EFFECTS OF THE FAMILY PLANNING PROGRAM ON CONTRACEPTIVE ADOPTION AND CONTINUATION IN VIETNAM

by

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INTRODUCTION

The Vietnamese family planning program has been in place since the early 1960s. With sizable investments in this program, contraceptive prevalence increased rapidly in the 1980s and reached 75 percent by 1997 (The Population and Family Health Project, 1999). Such an increase has undoubtedly contributed to the steady decline of total fertility from 3.8 in 1989 to 3.2 in 1993 and 2.7 in 1999 (Haub and Huong, 2003; Haughton, 1997). However, many couples still rely on abortion and traditional methods for fertility control (Allman et al., 1991; Goodkind, 1994; Haughton, 1997). The official average number of lifetime abortions in Vietnam in 1992 was about 2.5 per woman aged 15-44 – among the highest in the world (Goodkind, 1994). Other surveys in 1994 and 1997 give similar results concerning abortion levels, after adjusting for underreporting (General Statistical Office (GSO), 1996; The Population and Family Health Project, 1999).

Despite increasing contraceptive practice, there is also evidence of high rates of contraceptive discontinuation among Vietnamese women. By one year after adoption, 25 percent of condom users and 40 percent of all oral pill users have discontinued use; a smaller but significant percentage of IUD users (11%) have also discontinued use (General Statistical Office (GSO), 1996). The high level of contraceptive discontinuation among women who are at risk of pregnancy contributes to high levels of unwanted pregnancy, which is reflected in the widespread practice of pregnancy termination in Vietnam.

While Vietnamese policy makers have expressed concern over the persistently high level of contraceptive discontinuation and unwanted pregnancy among Vietnamese women, little empirical evidence exists on the linkages between family planning services and modern contraceptive adoption and use (Thang and Dang, 2002). This study aims to assess the impacts of accessibility and quality of family planning services on both adoption and continuation of a modern contraceptive method. Our hypotheses are:

a) Women residing in communities with better access to and quality of family planning services are more likely to adopt a modern method of contraception and continue contraceptive use, compared to women residing in communities with poorer service access and quality; and

b) The effects of programmatic factors are conditioned by personal client characteristics in influencing contraceptive adoption and continuation.

DATA AND METHODS

Data for this study come from the Vietnam 1997 Demographic and Health Survey (DHS), a nationally representative survey of 5,664 ever-married women aged 15-49 selected from 205 clusters in 18 provinces in the country. The calendar section in the individual questionnaire recorded all contraceptive and fertility events that happened during the five year period before the survey. Because explanatory variables of interest were measured at the time of interview, the analysis is limited to only three years preceding the survey, allowing a reasonable assumption that such measures remained relatively constant during that period of time. Therefore, the sample for the analysis of modern contraceptive adoption included women who had at least one pregnancy ending

within the three years preceding the survey, resulting in a subsample of 1,666 women who contributed 2,535 pregnancies. The subsample for the study of method continuation consisted only of those women who had used a method of contraception within the three years before the survey. There were 2,463 women who met this criterion – some of whom had been using a method of contraception at the beginning of the three-year interval—and they contributed 2,804 episodes[1] of contraceptive use.

Definitions of dependent variables

Outcome 1: Modern contraceptive adoption after a recent pregnancy outcome

This dependent variable is constructed from data recorded in the calendar section of the questionnaire. Any woman who experienced a pregnancy outcome – either a live birth, a still birth, or an induced or spontaneous abortion– was followed until the next pregnancy outcome (if any) or to the end of the three-year interval. An event occurred when the woman adopted a modern method of contraception (IUD, oral pills, condoms, injectables, sterilization) after the index pregnancy. If another pregnancy outcome occurred to the same woman within the three-year interval, this began another duration of observation, regardless of whether the woman had adopted a modern method of contraception after the previous pregnancy outcome. Each woman may experience more than one pregnancy outcome, and therefore, may contribute multiple observations during the three-year interval.

Since all women in the sub-sample for this analysis must start the duration of observation with a pregnancy outcome within the three-year interval, left-truncated cases

[1] An episode of contraceptive use is defined as the time duration from when a woman accepts a new method of contraception until she stops using that method continuously for any reason.

where women had a recent pregnancy ending before this three-year time period are excluded. Right censoring occurs when a woman had a pregnancy outcome within the three-year interval, then did not adopt a modern method of contraception until another pregnancy occurred or the observation period ended.

Outcome 2: *Discontinuation of modern contraceptive use*

Discontinuation of modern contraceptive use is categorized into two outcomes: first-method discontinuation and all-method discontinuation. First-method discontinuation is defined as when a woman stops using the initial method adopted for any reason. In the month immediately after discontinuation, the woman may be pregnant, may be using a traditional method of contraception, may have switched to a modern method other than the initial one, or may be in none of these states. In such cases, she would be considered a discontinuer of the first method that she had adopted.

Empirical evidence, however, has suggested that in an environment where more choices of methods of contraception are available, first-method discontinuation rates may be higher because women are able to switch between methods (Bhatia et al., 1980; Koenig et al., 1997). In addition, all-method discontinuation is of greater importance in terms of program implications than first-method discontinuation, because women who do not use any method of contraception are not protected against the risks of unintended pregnancy (Blanc et al., 1999).

All-method discontinuation allows for switching between methods, which means that an episode of use of a modern, temporary method is followed immediately in the next month by use of another modern contraceptive method, including sterilization. All-method discontinuation is defined when a woman switches to a traditional method of

contraception or stops using contraceptives completely in the month following an episode – in such cases, she may also be pregnant in the month immediately following an episode. Right censoring occurred when a woman exited the observation period while still using a modern method of contraception.

Definitions of independent variables

Individual factors considered in this study include area of residence (urban/rural), the number of years that the women attended school, employment status (i.e. whether the women were gainfully employed in the previous twelve months), household wealth (constructed as an index of 9 household items, reliability coefficient=.77), the women's age at the time of pregnancy (in the study of adoption) or the beginning of contraceptive episode (in the study of continuation), and family planning motivation (i.e. the difference between actual and ideal numbers of children at the beginning of each episode). These individual variables came from data obtained using the Individual Questionnaire.

Community-level variables included aggregated women's education, modern contraceptive prevalence at the beginning of the three-year interval (constructed from the calendar data, excluding the index woman), access and quality of the family planning outreach program[2], and access and quality of commune health centers. Outreach program access was measured by the frequency of visit, and its quality was measured by the number of contraceptives provided by both field workers and mobile teams – two parts of

[2] The outreach program is an important component of the Vietnam's family planning program. Family planning field workers at the commune level make home visits to motivate and to provide information to potential clients and contraceptive methods – generally oral pills and condoms - to adopters. Meanwhile, mobile family planning teams consisted of health professionals at the district level visit communes and provide clinical methods such as IUDs and sterilization.

the outreach program. Our expectation is that if the outreach program offers more choices, women would be more likely to adopt modern contraception or to use methods longer since re-supply is facilitated. If fewer than two modern methods of contraception were offered, the program was considered to provide limited choice.

Access to commune health centers was measured by travel time to commune health centers; health commune centers quality was an index score of infrastructure (e.g. electricity, running water, etc), medical equipment (e.g. delivery kit, linens, etc), essential medicines (e.g. penicillin, folic acid, iron tablets, etc), contraceptive methods available on the day of visit and the number of staff trained in family planning. Although more than one health facility may be visited in each community, one in six women lived in communities where no facility other than the commune health center was visited. In the 1997 Vietnam DHS, statistics showed that the majority of current users of family planning obtained their methods from facilities at the grass-roots level, mainly the commune health centers. Therefore, we focused on commune health centers in this study. The programmatic variables were from data obtained with the Community/Health Facility Questionnaire, where one key informant was interviewed and a nearest commune health center was visited in each community.

Statistical models

For both outcomes – the adoption of contraception after a recent pregnancy outcome and contraceptive discontinuation – the analyses examine durations that lead to various events, with the possibility of censoring. Hence, an appropriate approach is to use

hazard models to estimate the impact of various factors on the hazard, or the risk of having the event of interest (Klein and Moeschberger, 1997).

a) Study of adoption of modern contraception

Cox proportional hazard models were used to examine the relationship between independent variables and the hazard of modern contraceptive adoption. Although the nature of the data calls for the use of multi-level analysis (in this case, data came from the pregnancy level, the woman level and the community level), there is currently no statistical package available that allows for a three-level model of a Cox proportional hazard; therefore we used a two-level Cox proportional hazard model, which takes into account the unobserved heterogeneity at the community level (Angeles et al., 2002; Klein and Moeschberger, 1997). The assumption of the Cox proportional hazard model- that for any individual at any point in time the ratio of their hazard is constant - was tested and confirmed graphically by plotting the log-log($S_{(tx)}$) (log-minus-log of survival function) versus log of time. Stata 8 Special Edition package was used for this analysis (StataCorp, 2003).

b) Study of contraceptive continuation

In this study, the discrete-time approach was appropriate for the analysis, instead of the continuous-time approach, for several reasons (Allison, 1984; Yamaguchi, 1991). First, although contraceptive use/non-use operates in continuous time, the duration of each interval is recorded to the nearest whole month; thus it is more natural to assume a model that reflects discrete time measurements. Second, because data were recorded to the nearest whole month, they are likely to contain a number of ties, in which two or more individuals experience an event in the same month, which may lead to serious

biases if partial likelihood estimation methodologies were used (Kalbfleish and Prentice, 1980; Steele et al., 1996). Third and most importantly, tests for the assumption of proportional hazards did not hold for the entire duration. Lastly, the literature has suggested that unlike contraceptive adoption, the risks of discontinuation vary by duration of use (Ali and Cleland, 1995; Bhatia et al., 1980; Bhatt and Halli, 1998; Curtis and Blanc, 1997; Steele et al., 1996; Steele et al., 1999). Thus, an advantage of the discrete-time approach is that it is more straightforward to incorporate time-varying covariates in the model. To reduce the computational burden of a large data set created by month-by-month records, a common approach is to divide the time scale into a number of broader discrete intervals, within which hazards are assumed to be constant (Steele et al., 1996). Diamond et al. (1986) found that little precision was lost by grouping durations into reasonably broad groups. With such discrete time intervals, the hazard is the probability that an event of interest will occur during a particular time interval to a particular individual, given that the individual is at risk at that time. In this study, the time axis was divided into four time periods, assuming a constant hazard in each: 1-3 months, 4-6 months, 7-12 months, and 13 or more months. These intervals were selected based on a review of literature on contraceptive discontinuation rates in other countries (Ali and Cleland, 1995; Bhatia et al., 1980; Bhatt and Halli, 1998; Curtis and Blanc, 1997; Steele et al., 1996; Steele et al., 1999). Thus, each woman may contribute up to four observations in each episode of contraceptive use, depending on the total duration of use prior to discontinuation or censoring.

When time is expressed in discrete periods, the conditional hazard of event occurrence in each time period has a bounded nature, with the lower and upper limits of 0

and 1. It is, therefore, necessary to transform the hazard into another scale that does not have any bound and can be expressed in a widely familiar linear function of independent variables. Although log-odds is a commonly used transformation, complementary log-log transformation[3] is preferred in the study of discontinuation because it has a built-in proportional hazard assumption, and not a proportional odds assumption, as in the case of the logit transformation. The complementary log-log link, thus, provides a discrete-time analog for the continuous-time hazard assumption and anti-logging a coefficient from a complementary log-log model would give a hazard ratio. In addition, for hazards that are small, results from the complementary log-log link and the logit link are very similar (Singer and Willet, 2003).

Similar to the study of modern method adoption, data came from three levels (the episode, the woman and the community levels). It is noteworthy that nearly 90 percent of women included in the subsample had only one episode of contraceptive use, which made the three-level analysis unnecessary. We therefore performed two-level complementary log-log models in this study. Analyses were carried out with Stata 8 Special Edition (StataCorp, 2003).

RESULTS

1. Study of adoption of modern contraception

The subsample for the study of modern contraceptive adoption consisted of 1,666 women who had at least one pregnancy outcome within the three years preceding the survey. Table 1 shows that the vast majority of these women (98 percent) had no more

[3] The complementary log-log function is mathematically the logarithm of the negative logarithm of the probability of event non-occurrence.

than three pregnancy outcomes within that period; more than 60 percent of them had only one pregnancy outcome.

TABLE 1 GOES HERE

Among the 2,535 pregnancy outcomes that occurred within the three years before the survey, 794 – nearly one in four - were followed by the adoption of a modern method of contraception, including sterilization, within the observation period. Very few women adopted a modern contraceptive method in the month immediately following a pregnancy outcome, but by the end of the third month, about 23% of them had done so. Most of the contraceptive adoption in this study sample occurred within the first year following a pregnancy outcome. By the end of the first year, the cumulative rate of adoption of a modern method of contraception was 39.2% and it reached nearly 50% by the end of the second year for women who were observed for more than two years. The most frequently adopted method was the IUD (71%), followed by condoms (16%); oral pills accounted for a minority of method use (9%), while female and male sterilizations and injection use were minimal.

As previously mentioned, a significant proportion of women in this subsample had more than one pregnancy during the three-year interval. In addition, the average number of women interviewed in each community was 12.5 and more than 90% of the communities had at least five women interviewed; 60% had at least 10 women interviewed. The amount of clustering, therefore, was significant at both individual and community levels. Ideally, clustering at these two levels should be statistically controlled for. However, there is not yet a statistical package that can handle a three-level Cox

proportional hazard model. Therefore, we opted for models that control for clustering at the outer most level – the community level. Pregnancy outcomes that happened to the same women who lived in the same community would share the same "frailty" or same "unobserved" characteristics of the community that may affect the hazard of adopting modern methods of contraception. The argument is that by controlling for correlation at the highest level, the models would provide unbiased estimated of the effects of programmatic factors on the outcome, as would the ideal three-level maximum likelihood procedures (Angeles et al., 2002).

Table 2 presents the unadjusted and adjusted hazard ratios, using the Cox proportional hazard model, with the outcome defined as the hazard of accepting a modern method of contraception following a pregnancy outcome. The effects of individual characteristics upon contraceptive adoption are consistent with expectations. There was a steady increase in both the unadjusted and adjusted likelihood of modern contraceptive adoption with each increased level of women's education, as well as motivation to practice family planning. Urban residence, employment status, household wealth level and age of the women at the time of pregnancy outcomes were not found to be significant predictors of modern contraceptive adoption after a recent pregnancy outcome in the multivariate analysis.

TABLE 2 GOES HERE

Statistical associations were also observed between contraceptive adoption and the aggregated levels of women's education and baseline modern contraceptive prevalence. While the effects of community-level women's education were of marginally

statistical significance, modern contraceptive prevalence in the communities at the beginning of the three-year period was strongly related to increased likelihood of modern contraceptive adoption. Clearly, in such a country as Vietnam, where fertility transition has been under way for the last few decades, and contraceptive practice has become a normative and widely accepted behavior, the observed close relationship between the community-level contraceptive prevalence and the individual-level contraceptive adoption is quite expected.

Among variables measuring accessibility and quality of outreach family planning program and commune health centers, marginally statistically significant associations were found between the likelihood of contraceptive adoption after a recent pregnancy outcome and both the number of contraceptive methods provided by the outreach program and the commune health center quality of care index. If more than two modern methods of contraception were provided by the outreach program, the likelihood of adoption increased by 40%, an effect which was of borderline statistical significance ($p<.10$). The hazard of adoption also increased by 18% for every 1-unit increase in the commune health center quality of care score. The hazard of adoption was not statistically reduced with longer time to travel to commune health centers; neither was it associated to the frequency of outreach visits to the communities.

2. Study of contraceptive continuation

The sample for this analysis includes 2,463 women who either were using a method of contraception at the beginning of the three year interval, or who adopted a method during the observation period. Contraceptive use during the three months

immediately before the survey was excluded in recognition of possible underreporting of first trimester pregnancies at the time of the survey, which could potentially bias estimates of contraceptive discontinuation resulting from method failure. If a woman became pregnant while using a method of contraception and was in the early stage of the pregnancy, she might not have realized and reported the pregnancy. As a result, the failure rate for the three-month period prior to the interview might be underestimated.

This sample of women contributed a total of 2,804 episodes of contraceptive use, with each woman contributing between one and five episodes. Most women (88 percent), however, had only one episode of contraceptive use that either ended in the three years before the survey or was censored at the time of the survey. About 10 percent of women had two episodes; very few had three or more episodes of contraceptive use. Table 3 presents the distribution of all episodes by method of contraception. The IUD remained the most frequently used method, accounting for nearly half of all episodes. Among modern methods of contraception, condoms were the second most commonly used method (12%), followed by oral pills (10%). Other modern methods were not as widely used. Although some traditional methods were also popular, with withdrawal accounting for about 15% and rhythm accounting for 8% of all episodes, the focus of this study on continuation will be the three main modern, temporary methods that were most frequently used in this population: the IUD, oral pills and condoms. Together, they accounted for 1,978 total episodes of use.

TABLE 3 GOES HERE

In the following section, we discuss findings from our pooled analyses of first- and all-method discontinuation, the latter where switching to other modern methods, including sterilization, was considered continuation. We also examine discontinuation for any reasons as well as discontinuation due to service-related reasons, which include method failures, side effects, health concerns, desire for a more effective method, inconvenience of use and costs. These are reasons that, at least in theory, may be addressed by improving access and quality of family planning services and do not suggest a change of a woman's desire to limit or delay childbearing (Blanc et al, 2002). In the analyses of service-related discontinuation, discontinuation due to other reasons was censored at the point when women ceased use, following the associated single-decrement life table approach.

The cumulative one-year first-method discontinuation rate for the three main methods (the IUD, oral pills and condoms) was 13.7%. When switching from one modern, temporary method to another modern method (temporary or permanent) was considered as continuation, the all-method discontinuation rate by the end of the first year of use was 9.2%. Among discontinuers, service-related reasons accounted for two-thirds of all first-method discontinuers and more than half of all-method discontinuers (see Table 4). These results indicate that a small but significant number of users of modern, temporary contraceptive methods switched from one method to another for reasons which should be addressable by the service delivery program. Although not shown here, more than one-half (55%) of the 100 users who switched between modern methods of contraception did so because of side effects and health concerns they experienced with the first method. 17.6 percent women who switched cited inconvenience in the use the

first method, and an additional 23.5% did so because they did not think that the first method was highly effective. With regard to the method that women had been using before they switched to another modern method of contraception, the IUD was used by 41% who switched, condoms by 18%, and oral pills by 13% of those who switched.

TABLE 4 GOES HERE

There were other interesting variations in reasons for discontinuation by duration of use (results not shown), which were similar for both first- and all-method discontinuation. Discontinuation in the earlier months of use was mainly due to reasons that were related to service and the methods themselves, while much of the discontinuation after the first year was due to reduced needs, most notably the desire to get pregnant.

We next employed the discrete-time hazard model with complementary log-log link to examine the influence of individual and community characteristics on first and all-method discontinuation, for any as well as service-related reasons. Duration of use was divided into groups: 1-3 months, 4-6 months, 7-12 months and 13 months or more. In each of these discrete-time intervals, the hazards of discontinuation maintained proportionality. In addition, programmatically, the first few months of use are more important for family planning services, as women are more likely to discontinue contraceptive use in these early months if they experience side effects with their method. As a result, each episode of contraceptive use consisted of between one and four discrete-time durations, and thus contributed up to four observations in the data set, expanding the sample size for the three methods of contraception from 1,978 to 6,529 observations (for

first-method discontinuation analysis) and from 1,852 to 6,446 observations (for all-method discontinuation analysis). Table 5 presents results from all the discontinuation analyses.

TABLE 5 GOES HERE

Across all the four analyses, women who were gainfully employed had lower risks of modern method discontinuation. Lower likelihood of discontinuation for any reasons was also found among women who were more than 30 years of age at the time of contraceptive adoption, although age was not associated to service-related discontinuation. Motivation to practice family planning, as measured by the difference between ideal and actual family size, failed to make a statistically significant difference.

In terms of community characteristics, neither aggregated levels of women's education nor modern contraceptive prevalence at baseline was found to be statistically associated with the risk of contraceptive discontinuation. Among programmatic factors, only accessibility and quality of commune health centers emerged as significant, and this was true across discontinuation outcomes. Travel time to the health center had a positive effect on discontinuation of contraceptive use, with users who lived further away from the health center more likely to discontinue than those who lived closer, for any given period of time ($p<.01$). On the contrary, users who lived in communities with health centers that had higher scores on the index of quality were significantly less likely to discontinue use of modern contraception ($p<.05$). An explanation might be that contraceptive users who lived in communities with higher quality commune health centers had more readily access to resupplies and/or professional help when needed.

Access and quality of the outreach program did not seem to be important to any of the discontinuation outcomes.

3. Interaction effects

Since commune health centers were found to have an important role in women's contraceptive adoption in the first analysis, we further examined how the effects of the commune health centers might vary by individual and community characteristics. To do so, interaction terms between commune health centers' characteristics and the women's number of years of schooling, age and family planning motivation at the time of pregnancy outcome, as well as the aggregated level of women's education, were sequentially tested for the total subsample (results not shown).

The only significant interaction observed was between the women's years of schooling and time to travel to commune health centers ($p<.05$). Figure 1 below depicts the estimates of hazard ratios of joint effects of education and physical access to commune health centers, calculated using a simulation procedure, on women's subsequent adoption of modern contraception. To illustrate the differential effects of physical distance to commune health centers on subsequent modern contraceptive adoption, we assigned different values of time to travel to the health centers and predicted the hazard ratios of contraceptive adoption for the three levels of women's schooling. We used the mean value on the log scale (which is 2.35), and the mean plus or minus one standard deviation (.96) of time to travel to commune health centers for the simulations. The figure illustrates stronger proportional negative effects of physical access to

commune health centers on modern contraceptive adoption among women who were less educated compared to more educated women.

FIGURE 1 GOES HERE

In the analysis of method continuation, we also examined whether programmatic factors had differential effects among different groups of women who had different individual and community characteristics. We found that access to commune health centers had stronger effects on women who were older than 30 at the time of contraceptive adoption (see Figure 2). For first-method discontinuation for any reasons, a unit increase in travel time (on a log scale) to commune health centers would result in a 22 percent increase in the likelihood of discontinuation among younger adopters, but a 65 percent increase in the likelihood of discontinuation of older adopters. The results were similar for the other discontinuation outcomes. In addition, we also confirmed our hypothesis that the effects of access to commune health centers on first-method discontinuation due to any reasons were strongest during the first three months of use, and diminished after that (see Figure 3). Quality index score of commune health centers, however, did not show any differential effects by duration of use. No other differential effect of the programmatic factors by duration of use was observed with the other discontinuation outcomes.

Finally, we implemented the same analyses, stratified by urban/rural residence to examine how programmatic factors might operate differently. Results from rural areas were largely similar to those of the total subsamples, while very few statistically significant associations were observed in the urban groups. Part of the reason may be the

small sample sizes of the urban women, but a potentially more important explanation may lie with the fact that the programmatic factors considered in this study were truly less important in urban than in rural. Urban women generally have much greater access to a variety of family planning service providers and are not limited to only public sector sources. The assumption that every woman in the same community would use the same services provided by the outreach program and the commune health centers is also unlikely to hold for urban women. In addition, the measures of programmatic variables were not able to capture the full range of variety in access and quality of services provided for the total sample and much less so for the urban sample. A closer exploration of the data also revealed that while the prevalence of modern contraception at baseline was the same for rural and urban communities (37.6% versus 38.0%, respectively), and more women in urban than rural areas had ever used contraceptives, urban women actually relied more on traditional methods and condoms for contraception. Fourteen percent of urban women were using the calendar method at the time of the survey, compared to only 5.9% of rural women. Furthermore, with the exception of condoms, which were used by 11.5% of urban women and 4.8% of rural women at the time of the survey, all of the other modern methods of contraception were less commonly used among urban than rural women. As a result, the prevalence of modern methods of contraception at the time of the 1997 survey was only 52.8% among urban women, compared to 56.1% among rural women. This difference was still observed in the subsequent 2002 DHS (Committee for Population, Family and Children, 2003). Since condom use does not require service use from the outreach program and health facilities,

the finding that programmatic factors were not significantly important for modern contraceptive adoption among urban women is hardly surprising.

DISCUSSION

Our study shares a number of well-known limitations that are related to the use of DHS data for the evaluation of the effects of service provision. A key limitation is the limited data on service quality, and the fact that the variables available measure more the service delivery infrastructure rather than the actual quality of services provided to clients. In addition, most of the individual, community and programmatic variables used in this study were measured at the time of the interview. Thus, they may produce biases as they may not be accurate measurements of the characteristics or experience of women with the service program at the time of contraceptive adoption or use—this is again a particular concern with our service program measures. In addition, the measure of motivation used was the difference between the actual number of children and the ideal number obtained at the time of interview. Since women are likely to have adjusted their ideal number of children according to the actual number they already had, our measure of motivation might be an underestimate of true measure of motivation for contraceptive use.

Nevertheless, the study provided evidence that the family planning program in Vietnam, especially the commune health center system, plays a critical role in women's adoption and continuation of modern methods of contraception. Quality of health center service was significantly associated with both increased likelihood of adoption and lowered risks of discontinuation. Access to the commune health centers was more important for contraceptive discontinuation than for adoption. Meanwhile, the outreach

program did not appear to play a significant role in either adoption or continuation of modern contraceptive use. Only quality of the outreach program had a marginally significant association with adoption.

The findings of this study have important program implications. First, the lack of a strong relationship between the outreach component of the program and both adoption and continuation of modern methods of contraception needs further exploration, given the costs of maintaining a large network of field workers and mobile teams. Some of these workers and mobile team members come from the commune health centers or district hospitals. Maintaining the outreach program when it may no longer be effective adds more work to the already heavy burden of these workers, with high costs, and with few or no apparent benefits. About one in four women still lived in communities that were not routinely covered by the outreach network, and it did not have an effect on their likelihood of adoption, as well as first and all-method continuation of modern contraceptive use. Unfortunately, while the outreach component has been in place since the early days of the Vietnamese family planning program (in the 1970s) and assumed to be an important source of contraceptives and other family planning services, there has been no formal evaluation of this program component. The role of outreach workers, as the first point of contact between women and the family planning program, other than commune health centers, should be carefully evaluated. In addition, while the Government of Vietnam has long emphasized coverage of health and family planning services in communities, little exploration has been carried out to assess the quality of either the outreach network or the health centers. Because of the availability of measurements in DHS data, physical access may also have been overly emphasized.

There are other dimensions of access (economic, cognitive, psychosocial and administrative) that may be overlooked in this study (Bertrand et al., 1995).

Not withstanding the imperfect measures of access and quality of commune health centers available from DHS data, we still found that commune health centers played a significant role in adoption and first and all-method continuation of modern contraceptive use, especially in rural areas. However, the finding that individual characteristics (education and reproductive motivation) were more important for adoption than quality of commune health center care suggests there may be issues with measurements of accessibility and quality of commune health centers. Another possible explanation could be that the finding accurately reflects the situation in Vietnam, where family planning has been increasingly widely practiced for the last several decades, and where programmatic factors may have become increasingly less important in the contraceptive adoption process. Nevertheless, the findings of the study provide evidence for and emphasize the needs to improve quality of services while the family planning program's emphasis is being shifted from recruiting new acceptors to promoting longer duration of contraceptive use. The study identifies priorities for further research on issues of client perspectives of quality and gaps in the service provision environment. The findings also suggest the need for special attention by family planning service providers to users during the early months of use. In addition, the study also points out groups that are more easily affected by changes in the service environment. Efforts for improving program access and quality should be designed and implemented with less educated and older women in mind, as they are more vulnerable to poorer access and quality of services.

TABLES AND FIGURES

Table 1. Number of pregnancy outcomes within the three years preceding the survey per woman, Vietnam, 1997.

Number of pregnancy outcome	Number of women	Percent
1	1,029	61.8
2	451	27.1
3	148	8.9
4	31	1.9
5	6	.4
6	1	.1
Total	**1,666**	**100.0**

Table 2. Results from bivariate and multivariate Cox proportional hazard models on subsequent adoption of any modern method of contraception, following a recent pregnancy outcome, Vietnam, 1997.

Independent variables	Cumulative one-year adoption rate	Unadj.	Adj.
	%	Haz. ratio (se)	Haz. ratio (se)
INDIVIDUAL-LEVEL			
Residence			
Rural (ref.)	38.6	1.00	1.00
Urban	41.8	.92 (.13)	1.10 (.21)
Employment			
Unemployed (ref.)	38.9	1.00	1.00
Paid employment	39.2	1.13 (.15)	1.01 (.13)
Years of women's schooling			
0 – 5 (ref.)	31.7	1.00	1.00
6 - 9	41.6	1.57 (.21)**	1.28 (.21) †
10 or more	45.2	1.91 (.31)***	1.65 (.33)*
Household wealth			
Low (ref.)	34.7	1.00	1.00
Middle	43.5	1.67 (.22)***	1.18 (.16)
High	40.1	1.30 (.19)†	.89 (.16)
Age at start of episode			
15 – 29 (ref.)	38.5	1.00	1.00
30+	40.2	1.31 (.16)*	1.01 (.14)
Actual vs. ideal numbers of children at start of episode			
Actual < Ideal (ref.)	37.7	1.00	1.00
Actual = Ideal	41.6	1.77 (.28)***	1.33 (.23)*
Actual > Ideal	43.9	1.96 (.36)***	1.47 (.22)**
COMMUNITY-LEVEL			
Proportion of women with at least 6 years of schooling			
Low (ref.)	32.7	1.00	1.00
Medium	40.1	1.71 (.24)***	1.32 (.21)†
High	46.1	1.84 (.26)***	1.37 (.24)†
Modern contraceptive prevalence at baseline (log scale)	–	1.91 (.26)***	1.75 (.28)***
Outreach program			
Outreach visit at least once a month			
No	37.9	1.00	1.00
Yes	39.7	1.61 (.36)*	.80 (.11)
Number of contraceptives provided by outreach program			
0 -1 (ref.)	28.8	1.00	1.00
2 or more	40.1	1.31 (.16)*	1.42(.33) †

Independent variables	Cumulative one-year adoption rate	Unadj.	Adj.
	%	Haz. ratio (se)	Haz. ratio (se)
Health center			
Time to travel to health center (log scale)	–	.92 (.05)	.95 (.06)
Index of quality of health center	–	1.18 (.09)*	1.18 (.09)†
Control variables			
Duration of breastfeeding	–	–	.95 (.01)***
N (episodes)	2,535	2,535	2,535
Log pseudo-likelihood			-5784.82
Wald test: Chi-squared			105.69
Prob >chi-squared			.0000

† p<.10; * p<.05; ** p<.01; *** p<.001

Table 3. Distribution of contraceptive methods used within the 3 years preceding the survey

Contraceptive method used	Frequency	Percent
Oral pills	267	9.5
IUD	1,367	48.8
Injectables	10	.4
Condoms	344	12.3
Female sterilization	121	4.3
Male sterilization	18	.6
Rhythm	228	8.1
Withdrawal	407	14.5
Abstinence	39	1.4
Other traditional methods	3	.1
Total	**2,804**	**100.0**

Table 4. Reasons for discontinuation among recent first-method and all-method discontinuers of IUDs, oral pills and condoms, Vietnam, 1994 – 1997.

Reason	First-method Discontinuation (%)	All-method Discontinuation (%)
Service related	***65.8***	***55.9***
Became pregnant while using	19.7	30.0
Side effects	20.5	15.0
Health concerns	11.0	10.2
Wanted more effective method	7.0	1.0
Inconvenient to use	7.5	2.4
Costs	.3	.3
Reduced needs	***24.7***	***33.8***
Wanted to become pregnant	22.9	31.4
Infrequent sex/husband absence	1.8	2.4
Others	***9.5***	***10.2***
Husband's disapproval	2.5	2.4
Don't know	.3	.3
Others	6.7	7.5
Total (N)	**100.0 (401)**	**100.0 (293)**

Table 5. Results from discrete-time complementary log-log models on first and all-method discontinuation among recent users of oral pills, IUDs and condoms, Vietnam, 1994-1997.

Independent variables	Discontinuation: Any reason		Discontinuation: Service-related reasons	
	First-method	All-method	First-method	All-method
	Coef. (se)	Coef. (se)	Coef. (se)	Coef. (se)
INDIVIDUAL-LEVEL				
Residence				
Rural (ref.)	-	-	-	-
Urban	.04 (.19)	.07 (.24)	.18 (.23)	.26 (.30)
Employment				
Unemployed (ref.)	-	-	-	-
Paid employment	-.40 (.11)**	-.34 (.13)**	-.31 (.14)*	-.22 (.11)*
Years of women's schooling				
0 – 5 (ref.)	-	-	-	-
6 - 9	.01 (.15)	.10 (.18)	-.06 (.18)	.09 (.23)
10 or more	.05 (.18)	.09 (.24)	.08 (.21)	.05 (.30)
Household wealth				
Low (ref.)	-	-	-	-
Middle	.20 (.16)	.19 (.19)	.17 (.18)	.15 (.24)
High	.10 (.18)	.03 (.23)	-.05 (.23)	-.19 (.31)
Age at start of episode				
15 – 29 (ref.)	-	-	-	-
30+	-.40 (.13)**	-.37 (.14)**	-.09 (.15)	.13 (.17)
Actual vs. ideal numbers of children at start of episode				
Actual < Ideal (ref.)	-	-	-	-
Actual = Ideal	-.09 (.13)	-.09 (.16)	-.06 (.14)	-.12 (.19)
Actual > Ideal	-.15 (.12)	-.06 (.14)	-.30 (.14)	-.24 (.18)
COMMUNITY-LEVEL				
Proportion of women with at least 6 years of schooling				
Low (ref.)	-	-	-	-
Medium	.06 (.19)	-.01 (.25)	.04 (.22)	.00 (.31)
High	-.04 (.21)	-.14 (.27)	-.05 (.24)	-.24 (.35)
Modern contraceptive prevalence at baseline (log scale)	.04 (.18)	.05 (.23)	-.01 (.25)	.05 (.33)
Outreach program				
Outreach visit at least once a month				
No	-	-	-	-
Yes	-.01 (.13)	-.12 (.16)	-.13 (.15)	-.00 (.20)
Number of contraceptives provided by outreach program				
0 -1 (ref.)	-	-	-	-
2 or more	.27 (.39)	.09 (.35)	.83 (.61)	.59 (.57)

Independent variables	Discontinuation: Any reason		Discontinuation: Service-related reasons	
	First-method	All-method	First-method	All-method
	Coef. (se)	Coef. (se)	Coef. (se)	Coef. (se)
Health center				
Time to travel to health center (log scale)	.25 (.06)***	.24 (.07)***	.29 (.07)***	.28 (.09)**
Index of quality of health center	-.19 (.08)*	-.16 (.09) †	-.32 (.09)***	-.31 (.12)*
Control variables				
Duration of episodes that started before baseline	-.01 (.01)	.01 (.01)	.01 (.01)	.00 (.01)
Method used				
IUD (ref.)	-	-	-	-
Oral pills	1.41 (.16)***	1.32 (.18)***	1.34 (.18)***	1.27 (.21)***
Condoms	1.15 (.14)***	1.00 (.16)***	1.07 (.17)***	.88 (.24)***
Duration of use				
1 – 3 months (ref.)	-	-	-	-
4 – 6 months	-.15 (.17)	-.28 (.22)	-.14 (.17)	-.31 (.25)
7 – 12 months	-.68 (.19)***	.19 (.19)	.26 (.18)	.19 (.24)
13 + months	1.06 (.15)***	1.41 (.16)***	.79 (.16)***	1.00 (.21)***
N	6,529	6,446	6,529	6,446
Log pseudo-likelihood	-1350.62	-1056.58	-1022.98	-708.01
AIC	.42	.34	.32	.23
BIC	-5447.52	-53833.78	-55102.81	-54530.92

† p<.10; * p<.05; ** p<.01; *** p<.001

Figure 1. Hazard ratio estimates of effects of time to travel to commune health centers and education on subsequent modern contraceptive adoption, Vietnam 1997

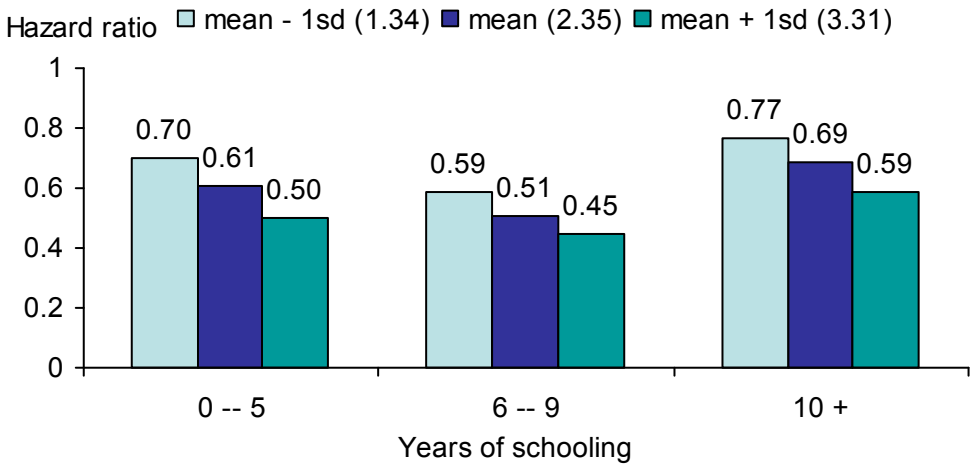


Figure 2. Hazard ratio estimates of effects of time to travel to commune health centers and age at adoption on first- and all-method discontinuation for any reasons, Vietnam 1997

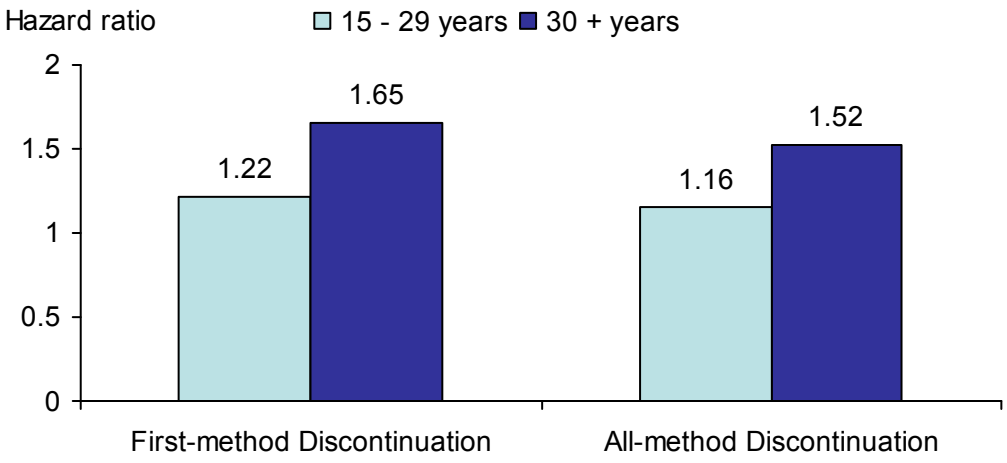
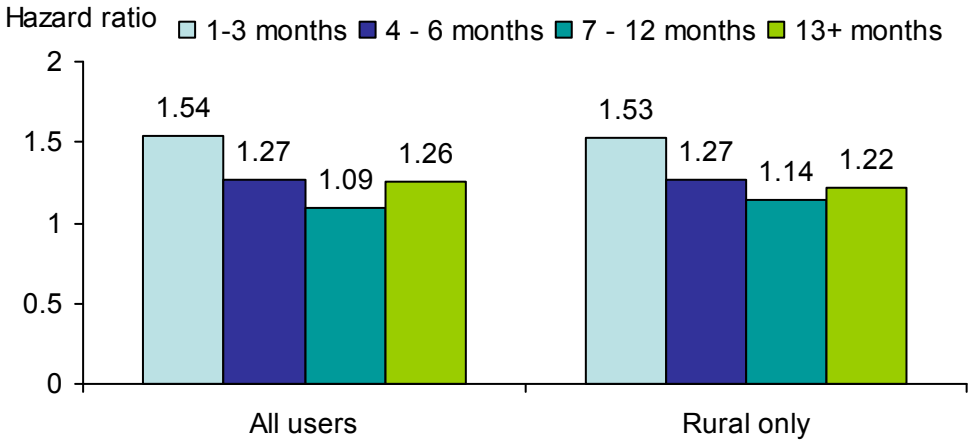


Figure 3. Hazard ratio estimates of effects of time to travel to commune health centers and duration of use on first-method discontinuation for any reasons, Vietnam 1997



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