

Quality Characteristics of Field Workers and Contraceptive Use Dynamics: Lessons from Matlab, Bangladesh

By M. Mazharul Islam, Monoj Kumar Barua and Radheshyam Bairagi *

The empirical findings of this study support the proposition that the contraceptive behaviour of an individual is affected not only by his or her personal characteristics, but also by the quality characteristics of the field worker who provides service to him or her

In recent years, the quality of services of the family planning programme has been identified as a fundamental determinant of contraceptive use and continuation, since the potential clients are more sceptical and more concerned with the quality of care than past clients (Hull, 1996; Jain, 1989; Koenig and

* M. Mazharul Islam, Ph.D., Professor, Department of Statistics, University of Dhaka, Bangladesh; Monoj K. Barua, Programmer and Radheshyam Bairagi, D.Sc., Senior Scientist, International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B): Centre for Health and Population Research, Dhaka, Bangladesh.

others, 1997; Mroz and others, 1999; Simmons and Phillips, 1990). However, the quality of care, which consists of a series of varied and interacting factors, has been defined in different ways in different contexts by various experts (Adeokun, 1994; Bertrand and others, 1995; Brown and others, 1995; Bruce, 1990; Hardee and Gould, 1993). In his classical study, Bruce (1990) has identified six elements of quality of care in family planning, such as choice of contraceptive methods, providers' technical competence, provider-client information exchange, interpersonal relations, mechanisms to encourage continuity of contraceptive use, and appropriate constellation of services. Jain (1989) stated that quality of care refers to the way clients are treated by the system providing services. Quality of care, in this sense, places much emphasis on the interpersonal dimension of interactions between providers and clients. In this context, the role of field workers is crucial in fulfilling the demand for quality of care, as they are the programme representatives working at maintaining the important link between the programme and the clients. Clients interact with the programme through outreach staff who promote the practice of contraception, disseminate information and distribute supplies.

Field workers who provide family planning and other reproductive health services in most developing countries have received a lot of attention in the literature. Population scientists have lauded their role as successful "change agents" in bringing about revolutionary changes in the case of family planning use in various developing countries (Gupta and Simon, 1996; Leete and Alam, 1993; Mauldin and Ross, 1991; Kamal, 1994; Kamal and Sloggett, 1996; Wu, 1994; Xiao and Zhao, 1997). The Bangladesh Family Planning programme is a brilliant example of a country where the introduction of female field workers at the grass-roots level has brought about dramatic changes in the use of modern contraception (Neaz and Banu, 1992; Kamal and others, 1999; Koenig and others, 1992; and Phillips and others, 1996). The contraceptive prevalence rate, which was only 8 per cent in 1975 has soared as high as 54 per cent in 1999-2000 (Mitra and Associates, 2000). While analysing the inter-village variation in using contraceptive methods in Matlab, Rahman (1986) observed that, although the villages of the Matlab maternal and child health and family Planning (MCH-FP) project are reasonably uniform in terms of accessibility, there were even variations in contraceptive practices among the villages attributable to the difference in the credibility of the family planning field workers and, to some extent, to the difference in the socio-economic infrastructure of the villages.

Two types of credential characteristics of a family planning field worker can be viewed. The first relates to the socio-economic and demographic characteristics of the field workers determined by the programme at the time of recruitment, which usually includes age, education, family size, social

status, personal experience of contraceptive use, and so on. The second relates to the behavioural or quality characteristics, which is a function of several factors usually earned through professional skill, experience, training, personal adoption, innovative idea, and so on. The effects of the first kind of credential characteristics of field workers on contraceptive use behaviour are well documented. While analysing the factors affecting the contraceptive use, continuation and failure, researchers often concentrate on the socio-economic and demographic characteristics of field workers along with users' characteristics and programme factors. However, despite the growing body of literature on quality of care in family planning and their effects on contraceptive use dynamics (Hossain and Phillips, 1996; Koenig and others, 1992; Koenig and others, 1997; Mroz and others, 1999; Mensch and others, 1996; Perry and others, 1999; Phillips and others, 1993; Whittaker and others, 1996), very little is known about the effects of behavioural or quality characteristics of field workers on contraceptive use.

This study, therefore, focuses on this neglected dimension of quality of care, i.e., behavioural or quality characteristics of family planning workers and their effects on contraceptive use dynamics in Bangladesh.

Since the family planning programme in Bangladesh is primarily dependent on a community-based delivery system, its success largely depends on the quality of care provided by the field workers which, in turn, depends on the behavioural or quality characteristics of field workers. Now, the question is how to measure the quality characteristics of a field worker. What are the elements of the quality of care offered by the field workers that would help to increase the use, effectiveness and continuity of contraceptive methods? This study analyses these issues using longitudinal data from Matlab, a field research station of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The study may have implications for policy makers in Bangladesh as well as in other developing countries. The outcome of the study may help to indicate important criteria that should be used in the selection and training of the family planning field workers.

Methods and materials

The setting

This study is based on the data from Matlab, a rural area, where the ICDDR,B has been operating a Demographic Surveillance System (DSS) since 1966. Like other rural parts of Bangladesh, the community is conservative and the majority of them are Muslims (88 per cent). Most women, generally confined to the family's compound, are illiterate (more than 50 per cent), (Razzaque and others, 1998). The population in Matlab is characterized by high

fertility and comparatively high mortality. However, in recent years, there has been a downward trend in these rates, particularly in the villages where the ICDDR,B introduced reproductive health interventions.

In October 1977, the ICDDR,B launched an innovative experimental maternal and child health and family planning (MCH-FP) programme in Matlab. From its beginning, the project has been characterized by a rigorous experimental design and careful collection of data on various issues of health and family planning. The design specified that approximately half of the villages (70 villages) of the study area (treatment area) would receive services from the intensive ICDDR,B programme, while the other half (79 villages), called the comparison area, would continue to receive the regular services offered by the government programme. The project has made an important contribution to the success of the country's family planning programme, through operations, research and technical assistance in the areas of management improvement and quality of care (Phillips and others, 1993).

The MCH-FP programme in Matlab is characterized by intensive services delivered by 80 community health workers (CHWs), who provide health and family planning services through door-to-door visits. The activities of the CHWs are carefully supervised by a female paramedic and a male supervisor, and they spend one day in every fortnight in meetings with programme organizers for work evaluation and training purposes. The remainder of their time is devoted to conducting household visits focusing on contraceptive education for all currently married and fecund women, provision of household-based services, and facilitation of access to medical treatment at nearby sub-centres or Matlab clinic. The CHWs have now established close rapport with the village women they serve and have become essential tools for motivating women to accept family planning services.

In the treatment area, information on contraceptive use dynamics is recorded by the CHWs in field registers, known as the "record-keeping system" (RKS), which are routinely compiled in the course of fortnightly household visits. As part of their regular service delivery activities, the workers maintain information on past and current contraceptive use status, reproductive status and lactational status, together with some health-related information and background data on a monthly basis, i.e., a prospective data collection system exists. These prospective records have been computerized and form a valuable database for the investigation of diverse health and family planning issues. Since the data collected are prospective in nature, they are largely free from the recall errors and biases that characterize most retrospectively collected data. Data from Matlab thus provide a unique opportunity to examine the contraceptive use dynamics (acceptance, continuation, switching behaviour, failure etc.) over a period of time in a rural Bangladeshi population.

The data

The study is based on longitudinal data obtained from the Matlab RKS, supplemented by the 1982 socio-economic survey (SES) data and the data of the 1987 evaluation study of CHWs. The RKS covers more than 16,000 eligible women. The 1982 SES provided information on women's religion, education, household possessions, e.g. quilt, radio, watch, bicycle, etc., dwelling space, and dwelling types. The study considered women's educational level, household possession, dwelling type and dwelling space as their socio-economic indicators. It was assumed that the socio-economic indicators remained the same during the follow-up period. As each and every person in Matlab has a unique identification number, the RKS data file can easily be linked with other occasional surveys.

The data on workers' quality characteristics come from an evaluation study on the work performance of CHWs, done in 1987. Since the CHWs are working under the close supervision of the field supervisors and project manager, they were given the responsibility to characterize the CHWs in terms of eight selected quality criteria: (a) regularity in work, (b) attitude/behaviour with clients, (c) innovative technique in communication with the clients, (d) technical competence, (e) enthusiasm for work, (f) accuracy for record-keeping, (g) politeness, and (h) conformity to social norms. These characteristics were thought to be conducive to increasing the effective use of family planning methods in Matlab. The regularity characteristics of the workers in performing duties, i.e. regular home visit, method supply or counselling is essential for programme success.

In rural Bangladesh, regularity in workers' visit and regular supply of the methods, especially pills, condom and injections, are very important, because workers provide these methods at the doorstep. Workers' attitude/behaviour may help to attract the potential clients to be users. Experiences show that in some situations, CHWs need to apply innovative techniques of communication to motivate clients to be users of family planning methods in general and specific methods such as male or female sterilization and IUD, in particular. In a study, Giridhar and Satia (1986) showed that the providers' innovative ability is more conducive in promoting contraceptive use than working under pressure of targets to attain demographic goals. Providers' technical competence about family planning methods help to improve the quality of counselling about family planning, by providing suggestions about appropriate methods and informed choice. Visaria and Visaria (1991) observed that the technical incompetence of the service providers often act as one of the important factors associated with poor programme performance in some rural areas in India. The clients are often not in a position to judge the technical skills of the providers; however, they have to bear the consequences of their deficient technical skills,

if any. Workers' enthusiasm for work is essential in achieving the programme goals. Accurate record-keeping by the CHWs is essential for programme evaluation and monitoring progress. Providers' politeness helps to attract potential clients to be users of family planning methods. In a conservative society like that in Matlab and other rural areas in Bangladesh, workers' conformity to social norms, such as dressing modestly, showing respect to the elderly or harmonizing with local customs, may help to increase the confidence of the potential users. The more the worker conform to social norms, the more she will be acceptable to the clients. This may help to improve the communication between workers and client, which in turn may increase the use of family planning.

To quantify the worker's quality, the project manager and the field supervisors jointly scored each of the 80 CHWs on each of the eight components of quality characteristics, as mentioned above, on a scale of 1 through 3, signifying 1 for low, 2 for medium and 3 for high performance. The supervisors and the project manager discussed among them the performance of the CHW in terms of the above-mentioned eight criteria and then scored her (the CHW) unanimously. They observed the CHWs and filled out evaluations secretly without given them any explanation or specification of the criteria. The results of the evaluation were also kept secret to the community health workers.

It may be mentioned here that the turnover of CHWs has been negligible in Matlab. The CHWs were selected in such a way that the risks of their turnover remain at a minimum. Since 1977, only one community health workers was terminated for negligence of duties and another one resigned on personal grounds. As a result, most CHWs have the same length of services and similar training and thus have uniform service experience. Thus, the extraneous effects of the characteristics, other than quality characteristics of the CHWs on contraceptive use dynamics, remain at a minimum.

Method of analysis

The study is based on an individual level of analysis. The quality assessment scores of workers were assigned to the individual women served by the CHWs. This type of nesting of the individual response under a common CHW-level variable (quality score) involves the clustering of observations, which may have some bearing on the estimation of the effects of CHW characteristics. Data were analysed for the contraceptive users following the date of acceptance of a method during a follow-up period from 1988 to 1994, assuming that the socio-economic indicators and the workers' quality remained stable over the period. The RKS data file beyond 1994 was not completely clean and ready for analysis at the time of the study, so we confined our follow-up study to 1994.

To identify the most significant quality characteristics of CHWs affecting the CPR, a multivariate logistic regression model was used, while for failure and continuation of contraceptive methods a multivariate hazards regression model was applied, since contraceptive continuation and failure are the time-dependent stochastic variables with censoring cases.

To examine the effects of workers' performance on contraceptive use dynamics, we have created an aggregate index of scores obtained by the CHWs. This has been done by adding the scores of the above-mentioned eight quality characteristics of CHWs, which takes values as low as 10 and as high as 24 points, because two measures (regularity of work and conformity to social norms) were scored 2 and 3 as none got 1 for these two characteristics. Based on the preliminary analysis of the scores of different quality characteristics of CHWs, the total scores were then categorized into three groups, namely 10-15, 16-20 and 21-24, signifying, poor, moderate and high level of performance, respectively. According to this aggregate index of quality, 15 per cent of the CHWs were of poor quality, 40 per cent of moderate quality and 45 per cent of high quality.

By contraceptive failure, we meant both user's failure and method error. The use-failure of a method was calculated on the basis of total months of use of that method, either continuously or with a small break or switching to another method, followed by conception during the use of a contraceptive method that subsequently led to a live birth. This study considers "all-method failure" and continuation rates rather than first method. It should be mentioned here that the estimate of failure largely depends on the perception and recall memory of the respondent, whether or not particular births were reported as having resulted from contraceptive failure. To make data free from individual perception, bias and response error, we followed a specially designed data analysis methodology. In calculating the probability of failure, we assumed that a live birth requires a gestation period of at least 7 months (average gestation period is considered to be 9 months). Thus, if a live birth occurred within 7 months after discontinuation of the method, we considered the pregnancy as the result of contraceptive failure. The gestation period preceding abortion (induced and spontaneous) or still birth, varies widely. Therefore, we could not determine whether pregnancies with those outcomes resulted from contraceptive failure. As a result, our estimate of the use-failure rate may be downward biased. The detailed methodology may be seen elsewhere (Bairagi and Rahman, 1996; Bairagi and others, 2000).

Since we were interested in the gross use-failure rate of a contraceptive method that resulted in accidental pregnancy, we employed a single decrement life table to obtain the duration-specific cumulative probability of failure. Life-table methodology was employed to allow for the inclusion of censored

and non-censored cases. To control the left censoring, we excluded all users before the follow-up began. After excluding all current users (as their first method adoption date was unknown) at the beginning of the Matlab MCH-FP programme and also excluding the women who were using permanent methods, our study population consisted of 25,960 ever-married women, of whom 18,440 were ever-users of different temporary methods during the period 1988-1994. Five methods, such as pills, condoms, IUDs, injectables and “other” methods, were considered in the study. The “other” methods included mainly traditional methods, such as periodic abstinence and withdrawal and very few cases of sampooon, foam or jelly, for which no separate analysis was possible. In 1994, the CPR was 65.6 per cent, of which only 2.4 per cent were due to “other” methods and the remaining 63 per cent were due to injectables (33 per cent), pills (16 per cent), permanent methods (9 per cent), condom (2.5 per cent), and IUD (2 per cent). The permanent methods were excluded from the study of failure and continuation, because their failure and discontinuation rates were negligible in Matlab.

Results

Table 1 shows the association between aggregate quality of care index and contraceptive use dynamics in Matlab. The results indicate that workers’ aggregate quality has a positive relationship with the CPR and a negative relationship with the failure rates of contraceptive methods. However, workers’ quality shows little positive effects on the contraceptive continuation rate. The continuation of different contraceptive methods increased with the increase of the aggregate quality index from poor to moderate level and any further increase in quality level practically shows no effect on contraceptive continuation. The results thus indicate that workers’ quality helps to motivate clients of different family planning method users to be effective users.

Table 1. Contraceptive prevalence rate (CPR), failure rate and continuation rate between 1988 and 1994 by the workers’ quality, Matlab

Quality characteristics	CPR	Contraceptive continuation rate					Contraceptive failure rate				
		Pill	IUD	Injection	Condom	Others	Pill	IUD	Injection	Condom	Others
Poor	56.8	58.8	82.2	77.2	48.4	57.6	15.3	3.6	1.0	22.1	19.0
Moderate	60.1	60.7	83.0	79.3	48.7	58.4	12.4	2.4	0.5	23.4	11.4
High	63.7	61.4	83.1	79.1	49.5	58.2	11.9	1.2	0.5	18.6	13.4

Contraceptive use dynamics (current use, continuation and failure) may also be affected by other socio-economic and demographic characteristics of the respondents as well as the CHWs. To isolate the extraneous effects of these

factors from the quality characteristics of CHWs, the authors performed multivariate regression analyses considering the workers' quality characteristics and their other sociodemographic characteristics and individual users sociodemographic characteristics as the explanatory variables. A logistic regression analysis was performed considering the current contraceptive use status of client as the dichotomous dependent variable. The explanatory variables are age and education of clients as well as CHWs, number of living children, religion, economic status and work status of individual clients.

The importance of the age and education of individual users and CHWs in contraceptive use behaviour has long been recognized. The logistic regression model was fit with these variables being continuous. The number of living children of the clients was included to capture both the previous experience with birth and family-size effects associated with contraceptive use behaviour. Religion was represented by a dummy variable for Muslims and non-Muslim. Muslim women are expected to differ in fertility regulation behaviour owing to their restricted movement and cultural norm. Since the information on household income is very difficult to collect directly, we have used a composite index as a proxy measure of the economic status, defined in terms of household assets or wealth, rather than in terms of income. The variable is created on the basis of a number of household assets and housing characteristics which include electricity, television, radio, wardrobe, bicycle, availability of safe drinking water, hygienic sanitation facility and household size, and construction materials. Each household asset and wealth status was assigned a weight or factor score generated through principal components analysis, and then assets scores were created based on a model described elsewhere (Gwatkin and others, 2000). The lower 33.3 per cent of the score was treated as poor economic status and the upper 33.3 per cent was treated as high economic status.

The results indicate that when the demographic and socio-economic characteristics of users and workers were controlled, the workers' aggregate quality index still remains a significant determinant of contraceptive use. The quality of care had a significant positive relationship with the CPR. For example, each unit increase in the aggregate score of worker's quality characteristics increased the odds that clients would use contraceptives by 6 per cent. The age of community health workers also showed significant positive effects on contraceptive use. Rahman (1986) also found that contraceptive use varied with the age and social status of the CHWs, but it was less variant with their education. It is evident that the education of CHWs had a positive effect on contraceptive use in the Matlab MCH-FP area, but the effect was not significant (see table 2).

Table 3 presents the CPR by each quality characteristic of the CHWs and the scores (1 for low, 2 for medium and 3 for high) they obtained for different years. It has been observed that high innovative techniques in communication

Table 2. Logistic regression estimate of the effects of workers' quality and sociodemographic characteristics of the women on current use of contraception, Matlab 1988-1994

Characteristics	Relative odds of contraceptive use
Age (years)	0.94*
Religion	
Muslim	0.90**
Hindu (r)	1.00
Women's education (years)	1.01
Number of living children	1.03*
Economic status	
Low (r)	1.00
Middle	1.64**
High	2.23***
Workers' quality	1.06***
Age of CHW (years)	1.04**
Education of CHW	1.02

(r) = reference category

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

of the CHWs led to the highest CPR, followed by high enthusiasm for work, attitude/behaviour with clients, technical competence, politeness, accuracy in record-keeping, regularity in work and conformity to social norms. In general, the CPR increased with the increase of scores obtained by the CHWs for most of the quality characteristics, with few exceptions for low to medium scores of certain characteristics and cohort of users. However, for the most recent cohort of users, the CPR consistently increased with the progress of scores obtained by the CHWs for each quality characteristic. Irrespective of time and quality characteristics, the CPR is highest for the higher score of workers' quality characteristics. It is to be mentioned here that the CPRs have been increasing in the Matlab study area over time, irrespective of the score of the quality of care, but still the difference in CPR persists with the variations in the workers' quality score.

From the foregoing analysis, it is clear that workers' quality has a significant effect on contraceptive use dynamics, and different components of the quality characteristics affect the current use of contraception differently. Now the question is which of these components of quality characteristics of CHW have the most significant effects on overall and method-specific contraceptive use dynamics? To answer this question, two different multivariate regression analyses (logistic regression and Cox's proportional hazard regression) were performed. The logistic regression model was fitted for the

Table 3. Contraceptive prevalence rate for different cohorts of users according to CHWs' quality characteristics and score of performance, Matlab 1988-1994

Characteristics	Score	Cohort of users						
		1988	1989	1990	1991	1992	1993	1994
Regularity in work	2	51.2	57.6	59.8	59.6	60.5	62.8	64.9
	3	54.6	60.1	61.2	62.1	63.2	64.1	66.4
Innovative technique in communication	1	48.1	54.5	54.7	57.9	58.3	60.8	60.9
	2	50.3	56.7	58.9	58.6	59.2	60.8	63.8
	3	56.6	62.0	63.4	64.0	65.4	66.9	68.5
Attitude/behaviour with clients	1	46.4	50.0	53.0	56.9	57.3	63.6	64.0
	2	50.6	57.4	59.0	59.0	60.0	61.4	63.3
	3	54.7	60	61.8	62.4	63.5	65.2	67.7
Technical competence	1	52.6	57.3	56.1	61.4	59.9	63.6	61.9
	2	50.3	56.9	58.9	58.4	59.2	60.9	63.9
	3	55.3	60.8	62.5	63.2	64.5	65.9	67.6
Enthusiasm for work	1	48.7	54.4	56.6	58.1	59.4	60.2	61.6
	2	52.3	58.4	59.9	60.1	60.8	62.3	65.0
	3	55.4	61.2	62.9	63.4	64.7	67.0	68.1
Accuracy in record- keeping	1	53.3	59.2	59.1	58.2	59.8	62.9	64.0
	2	51.2	57.2	59.1	59.3	60.1	61.5	64.6
	3	54.6	60.5	62.3	63.2	64.1	65.6	67.0
Politeness	1	51.9	56.7	57.6	60.4	60.1	60.3	63.3
	2	50.7	57.4	59.4	59.2	60.4	61.9	64.4
	3	55.6	60.9	62.4	62.9	63.8	65.9	67.5
Conformity to social norms	2	50.0	57.1	59.2	59.8	60.8	62.0	64.2
	3	54.2	59.6	61.1	61.4	62.3	64.2	66.3

current use of family planning methods in 1994 and the proportional hazard model was fitted for analysing contraceptive continuation and failure during the period 1988-1994. The eight quality characteristics which take values 1-3, age and education of CHW, socio-economic and demographic characteristics of users were considered as the explanatory variables. Table 4 through table 6 present the results of the multivariate analysis showing the effects of CHWs' characteristics only after controlling for the users' selected characteristics.

In Matlab, as well as at the national level in Bangladesh, a variety of contraceptive methods are available. In this situation, we may consider contraceptive use and method choice as a two-step process: first, a woman chooses whether or not to use contraception at all. If the outcome is to choose to

use contraception, the second step is to choose a particular method from the available methods.

To estimate the effects of CHW characteristics on whether or not to use contraception, we have employed a binomial logistic regression model with use/non-use as the outcome variable (table 4, column 2), while in identifying the characteristics affecting use of a particular method among all women, we performed multinomial regression analysis with seven categories outcome: six method categories and one no method category. The relative risk of using a particular method was estimated considering no method use as the reference category. The results are presented in table 4.

The results in table 4 indicate that four out of the eight selected quality characteristics of CHW had a significant positive effect on the current use of any method after controlling for the effects of age and education of CHWs: regularity in work, innovative technique in communication, technical competence, enthusiasm for work, and conformity to social norms. The users' characteristics such as age, education, religion, number of living children and dwelling size were considered as confounding factors. Workers' technical competence and age were marginally significant ($p < .05$). However, different characteristics affected the current use of different methods in varying degrees. For example, regularity in work has a significant positive effect on current use of pills, injection, and condom, which is quite expected. Innovative technique in communication has a significant effect on the current use of pills, IUD and "others" methods, which include mainly traditional methods, such as periodic abstinence and withdrawal and very few cases of sampooon, foam or jelly. The attitude/behaviour of CHW with clients influences the use of injectables and "others" method only. Technical competence has a significant positive effect on the current use of IUD and injection. Enthusiasm for work has significant positive effects on all the methods, except IUD. Accuracy of record-keeping affects only condom use. Politeness has a significant effect on pill and condom use. Conformity to social norms has a significant positive effect on the current use of pills and injection.

Table 5 presents the relative risk of contraception of different contraceptive methods according to workers' quality characteristics. The results indicate that, after controlling the effects of background characteristics of CHWs and individual users, different quality characteristics of the CHWs affect the continuation of an individual method in a different way. It appears that all the characteristics are not equally important for the continuation of a method. For example, the attitude or behaviour of CHWs do not have a significant effect on the continuation of any contraceptive methods, although the continuation of pills, IUD and "other" methods is likely to increase with the quality score of the characteristic. However, all other characteristics have

Table 4. Relative odds of contraception and use of a specific method in 1994 by CHW characteristics, Matlab

Characteristics	Odds of use of contraception	Relative odds of use of (with reference to no method)				
		Pill	IUD	Injection	Condom	Others
Regularity in work	1.08**	1.26***	0.86	1.21***	1.10**	0.99
Innovative technique in communication	1.21***	1.11**	1.32**	0.95	1.01	1.41***
Attitude/behaviour with clients	0.95	1.02	1.01	1.07**	0.91	0.86**
Technical competence	1.10*	0.92	1.16**	1.17**	0.95	0.91
Enthusiasm for work	1.11***	1.20***	0.94	1.06**	1.12***	1.27***
Accuracy of record-keeping	1.02	0.94	0.91	0.97	1.06*	0.89
Politeness	1.03	1.09**	1.03	1.00	1.31***	1.04
Conformity to social norms	1.07**	1.03**	1.02	1.14**	1.00	1.03
Age of CHWs	1.04*	0.87*	0.98	1.01	0.88	1.08**
Education of CHWs	1.02	1.04*	0.90	1.07**	1.15*	1.01

* $p < 0.05$; ** $p < 0.01$; *** $p < .001$.

Note: Individual users' sociodemographic characteristics, such as age, education, religion, number of living children and economic status, were considered as confounding factors.

significant positive effects on the continuation of one or more methods. Among these characteristics, regularity in work appeared as the most prominent characteristic having a positive significant effect on all the methods, except IUD. Enthusiasm for work appeared as the next most important characteristic having a positive significant effect on most of the modern methods such as pills, IUD and injectables. Politeness and technical competence are the two other important characteristics, each having significant positive effects on two modern methods. With the increase in the quality score of politeness, the continuation of pills and condom is likely to increase. Similarly, the continuation of IUD and injectables is likely to increase with the increase in the quality score of technical competence. Innovative technique in communication has significant positive effects on pills only, while conformity to social norms has significant positive effects on pills and "other" methods.

Table 6 presents the relative risks of the CHWs characteristics for contraceptive failure in Matlab during the period 1988-1994. Like the effects of the quality characteristics on method-specific contraceptive continuation, the effects on failure are also not uniform for all the methods. The attitude or behaviour of CHWs with clients showed no significant effects on contraceptive failure for any method. Technical competence did not have any significant negative effect on contraceptive failure either.

Table 5. Relative risks of continuation of family planning methods by CHW characteristics controlling the effects of users characteristics, Matlab, 1988-1994

Characteristics	Relative risk of continuation of				
	Pill	IUD	Injectables	Condom	Others
Regularity in work	1.12***	1.10	1.04**	1.20**	1.27**
Innovative technique in communication	1.05**	0.90	1.06	0.88	0.99
Attitude/behaviour with clients	1.02	1.03	0.99	0.90	1.04
Technical competence	0.93	1.05*	1.09**	0.98	0.98
Enthusiasm for work	1.17**	1.09*	1.12***	1.02	0.91
Accuracy of record-keeping	0.91	0.92	0.93	1.15***	0.96
Politeness	1.13**	1.02	0.78	1.11**	0.84
Conformity to social norms	0.84*	1.01	0.93	1.00	1.05*
Age of CHWs	1.04*	0.98	1.03	1.03	1.08**
Education of CHWs	1.02	1.00	1.07*	1.04	1.01

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Note: Individual users' sociodemographic characteristics, such as age, education, religion, number of living children and economic status, were considered as confounding factors.

The results showed that regularity in work, innovative technique in communication and enthusiasm for work are the three most important quality characteristics having significant negative effects on the failure of three different methods. For example, the relative risks of failure of pills, injectables and condom are likely to decrease with the increase in the quality score of the regularity in work characteristics. Other important characteristics which have significant negative effects on contraceptive failure of the methods are politeness, conformity to social norms and accuracy of record-keeping. The relative risks of failure of pills and injectables are likely to decrease with the increase in the quality score of politeness characteristics. Similarly, the relative risk of failure of pills and IUD are likely to decrease with the increase in the quality score of conformity to social norms.

Discussion and conclusion

The study demonstrated that workers' quality characteristics had a significant positive effect on the CPR and continuation of contraceptive methods and a negative effect on method failure. The effects of workers' quality characteristics on contraceptive use dynamics remained significant even after controlling for the effects of the sociodemographic characteristics of workers and users. The empirical findings of the study thus support the

Table 6. Relative risks of failure of family planning methods by CHW characteristics controlling the effects of users characteristics, Matlab, 1988-1994

Characteristics	Relative risk of failure of				
	Pill	IUD	Injectables	Condom	Others
Regularity in work	0.86**	1.02	0.97**	0.76**	1.03
Innovative technique in communication	0.98**	0.78*	1.03	0.86*	0.83
Attitude/behaviour with clients	1.03	1.06	0.96	0.98	1.02
Technical competence	1.01	1.00	1.08*	0.91	0.80
Enthusiasm for work	0.91***	1.02	0.82**	1.02	0.77**
Accuracy of record-keeping	1.02	0.88	0.98	0.69**	0.84*
Politeness	0.81*	1.03	0.65***	0.73	0.82
Conformity to social norms	0.82**	0.72*	0.93	0.84	0.85
Age of CHWs	1.03	1.07*	1.12**	1.14*	1.10
Education of CHWs	1.02	1.04	1.17**	1.20**	1.12*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Note: Individual users' sociodemographic characteristics, such as age, education, religion, number of living children and economic status, were considered as confounding factors.

proposition that the contraceptive behaviour of an individual is affected not only by his or her personal characteristics but also by the quality characteristics of the field worker who provides service to him or her. The findings also imply that the mere presence of, or visit by, a field worker is not sufficient to increase the CPR and contraceptive continuation and to decrease the contraceptive failure rate. Further qualities of the service providers are needed. The individual worker's quality service plays an important role in explaining variations in contraceptive use dynamics. Although the Matlab MCH-FP project is characterized by well-managed and trained workers having a closely monitored delivery system, differences in the way an individual worker deals with clients still exist and play an important role in explaining variations in contraceptive use dynamics.

At the national level, to sustain the progress made by the Bangladesh family planning programme, more emphasis should be given to the quality of care provided by the service providers. Since the quality of services affects the continuation of the use of family planning methods by clients, it is increasingly important to make the family planning programme more client-centred. Client-centred care demands that the provider respects the clients' point of view, encourages clients to express their needs and preferences, tailors information to the clients' situation and helps clients to make informed decisions rather than telling them what to do.

The empirical findings of this study show the varying effects of different components of quality characteristics of CHWs on overall and method specific

use dynamics. Of the eight selected components of quality characteristics of CHWs, both regularity in work and enthusiasm for work have significant effects on CPR, and contraceptive failure and continuation. On the other hand, conformity to social norms affects both CPR and contraceptive continuation, while politeness affect both continuation and failure. In Bangladesh, pills and condoms are supplied at the doorstep, while IUD and injections are given from the Family Welfare Centre, Thana Health Complex or sub-centre and thus, different motivational skills of CHWs are needed for home-delivery methods and other methods. This is also evident from our analysis that different components of quality characteristics of CHWs have different effects on different methods. For example, regularity in work, innovative technique in communication, enthusiasm for work, politeness and conformity to social norms are important characteristics for pills use. In sum, it may be concluded that regularity in work, enthusiasm for work, politeness, and conformity to social norms are the most effective quality characteristics of workers for contraceptive use dynamics.

Workers' regularity in work, i.e. regular home visit, delivery of methods (especially the temporary methods) and counselling help a client to be an effective user by reducing the risk of discontinuation and failure. Through regular visits, the worker becomes a "reliable institutional factor" in the life of clients and a source of information and help when they need it (Simmons and others, 1988). In any community-based distribution programme, the worker-client ratio, distance between home and work sites, transportation and communication, and supervision are the determinants of the regularity in work of field workers. In order to ensure the regularity of the field workers, the programme managers should make all necessary arrangements, such as distribution of clients to the workers in a manageable ratio, housing arrangement for those workers who live very far from their working area, arrangements for suitable transportation, and so on.

The results of the study suggest a strong relationship between workers' enthusiasm for work and contraceptive use dynamics. Enthusiastic workers are most effective in achieving the programme goals, because they dedicate more of their time, efforts, talents and energy to the programme than do other workers. Enthusiastic field workers are also more adaptable than others, demonstrate less turnover and tardiness (Angle and Perry, 1981) and derive greater satisfaction from their jobs (Bateman and Strasser, 1984). Highly enthusiastic workers are expected to exert great effort for the programme and adopt a long-term orientation focused on helping to achieve the programme's objectives. The programme managers may encourage workers to be enthusiastic by rewarding them in cash or kind, showing respect and solving their problems if any, and also by arranging refresher training.

The results of the study have important implications for the recruitment criteria of field workers and their training. In addition to the socio-economic and demographic characteristics (mentioned earlier) of a field worker that have an important bearing on service delivery, the programme managers should emphasize behavioural and quality characteristics such as politeness, enthusiasm for work, conformity to social norms and so on when recruiting a field worker. Some of these behavioural or quality characteristics cannot be determined well in advance at the time of selection. However, by providing appropriate training, the situation can be improved. Thus, the training curriculum should be redesigned to change the attitudes, behaviour and quality of field workers to make them more committed to the programme. Instilling a high level of regularity in work, enthusiasm for work, politeness, and conformity to social norms among field workers through training would lead to achieve optimal performance. Training programmes must also be devised and strengthened to develop the requisite competence among supervisors and to achieve programme objectives. The training programme should place relatively less emphasis on normal classroom study and more on learning by doing the job under supervision.

Since the Government of Bangladesh is in the process of implementing one-stop services delivery from the fixed-site clinic, called community clinic (CC) keeping the provision of door-step service delivery for certain groups of clients such as adolescents, newly married couples, hard-to-reach groups etc., the findings of this study will still have important policy implications in the changing environment. Since the same worker will remain responsible for the service delivery from the fixed-site clinic and limited home visit, her interaction with the clients and her attitude and behavioural characteristics will definitely influence contraceptive use dynamics. In a recent study, Mroz and others (1999) have shown that the presence of fixed family planning service units (e.g. clinic) in the area has significant effects on contraceptive use dynamics. Besides, the findings of the study would have important implications not only for the family planning programme in Matlab or that in Bangladesh but would also help the policy makers, planners and training specialists from other countries where a similar community-based distribution programme is implemented or being implemented.

Since, to the authors' knowledge, there is no other research on fieldworkers' behavioural characteristics and their impact on contraceptive use dynamics in a developing country, the findings of this study may be taken as an initial contribution that should lead to further development of this literature. The programme managers, policy planners and training specialists should consider the individual quality characteristics of field workers in designing the family planning programme, recruiting field workers and refresher training. While the results of this study are encouraging, more research on this important issue should be done to reach a firm conclusion.

Acknowledgements

This research was supported by the European Union and the ICDDR,B: Centre for Health and Population Research. The Centre is supported by many countries, donor agencies and others who share its concern for the health and population problems of developing countries.

References

- Adeokun, L.A. (1994). "Service quality and family planning outreach in Sub-Saharan Africa", in Therese Loco and Veronique Hertrich, *The onset of fertility transition in Sub-Saharan Africa* (Liege, International Union for the Scientific Study of Population (IUSSP)), pp. 235-249.
- Angle, H.L. and J.L. Perry (1981). "An empirical assessment of organizational commitment and organizational effectiveness", *Administrative Science Quarterly*, 6:1-14.
- Bairagi, R. and M. Rahman (1996). "Contraceptive failure in Matlab, Bangladesh", *International Family Planning Perspectives*, 2:21-25.
- Bairagi, R., M.M. Islam and M.K. Barua (2000). "Contraceptive failure: levels trends and determinants in Matlab, Bangladesh", *Journal of Biosocial Science*, 32:107-123.
- Bateman, T.S. and S. Strasser (1984). "A longitudinal analysis of the Antecedents of organizational commitment", *Academy of Management Journal*, 27:95-112.
- Bertrand, J.T., K. Hardee, R.J. Magnani and M.A. Angle (1995). "Access, quality of care and medical barriers in family planning programmes", *International Family Planning Perspectives*, 21(2):64-69.
- Brown, L., M. Tyane, J. Bertrand, D. Lauro, M. Abou-ouakil and L. de Maria (1995). "Quality of care in family planning services in Morocco", *Studies in Family Planning*, 26(3):154-168.
- Bruce, J. (1990). "Fundamental elements of the quality of care: a simple framework", *Studies in Family Planning*, 21(2):61-91.
- Giridhar, G. and J.K. Satia (1986). "Planning for service delivery at health centers: an experiment", *Asia-Pacific Population Journal*, 1(2):39-56.
- Gupta, J.P. and H.H. Simon (1996). "Quality of family welfare services and human resource development", In Proceedings of the United Nations Expert Group Meeting on Family Planning, Health and Family Well-Being, Bangalore, India, 26-30 October 1992, New York, United Nations.
- Gwatkin D.R., S. Rutstein, K. Johnson, R.P. Pande and A. Wagstaff (2000). *Socio-economic difference in health nutrition and population in Bangladesh*, Health Population Advisory Service, (Washington, DC, The World Bank), available at: <http://www.worldbank.org/poverty/health/data/bangladesh/Bangladesh.pdf>
- Hardee, K. and B.J. Gould (1993). "A process for quality improvement in family planning services", *International Family Planning Perspectives*, 19(4):147-52.
- Hull, V.J. (1996). *Improving quality of care in family planning: How far have we come?* South and East Asia Regional working papers No. 5 (Jakarta, Population Council).
- Hossain, M.B. and J.F. Phillips (1996). "The impact of outreach on the continuity of contraceptive use in rural Bangladesh", *Studies in Family Planning*, 27(2):98-106.
- Jain, A.K. (1989). "Fertility reduction and the quality of family planning services", *Studies in Family Planning*, 20(1):1-16.

- Kamal, N. (1994). "Role of government level family planning workers and health centers as determinants of contraceptive use in Bangladesh", *Asia-Pacific Population Journal*, 9(4):59-65.
- _____ and A. Sloggett (1996). "The effect of female family planning workers on the use of modern contraception in Bangladesh" *Asia-Pacific Population Journal*, 11(3):15-26.
- _____, A. Sloggett and J. Cleland (1999). "Area variations in use of modern contraception in rural Bangladesh: a multilevel analysis", *Journal of Biosocial Science*, 31:327-341.
- Koenig, M.A., M.B. Hossain and M. Whittaker (1992). "The influence of fieldworker quality of care upon contraceptive adoption in rural Bangladesh", paper presented at the Annual Meeting of the Population Association of America, Denver, Colorado, April 30 - May 2:33.
- _____ (1997). "The influence of quality of care upon contraceptive use in rural Bangladesh", *Studies in Family Planning*, 28(4):278-289.
- Leete, R. and I. Alam (1993). "The revolution in Asian fertility: dimensions, causes, and implications", *International Studies in Demography*, (Oxford, Clarendon Press).
- Mauldin, W.P. and J.A. Ross (1991). "Family planning programmes: efforts and results, 1982-89.", *Studies in Family Planning*, 22(6):350-367.
- Mensch, B., M. Arends-Kuenning and A. Jain (1996). "The impact of the quality of family planning services on contraceptive use in Peru", *Studies in Family Planning*, 27(2):59-75.
- Mitra and Associates (2000). *Bangladesh Demographic and Health Survey 1999-2000*.
- Mroz, T.A., A.B. Kenneth, I.S. Speizer and D.J. Mancini (1999). "Quality, accessibility, and contraceptive use in rural Tanzania", *Demography*, 36(1):23-40.
- Neaz, A. and H. Banu (1992). *Effect of programmematic and non-programmeetic factors on contraception and fertility in Bangladesh*, (Dhaka, National Institute of Population Research and Training (NIPORT)).
- Perry, H., S. Begum, A. Begum, T. Kane (1999). "Quaiyum MA and Baqui AH, A comprehensive assessment of the quality of care of services provided by family planning field workers in one major area in Dhaka City", *Journal of Health and Population in Developing Countries*, 2(1):45-57.
- Phillips, J.F., M.B. Hossain, R. Simmons and M.A. Koenig (1993). "A worker-client exchanges and contraceptive use in rural Bangladesh", *Studies in Family Planning*, 24(6):329-342.
- Phillips, J.F., M. Arends-Kuenning, M.B. Hossain (1996). "The long-term demographic role of community-based family planning in rural Bangladesh", *Studies in Family Planning*, 27:204-219.
- Rahman, M. (1986). "Tradition, development, and the individual", in *Asian Population Change Series No. 1*, edited by Penny Kane and Lado Ruzicka, (Canberra, Australian National University).
- Razzaque, M.A., L. Nahar, A.M. Sarder, J.K. vanGinneken and M.A. Shaikh (1998). "Demographic Surveillance System-Matlab, Volume twenty nine, 1996 socio-economic census", *Scientific Report No. 83*, (Dhaka, International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B)).
- Simmons, R. and J.F. Phillips (1990). *The proximate operational determinants of fertility regulation behavior*, Working Papers No. 15, (New York, The Population Council, The Population Council Research Division).
- Simmons, R., L. Baqee, M.A., Koenig and J.F. Phillips (1988). "Beyond supply: the institutional potential of female family planning workers in rural Bangladesh", *Studies in Family Planning*, 19(1):29-38.

- Visaria, L. and P. Visaria (1991). *Quality of services and family planning in Gujarat State, India: an exploratory analysis*, Working paper No. 34, paper presented at the ICOMP International Conference on the Strategy of Quality Service Delivery in Population Programme, Kuala Lumpur, Malaysia Nov. 12-16.
- Whittaker, M., R. Mita, M.B. Hossain and M.A. Koenig (1996) "Evaluating rural Bangladeshi women's perspectives of quality in family planning services", *Health Care for Women International*, 17(5):393-411.
- Wu, J.(1994). "Population and family planning in China", *Verhandelingen - koninklijke academie voor geneeskunde van belgie*, 56(5):383-402.
- Xiao, B.L. and B.G. Zhao (1997). "Current practice of family planning in China", *International Journal of Gynecology and Obstetrics*, 58(1):59-67.