow-up survey; however, the short duration of the study is a limitation. Had funding been available, a subsequent assessment of midwives' use of the QI self-assessment tool and the quality of care provided would have been extremely useful in assessing the use of the tool over a longer period of time. Another limitation of the study is that it did not examine processes of change as carefully as it might have. For example, it would have been useful to learn whether differences existed in the thoroughness with which midwives completed the self-assessment tool and the action plan depending on whether they received supervisor support or not.

The QI package was effective in improving the quality of care when both supervisors and midwives were trained in its use. The tool can be readily adapted for use among small commercial sector providers of RH care who are part of an association, network, or franchise. Evaluation of this tool over a longer duration of its implementation is recommended. As this tool is rolled out in other settings, it will be important to develop and test variants of the QI package that are effective in improving quality of care among providers who do not have regular supervisory support. The latter constitutes the majority of private commercial providers of RH care in developing countries.

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