Family Planning, Maternal/Child Health, and Sexually-Transmitted Diseases in Tanzania: Multivariate Results using Data from the 1996 Demographic and Health Survey and Service Availability Survey

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I. Introduction

Tanzania is a Sub-Saharan African country with a large and rapidly growing population. At the time of the Tanzania Demographic and Health Survey (TDHS91) in 1991, the population was 27 million with a total fertility rate of 6.3. This large rate of population increase coupled with an under five mortality rate of 141 per 1,000 and per capita GNP of $110 provided the impetus for the development of a "National Population Policy" in March 1992. The policy is implemented by the National Family Planning Programme (NFPP) through the Government's Family Planning Unit (FPU) which is under the Ministry of Health. Substantial financial and technical support has been made available from a number of bilateral and multilateral organizations. The major donors for family planning are the United States Agency for International Development (USAID), The United Nations Population Fund (UNFPA), and the International Planned Parenthood Federation (IPPF). The British Overseas Development Administration and the German Association for Technical Cooperation also make significant contributions. While IPPF assistance is centered around their own set of clinics that provide family planning, the bulk of the assistance provided by USAID and UNFPA runs through the FPU which is under the Ministry of Health. UNFPA is currently in a five year program that provides $21 million of support while the USAID funded Family Planning Services Support (FPSS) Project that began in 1990 had an initial bilateral funding level of $20 million for seven years.

The Government of Tanzania endorsed the recommendations of the ICPD (International Conference on Population and Development) and opened the Centre for Reproductive Health in April 1997. These moves are bringing family planning into a Reproductive Health Framework which integrates FP with STD/HIV/AIDS interventions and safe motherhood. The purpose of this report is to use merged, nationally representative population level data and facility level data gathered in 1996 to examine the determinants of the key outcome variables of the program. The determinants of contraceptive method choice will be a major focus of this report; however, other outcome variables related to reproductive health such as desired family size, the use of antenatal care, trained delivery, vaccinations, and STD/HIV/AIDS testing will also be examined. We will look at both individual and household level determinants of these outcome variables. In addition, since the major components of the FPU program are to train health

providers in the provision of family planning as a component of reproductive

health, provide logistical support for the provision of family planning supplies, and to develop an information, education, and communication (IEC) program that would promote family planning, we will examine the impact of these factors on our outcome measures as well.

This report is organized as follows. In the next section, we present background information on the two linked surveys: The 1996 Tanzania Demographic and Health Survey (TDHS96) provides us with information on important outcomes at the individual level, as well as individual level explanatory factors such as the respondent's age and education. The 1996 Tanzania Service Availability Survey (TSAS96) provides us with program variables measured at the facility level that may also have impact on individual level outcomes, such as the choice to use a contraceptive method or the choice to obtain antenatal care. Section III provides an overview of the multilevel, multivariate statistical methods that we use as well as descriptive statistics for all variables. Section IV presents results for the multivariate analysis of the choice of contraceptive method and the closely related variable, additional children desired. In this section, we also attempt to measure the impact of the FPU training program, which has been highly targeted to urban areas. This targeting makes evaluation more difficult.

Section V presents results for other important outcome variables. This section is divided into two parts: The first part examines MCH related outcome variables such as the use of antenatal care, the use of trained delivery services, and child immunizations. The second part examines program effects on STD related outcomes. We conclude in Section VI.

II. Background on the Surveys

1996 Demographic and Health Survey

The 1996 Tanzania Demographic and Health Survey (TDHS) was the third national sample survey of its kind to be undertaken. The first DHS survey was done in 1991-92, followed by the Tanzania Knowledge, Attitudes and Practices Survey (TKAPS) in 1994. In addition to the same questions included in these two surveys, the 1996

TDHS added more detailed sections of questions on AIDS, maternal mortality, and female circumcision.

The general objectives of the 1996 TDHS were to:

- Provide national-level data that will allow for the calculation of various demographic measures, including fertility and childhood mortality rates.
- Analyze the direct and indirect factors which determine the level and trends of fertility.
- Measure the level and type of contraceptive knowledge and practice of both women and men;
- Collect reliable data on maternal and child health indicators, including but not limited to the following: immunization patterns; prevalence and treatment of diarrhoea and other diseases among children under age five; antenatal medical visits; type of assistance at delivery; and breast feeding.
- Assess the nutritional status of children under age five and their mothers by means of anthropometric measurements (weight and height), and child feeding practices.
- Assess among women and men the prevailing level of specific knowledge and attitudes regarding AIDS, and evaluate patterns of behavior modification in response to AIDS (e.g. condom use).
- Measure maternal mortality and collect data on female circumcision.

The 1996 TDHS, like the previous surveys, involved various institutions and individuals. The Bureau of Statistics in the Planning Commission had the overall responsibility of running the survey, while the Ministry of Health provided technical and logistical support. Financial support was provided by the USAID and administered by Macro International Inc., which also rendered technical advice. The government of Tanzania provided local professional staff, accommodation, transport, and other field logistics.

The TDHS sample was a three-stage design, consisting of the same 357 enumeration areas (EAs) that were used in the 1991-92 TDHS (262 EAs in rural and 95 EAs in urban areas). The selection of EAs was made in two stages. First, wards/branches and EAs within wards/branches were selected. Lists of all households were prepared for the selected EAs and, at the third sampling stage, households were selected at random from these lists. The TDHS was designed to provide estimates (based on the results of the Woman's Questionnaire) for the entire country, for urban and rural areas in the country, and for groups of regions (zones). In addition, the sample will provide certain estimates for each of the 20 regions in the mainland and 2 subgroups in Zanzibar: Pemba Island and Unguja. However, in this report the analysis is restricted to the mainland, for reasons which will be explained below.

The survey consisted of three questionnaires. The household questionnaire was used to list the names of the household members, certain individual characteristics of all usual members of the household, and characteristics of visitors who had spent the previous night in the household. This basic information included relationships, age, sex, education, and place of residence. Furthermore, it collected information on characteristics relating to the household, including the source of water, type of toilet facilities, materials used for the floor of the house, and ownership of various durable goods. The other main purpose of the household questionnaire was to identify women and men who were eligible for the individual interview.

The female questionnaire was used to collect information from eligible women aged 15-49. The topics covered in this questionnaire included basic background characteristics of the woman, reproductive history, fertility preferences, attitudes about family planning, child and woman anthropometry, etc. Most of the areas of the analysis mentioned in the goals of TDHS96 were covered with the women's questionnaire. Other non-health related information collected included occupation, education, partner's occupation and education, and earnings. The male questionnaire collected much the same information as the women's questionnaire, but was shorter, due to the fact that it did not contain questions on reproductive history and maternal and child health. All questionnaires were translated and printed in Kiswahili.

Before the design of the questionnaires could be finalized, a pretest was done in May-June 1996 to assess the viability of the questions, the flow and logical sequence of

the skip pattern, and the field organization. The pretest covered an area outside Dar es Salaam and took approximately one week to complete. Some modifications to the questionnaires were made based on lessons drawn from this exercise.

For the data collection, the 1996 TDHS field staff consisted of eight teams, each composed of six female interviewers, one male interviewer, a field editor, a supervisor, and a driver. Sixty female nurses and 12 male nurses were recruited and 8 statisticians were selected as supervisors. After three weeks of intensive training in early July 1996, necessary because of the length and complexity of the questionnaires, 50 female and 8 male interviewers were selected for the fieldwork. Supervisors and editors were trained exclusively for an additional three days to discuss their duties and responsibilities. Emphasis was given to the importance of ensuring data quality. The fieldwork for the main survey began in late July 1996, and lasted until November 1996. Office editing and data processing activities were initiated immediately following the receipt of the questionnaires from the field, and was completed in mid-December, 1996.

In the 1996 TDHS, 8,900 households were selected, out of which 8,141 were occupied. Of the households found, 7,969 were interviewed, representing a response rate of 98 percent. In the interviewed households, 8,501 eligible women (i.e., women age 15-49) were identified for the individual interview, and 8,120 women were actually interviewed, yielding a response rate of 96 percent. For further details on the survey and descriptive statistics, see *Tanzania Demographic and Health Survey 1996.*

Now we discuss the second survey used in this analysis, which was designed from the outset to be linked to the information collected in the 1996 TDHS.

1996 Facility Survey

These 1996 Tanzania Service Availability Survey data were gathered by the Bureau of Statistics (BOS) of the Government of Tanzania. The FPU worked with the BOS to develop the survey instruments and to coordinate the training of interviewers. Technical support and funding for the survey were provided by the USAID funded EVALUATION Project of the University of North Carolina at Chapel Hill. TSAS96 contains data that can be compared to two earlier surveys, as well as extensive additional information that is described below.

The survey instruments used combine features of the standard Situation Analysis questionnaires (e.g., Tanzania Family Planning Situation Analysis Study, 1993, conducted by the Ministry of Health, Dar es Salaam, Tanzania in conjunction with the Africa OR/TA Project, Population Council, Nairobi, Kenya) and a DHS Service Availability Module. Five main instruments as well as four ancillary forms were used.

The 5 main instruments were:

A. The *Facility Observation* instrument gathered information about equipment and supplies in the facility as well as the availability of medications. Service statistics for family planning and all other services were also collected.

B. The *Facility Interview* form involved an interview with the person in charge of the facility when possible, or a knowledgeable person at the facility. This instrument gathered information about staffing at the facility, problems with stock outs of family planning supplies, information about record keeping, and visitor programs.

C. The *Family Planning Service Provider Questionnaire* was administered to most family planning service providers at all facilities. The instrument gathered information about both pre-service and in-service training as well as information about specific services provided by the practitioner. The provider was also questioned about the way in which information about family planning services were given.

D. The *Family Planning Facilities, Procedures, and Practices Questionnaire* was used to gather information about the costs of providing services by leading the family planning manager through scenarios for some family planning and other reproductive health related services. This instrument requires quite a bit of time to complete and was only administered in a subset of facilities.

E. The *Exit Interview for Female Family Planning Clients* was used in a subset of facilities to gain information about client satisfaction with services and to determined what type of information about family planning the client received from the facility. Information about the clients' contact with other types of IEC, such as contact with radio or television programs, was also solicited.

Selection of Interviewers and Interviewer Training

The interviewers were 40 recent female graduates from the nursing program at Muhimbili Hospital in Dar es Salaam. They were trained by the BOS with assistance from the FPU, INTRAH, and The EVALUATION Project. Because the survey instruments were relatively lengthy and complex, training required 3 weeks and included field testing of the instruments. At the end of training, the interviewers were combined into 10 teams of 4 interviewers. Each team was assigned 2 of Tanzania's 20 mainland regions. The BOS Census Officer from each region served as team supervisor, and collected data about facility size and construction.

Linkage to the 1991 and 1994 Surveys

TSAS96 is a follow up to two earlier facility surveys carried out in Tanzania. The three surveys are longitudinal in the sense that exactly the same facilities were visited so that valid comparisons could be made across years. While the 1996 data will be the primary source of facility level data used for our calculations, in a few cases described below, the earlier data is also used to enrich the analysis. TSAS96 added some additional facilities that were not visited in previous years. The first survey (TSAS91) was conducted in 1991 by the Tanzania Bureau of the Statistics (BOS) of the Government of Tanzania's Planning Commission in conjunction with Macro International, Inc. The second (TSAS94) was also carried out by BOS in collaboration with the EVALUATION Project.

As with all DHS surveys, the original sampling strategy for the facility surveys was based on a cluster design. In all, 357 clusters were originally sampled. This report, however, is only relevant for the 327 mainland clusters, while excluding 30 clusters from Zanzibar. Within each cluster, the nearest hospital, health center, and dispensary was identified. Those facilities located within 30 kilometers of the cluster were then interviewed. (See S. Ngallaba et al.: *Tanzania Demographic and Health Survey 1991/1992* for a discussion of the survey and sampling methods). The sample size of this database is determined not by the number of clusters, but rather by the number of unique facilities contained in the final sample. Thus, instead of 327 facilities of each type in the sample, the number was reduced by several factors. First, in many instances the nearest hospital and health center (and occasionally even the nearest dispensary) was not located within 30 kilometers of a sample cluster, so no facility of that type was visited to represent the cluster. Second, when two clusters were located near each other, the same facility

often was identified as being nearest to both clusters. That facility was visited only one time, and is represented only once in this analysis. Third, even when the facility was visited, the interview may have not taken place because the facility staff refused to be interviewed.

Table 1 summarizes the reasons for loss of facilities from the survey. In the 1994 and 1996 surveys, BOS attempted to get cooperation from the facilities that refused to participate in preceding years. As can be seen from the table below, sample sizes increased in later years as more facilities chose to cooperate in the survey. The later figures are also larger due to the addition of new facilities. In 1996, all 10 UMATI (the local IPPF affiliate) were added to the sample of facilities as well as 5 of the 6 Marie Stopes Clinics that were in operation in 1996. Both of these types of facilities operate in urban areas of Tanzania. Descriptive statistics can be found in *Tanzania Service Availability Survey 1996*.

Table 1: Facility Sample Sizes

	Hospitals	Health Centres	Dispensaries
Eligible by cluster	191	204	329
Duplicates	81	76	83
Unique Facilities	110	128	246
Omitted (>30km)	18	32	2
Refusals 1991	11	7	26
1991 Total	81	89	218
1994 Total	89	118	230
1996 Total	90	123	253

III. Multivariate Methods and Descriptive Statistics

Methods

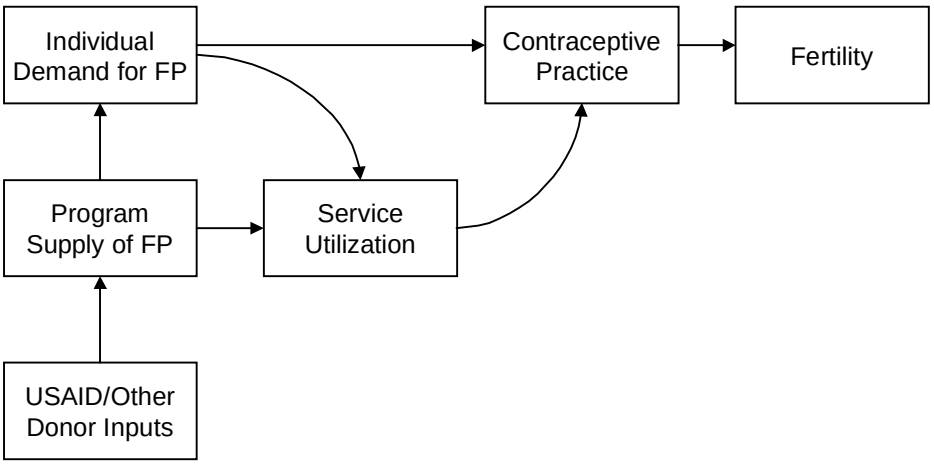
The type of multivariate models we estimate are referred to as reduced form models, which we further elaborate on below. An important feature of this type of estimation methodology is that we cannot examine the pathways through which family planning programs affect the outcome variables, but we can examine total effects. For example, a family planning program variable may have a direct effect on contraceptive

method choice and an indirect effect through a reduction in desired family size. Reduced form models will only measure the total effect and not examine the pathways through which the program operates. The advantage reduced form models have over structural models is that they are much easier to estimate, especially when only cross-sectional data is available, since there is no need to worry about identification problems that tend to make structural equation model estimates both unstable and controversial.

In the models estimated below, we make the critical assumption that decisions about placement and intensity of the family planning program in the country are exogenous to the outcome variables. In other words, we are assuming the distribution of family planning services are, for all practical purposes, randomly assigned. This may be an unrealistic assumption, and if so, the direction in which the results could be biased is a function of the true strategy used by the program. For example, if the government targeted the program to high fertility areas, it is reasonable to expect that program impact will be biased downwards, while if the program was targeted to areas where it was felt demand for services was high, one would expect an upward bias to the estimated impact. In our case, the placement of in-service trained providers was clearly highly targeted to urban areas, where the newly trained providers would see many clients and gain experience rapidly. This type of targeting presents serious analysis problems which we discuss below. This analysis is the only one in which we make explicit control for program targeting, but we discuss some anomalous results for other outcomes that may be due to non-random program placement.

Our reduced form analysis is guided by a conceptual framework that takes into account both demand and supply side factors that can affect fertility (see, for example, Easterlin and Crimmins 1985; Rosenzweig and Schultz 1985; Schultz 1989; and Buckner, Tsui, Hermalin, and McKaig, 1995). Figure 1 presents a simplified version of the conceptual framework presented in Buckner, Tsui, Hermalin, and McKaig (1995) and is similar to the diagram in Schultz (1989). An overview of the mathematical formulation for static models of the determinants of fertility can be found in Jensen (1985).

Figure1: Family Planning Demand and Supply Effects on Fertility



The simple model hypothesizes that exogenous individual background factors, such as the woman's age and education, household background factors, such as household assets, and family planning program variables all affect the woman's fertility preferences. Along with the direct effects of household and family planning program variables, fertility preferences affect contraceptive practice. Contraceptive practice, in turn, is a major determinant of fertility.

To fix ideas, we first discuss a simple structural equations model, based on Figure 1, for two outcomes. The statistical form for a structural equations model that would relate the set of outcomes listed above to exogenous individual, household, and community characteristics could take on a two equation form with the first equation modeling fertility preferences:

$$D_{ij} = X_{ij}^{D}\beta^{D} + P_{j}^{D}\alpha^{D} + \mu_{j}^{D} + \varepsilon_{ij}^{D} \qquad \textbf{(1)}$$

This equation states that fertility preferences for woman i (i=1,2,...N_j) from community j (j=1,2,...,J) are a function of X, a set of individual characteristics including age, education and household wealth among other variables; P, which represents family planning program variables such as distance to the nearest family planning facility and whether or not a CBD is active in the community; and two unobservable variables. The μ represents unmeasured characteristics of the community that affect fertility preferences, such as village leaders' attitudes towards large family sizes or the degree of motivation of family planning workers in the community. The ϵ represents unmeasured variables at the individual level, such as the woman's perception of her fecundity and her partner's family size desires.

The second equation models the contraceptive method choice decision:

$$C_{ij} = D_{ij}\gamma^{C} + X_{ij}^{C}\beta^{C} + P_{j}^{C}\alpha^{C} + \mu_{j}^{C} + \varepsilon_{ij}^{C}$$

This equation states that contraceptive method choice is a function of observed and unobserved community and individual level variables, as in the fertility preference equation. In addition, it is hypothesized that current method choice is a function of fertility preferences, measured here as desired family size. Note that contraceptive method choice is typically modeled within the framework of a multinomial logit model. We simply use the linear framework to make the exposition as straightforward as possible.

As specified, the fertility preferences equation is already in reduced form since there are no right-hand-side endogenous variables, and we must assume in this paper that program availability is exogenous. The reduced form for the contraceptive method choice equation can be found by substituting out for fertility preferences using equation (1):

$$C_{ij} = X_{ij}\pi_{1}^{C} + P_{j}\pi_{2}^{C} + v_{j}^{C} + \xi_{ij}^{C} \qquad \textbf{(3)}$$

where no superscripts on X and P indicate that all X's and P's enter the reduced from. The error still has community and individual components that are linear combinations of

the errors in the two structural equations.

This paper summarizes the results from reduced form equations of the general form laid out in equation (3) for all outcome variables. Estimation of equations like (2) would require us to be able to identify exogenous variables that only affect specific outcomes. This can be quite difficult with cross-sectional data sets, and even if "technical" identification is achieved, the results can be unstable. For more details, see Bollen, Guilkey, and Mroz (1995). Within the context of these reduced form models, we further hypothesize that program effects could be quite different in rural and urban areas. Therefore, we stratify individuals into urban and rural samples and estimate completely independent models for the two groups.

All of the tables of regression results are organized as follows. We first present coefficients for individual level variables associated with the respondent, such as her age and education and whether or not she has a partner. If she has a partner, we include her partner's education. This is probably our best proxy for the socioeconomic status of the household. We then include household characteristics, such as the ownership of a selected list of assets and whether or not the household has access to good water and sanitation. Finally we present results for the program variables, such as access to various types of family planning facilities and whether or not the respondent listens to a radio drama. In addition to presenting this basic set of results, we discuss our attempts to measure program impact for a variety of service quality measures that were not successful and we speculate on why this is the case.

Descriptive Statistics

Before we proceed to the regressions, however, Table 1a (in Appendix) provides descriptive statistics for all variables used in the analysis. The results are broken down by dependent variable, individual-level explanatory variable and facility-level explanatory variable, with means and standard deviations presented for both the urban and rural samples.

Dependent variables

Urban and rural women report an average of 2.4 and 2.9 additional children desired, respectively. These magnitudes are consistent with the 29.3 percent of urban

women and 13.5 percent of rural women that report the use of any contraceptive, and lends support to our strategy of separating out the analysis into urban and rural sub-samples. In contrast, the use of a variety of pre- and post-natal services is relatively high for both samples, with urban women, as expected, showing consistently higher usage. Over 70 percent of urban women, while only about 40 percent of rural women on average, report using each of these types of services. In this category of variable, the most notable urban/rural difference is the percent of births delivered by a trained professional, with nearly twice as many urban women, 82.9 percent compared to 41.2 percent, reporting trained deliveries. Finally, the results for the AIDS variables are mixed. While over 75 percent of the sample changed behavior after learning of AIDS and over 67 percent desire testing, less than 42 percent know of two sources of AIDS prevention, and less than 8 percent have been tested. Urban women faired slightly better on each of these counts, and this is also consistent with the limited availability of AIDS testing and counseling that we find at the facility level.

Individual-level explanatory variables

Our sample is relatively young, and with limited education. About 60 percent of the sample are 29 years old or younger and 97.9 percent of rural women and 86.7 percent of urban women have 7 or fewer years of education. Slightly more rural women report having a partner, 68.5 percent to 59.7 percent, and rural partners are also less educated on average. Although urban women report more household assets, neither sample is very wealthy. Good water is reported by 76.4 percent of urban women, but no other asset is reported by more than 37.9 percent of either sample. Less than 3 percent of rural women report having either electricity or good sanitation. The generally low levels of asset ownership in both samples may partially explain why these variables perform relatively poorly as household status indicators.

Religion is nearly universal, as over 99 percent of urban women and 88 percent of rural women claim some religion, with Islam most prominent among urban women (51.1 percent) and Catholicism most prominent among rural women (34.1 percent). An important aspect of IEC in Tanzania, Radios and FP dramas are much more prevalent among urban women, as 74.4 percent listen to radios and 53.6 percent listen to FP dramas, than for rural women, where the levels are 34.3 percent and 15.3 percent respectively. Finally, rural children in our sample have a higher average birth order, are younger and are

slightly more likely to be female.

Facility-level explanatory variables

Access to facilities offering FP differs greatly by facility type and urban/rural residence. Almost 94 percent of urban women are within 5 kms of at least one facility offering FP, compared to only 56.9 percent of rural women. The distribution across facility types is also fairly even for the urban sample, with 63.2, 50.7 and 46.6 percent within 5 kms of a hospital, dispensary and health center, respectively, which offers FP. In contrast, while 42.8 percent of rural women are within 5 kms of a dispensary with FP, more than 21 percent do not have access to any facility offering FP within 10 kilometers. Given the relatively limited services offered by dispensaries and the lack of other alternatives, this could be a potentially important indicator in the rural sample.

The contraceptive stock statistics present three items of note. First, the results are fairly similar across the various methods. If 63 percent of urban women are within 5 kms of a hospital with pills in stock, then close to 63 percent are within 5 kms of a hospital with condoms, IUDs and injections in stock. One exception to this is that a significantly smaller percentage of rural women have access to health centers and dispensaries with IUDs in stock, compared to pills, condoms and injections. This could again be due to the fact that most of the rural women are served by dispensaries, which tend to not offer the more labor intensive contraceptive procedures such as IUDs or Norplant that also require a higher level of staff training. Secondly, the percentages of urban women with access to facilities with contraceptives in stock are generally higher than for rural women. One consistent exception to this, dispensaries within 6 to 10 kms, shows a larger percentage of rural women with access for each contraceptive method.

The training variables were originally broken down to 1989-91 and 1992-96. However, virtually no women had access to facilities with staff trained between 1989-91, so those results are excluded. As for the 1992-96 results, larger percentages of urban women have access to facilities with trained staff, with hospitals and UMATI clinics within 5 kms being the most accessible at 43.6 and 28.9 percent of urban women, respectively. Less than 5 percent of rural women have access to any facility type with at least two trained staff within 5 or 6 to 10 kms. This is clear evidence that the training program was

specifically targeted to urban areas, and the analysis must be adjusted accordingly.

In regards to access to a facility for any purpose, the urban sample has a fairly even distribution. This is very similar to the access to contraception described above. Over 98 percent of urban women are within 5 kms of at least one facility, compared to only 70 percent for rural women. For rural women, 57.9 percent are within 5 kms of a dispensary and 24 percent within 6 to 10 km, much higher than any other facility type. About 70% of the urban population are within 5 kms of a hospital, and about 75% are within 5 kms of a dispensary.

The service availability variables include antenatal care, delivery services, child immunization, TT immunization and breast feeding counseling. A service is available if the facility offers the service and is within 5 or 6 to 10 kms. Facilities over 5 or 10 kms away are defined to have no services available for the 5 and 6 to 10 kms variables, respectively. It is important to again note the clustered nature of the data. For both the contraceptive and other service measures, the same facility may be within 5 km of one cluster and be within 30 km but farther than 10 km from another cluster. This facility would be "available" for the first cluster but unavailable in the second, although in a sense it is connected to both clusters. The results show that urban women have access to a greater number of services on average at all facility types, except health centers 6 to 10 kms away and dispensaries at both distances. Hospitals provide the most accessible services on average in urban areas, 3.193 out of 5, while dispensaries are best equipped, on average, in rural areas, 2.637 out of 5.

The immunization stock variables include BCG, polio, measles, dpt, hepatitis B and tetanus for ANC clients and convey the average number of available immunizations which are out of stock at relevant facilities, by facility type. Similar to the service availability variables, an immunization is available to a woman if the facility offers it and is within 5 or 6 to 10 kms. Facilities over 10 kms away are defined to have no immunizations available for this cluster. The results show that in general, facilities with immunizations available, but out of stock, is a slightly bigger problem for rural women. Dispensaries and health centers appear to have the greatest stock out problem, both in urban and rural areas.

IV. Basic Family Planning Outcome Variables

This section is divided into three parts. First, we will examine the determinants of additional children desired, measured as ideal family size minus births plus deaths. The second part presents the results from a mulitinomial logit estimation of current method choice at the individual level. We consider three categories for the dependent variable: modern use, traditional use, and no use. Finally, we do a separate analysis that focuses on the impact of recently trained family planning providers on the number of new acceptors and returning clients at family planning facilities. The reason for resorting to a facility analysis is explained below.

Additional Children Desired

Table 2a presents the regression results for additional children desired, woman's stated ideal family size minus births plus deaths, which we use as our indicator of fertility preferences. This is a variable of major programmatic importance, since programs to increase the availability of family planning can have little impact if individuals have no desire to restrict family size (see Pritchett, 1994). In a comprehensive survey of past research on this subject for a large set of countries, Freedman (1996) found little in the way of program effects on fertility preferences, so it is interesting to see if program effects can be measured for Tanzania.

The first set of coefficients in the table are for the respondent specific variables. The results are strong and much as expected. Noting that the omitted category for woman's age is the youngest category of 15 to 19, we see that women of older ages have desires for fewer additional children, and that largest coefficients are for the 40 to 44 age group in both the urban and rural samples. There is a very slight drop in the 45 to 49 group for rural woman, and a fairly substantial drop in the absolute size of the coefficient for the oldest age group for urban women. The omitted category for education is the substantial number of women with no education. We again see very strong effects for both the urban and rural sub-samples. In urban areas, we do not see much difference in the results for the 7 and 8 or more years of education categories, while in rural areas there is a substantial increase in the absolute value of the coefficient for the most highly educated group relative to all other groups. In rural areas, women with 8 or more years of schooling reduce by almost one child the additional children they desire, compared to

women with no education. However, as can be seen in the descriptive statistics in Table 1a, there are very few rural women in this education category.

It is interesting to note that even after controlling for the woman's education, strong independent effects are present for partner's education. The results differ, however, for urban and rural areas. For urban areas, the partner main effect is insignificant and the point estimate is small. The partner's education variables must be considered interaction terms, since they are set to zero when the dummy variable partner is set to zero. However, since the main effect is basically zero, we see having a partner with any level of education above zero causes a reduction of about one half of a child in additional children desired in urban areas. In rural areas, we must take into account the partner main effect. Here we see that the largest impact of husband's education is for the highest educational category, and we get a reduction in desired children that is comparable to urban areas (-1.031+.424). We still get reductions for the intermediate educational categories, but the results are not as strong as in urban areas.

The results for the various asset indicators are mixed, perhaps supporting our hypothesis that the best indicator of socioeconomic status that is available is partner's years of education. When the estimated coefficients of the asset variables approach statistical significance, they are typically of the hypothesized sign, resulting in decreased additional children desired. Note the urban results for electricity, good water and good sanitation.

We now turn to a discussion of the program variables. Taken as a whole, the impact of program related variables is disappointing. Access to hospitals is associated with reduced fertility preferences in both the urban and rural samples. For urban areas, access within 5 or within 6 to 10 kilometers reduces additional children desired by around one third of a child, but these estimated coefficients are only significant at the 10% level. For rural areas, access within 5 kilometers is associated with a one quarter of a child drop in fertility preferences, but this coefficient is also only significant at the 10% level. The only other significant effect is a perverse result for the presence of UMATI clinics within 5 kilometers in urban areas.

Unfortunately, we were not able to uncover the mechanism by which access to hospitals reduced fertility preferences. We tried including whether or not these accessible

hospitals had outreach programs and IEC posters, but these interactions were not significant. Interactions between accessibility with the providers having in-service training were also not significant.

The final two program related variables that were included in the model were whether or not the respondent listens to one of the three family planning related radio dramas, and the level of child mortality in the area in which the woman lives. None of the coefficients associated with these variables approaches statistical significance.

Current Contraceptive Method Choice

The results for contraceptive method choice are presented in Tables 3a and 4a. The first page of the table presents results for urban sample, while the second page presents results for rural areas. The estimation method was multinomial logit, and we present both the traditional versus no method contrast as well as the modern method versus no method contrast. We will confine most of our discussion to the choice of modern methods.

Strong age effects are evident for both urban and rural areas. For both areas, peak modern use is for the age 40 to 44 group. The respondent's education for all groupings also has a major impact, with the largest being the move from no education to any level of education. The effects of the socioeconomic variables (partner's education and the asset dummy variables) have markedly different effects for urban versus rural respondents. In urban areas, this whole set of variables has no impact; while in rural areas, we see highly significant positive impacts for the partner's two higher education levels (7 and 8 plus years of education). Ownership of a motorcycle and whether or not the household has electricity also have marginal positive effects on use.

Program effects are also strikingly different for urban and rural areas. In urban areas, few program variables are significant. When they are, they are just as likely to have perverse signs as positive effects. However, it is interesting to note the strong positive effect for the presence of a UMATI clinic within 5 kilometers and the marginally significant and positive impact of the radio drama variable on modern use. In rural areas, in contrast, we see strong positive impacts of access to hospitals and health centers within 5 kilometers, but a perverse effect for health centers within 6 to 10 kilometers. The radio drama effect is also much stronger in rural as opposed to urban areas. We quantify the size

of these effects in the simulations presented below.

Just as for additional children desired, we were unable to relate modern use to service quality. We tried including variables to measure outreach, IEC posters, and problems with stock outs of contraceptives. These variables did not add explanatory power to the model, and when the stock out variable was significant, the sign was perverse – stock outs were associated with increased modern contraceptive use. This result is obviously due to reverse causality, since facilities in high use areas seem to be more likely to experience supply problems. The presence of trained providers was also not significant, but more will be said on this point below.

A major concern for the family planning program in Tanzania is the leveling off of contraceptive use between 1994 and 1996. In order to gain insight into this concern, we repeated our analysis using both the 1991 and 1994 data. Recall that the TDHS96 was done in the same sample clusters as were used in 1991, while the 1994 survey was conducted in a subset of these same clusters. The three facility surveys also returned to the same facilities, with the addition of the Marie Stopes and UMATI clinics in 1996. However, we know the date of establishment of all the clinics and so we are able to backdate the presence of all clinics and thus include access to these clinics in models for 1991 and 1994. We cannot construct completely comparable measures for the radio drama variables across the three surveys. In 1991, no radio drama questions were asked, while in 1994 respondents were only asked about Zinduka. However, the number of positive responses in 1994 was surprisingly high and interviewers believe that respondents may have stated that they listened to Zinduka if they listened to any of the three dramas. Therefore, we use a radio drama variable in the models for both 1994 and 1996, but some caution should be used in interpreting the results.

We do not present the multinomial logit results for 1991 and 1994 since this would add four pages of tables to this document. Instead, we present a few key simulations that provide insight into the leveling off of contraceptive use. Before discussing the simulations, we summarize briefly the multivariate results, focusing on differences with 1996. The pattern of coefficients for the age categories are similar across the years, with women in older age categories typically more likely to use modern contraceptives than women in younger age categories. However, in all years and for both urban and rural samples the results are somewhat nonlinear, with women in the oldest category (45 to 49)

less likely to use modern methods than slightly younger women.

Recall that respondent's education had strong, positive impact on modern use for both the urban and rural samples in 1996. The results are not quite as strong for the two earlier years. In both 1991 and 1994, urban women in the 1 to 6 years of education category did not have significantly different behavior from women with no education. This is also true for rural women in 1994. Only for rural women in 1991 do we see a significant positive impact of 1 to 6 years of education on modern use. The impact on modern use associated with the two highest education categories, exactly 7 years and 8 or more years, are consistently associated with higher contraceptive use across the earlier samples.

Recall that our best indicator of socioeconomic status in the 1996 data was partner's education, and that this variable had a strong positive impact on modern use for the rural sample in 1996. In the multivariate analysis for 1991 and 1994, partner's education is a significant positive predictor of modern method use for all sub-samples except 1994 urban respondents. There was no consistent pattern of significance for the other indicators of status that are included in the models. These results confirm the importance of controlling for socioeconomic status in models for contraceptive method choice, and that partner's education may be the best measure available in the Demographic and Health survey data sets.

The pattern of significance for the program variables is similar for the three surveys. Both urban and rural women who reported that they listened a radio drama in 1994 were more likely to use a modern method. The presence of a hospital within 5 kilometers was a significant positive predictor of modern use for the rural samples in both 1991 and 1994, while the presence of health centers within 5 kilometers was a strong positive predictor in 1994 and marginally significant in 1991. These results for health centers are consistent with Aboud, et al. (1996) where large improvements in methods that are both available and in stock at health centers between 1991 and 1994 are reported. There are no significant facility access effects in urban areas in either 1991 or 1994. The presence of a UMATI clinic within 5 kilometers is almost significant at the 10% level for the 1991 sample, a result that is consistent with its significant positive impact in 1996.

In order to gain further insight into the effect of the significant program variables

on modern contraceptive use, we ran simulations based on the multinomial logit results. The simulations were done as follows: we used the estimated coefficients in each of the three years to predict modern use for each woman in the sample, and then averaged the predicted probabilities across women. We then set a particular program variable to zero, predicted modern use keeping all other independent variables the same, and then repeated the exercise with the program variable set to one. Next, the predicted modern use with the program variable set to zero was subtracted from the predicted modern use with the program variable set to one, to obtain predicted program impact. The results of the simulations for each of the samples are presented in table 2.

Table 2: Program Simulation Results

Variable	1991	1994	1996
Rural			
Radio drama	--	6.15%	3.32%
FP Hospital within 5 km	3.68%	5.52%	3.93%
FP Health Center within 5 km	0.88%	2.84%	3.30%
Urban			
Radio drama	--	7.39%	4.33%

The results in this table are quite instructive. Consider the radio drama results first. The program impact associated with listening to a radio drama in rural areas in 1994 is an increase of 6.15% in modern contraceptive use (simulated modern use assuming no one in the sample listens to a radio drama is 6.14% while simulated use assuming everyone in the sample listens is 12.29%). Unfortunately, program impact drops to 3.32% in 1996. Remember that the 1994 survey only asked about Zinduka while in 1996 specific questions were asked about the three leading dramas. When we used only listen to Zinduka rather than any drama, the effect was smaller. Thus, it appears to be the case that the incomparability between the two survey instruments may actually understate the drop in program impact. We get very comparable results for urban areas – radio drama program impact appears to be much smaller in 1996 than in 1994.

The results for access to hospitals within 5 kilometers tell a similar story. We see

increased impact between 1991 and 1994 and then a decrease back to 1991 levels in 1996. Health center impact increased between 1991 and 1994 but has gone up only slightly in 1996. There were no significant program effects for dispensaries in any of the years, so no simulations were done for them.

These results are certainly consistent with the observed leveling off of modern contraceptive use in Tanzania. If contraceptive use is to continue to increase, both supply and demand side factors should have increasing impact rather than impacts that are decreasing or leveling off, as is the case for both sets of variables. Unfortunately, with respect to the supply side factors, we were not able to obtain statistical significance for the service quality variables and so we are not able to pinpoint a source for the problem. However, we can offer a few speculations. First of all, it is clear from *Tanzania Service Availability Survey 1996* that stock outs have become an increasing problem in Tanzania. When we try to include facility stock outs as an explanatory variable, the results were either insignificant or perverse, perhaps indicating that facilities in high demand areas are the ones most frequently experiencing stock out problems. Second, when we run uncontrolled regressions to examine the relationship between in-service training and modern use, we get strong positive impacts. However, as soon as we add controls for the socioeconomic status, the effects go away. This means, to a large extent by 1996, the individuals being served by these newly trained providers are individuals who would have chosen to use modern contraceptives anyway. We will discuss training impact further in the next section.

The Impact of Trained Providers on Contraceptive Use

The in-service training strategy in Tanzania was to train providers in urban areas first, so that the providers would have an opportunity to refine their skills within an environment where they would have contact with many potential clients. As a result, TSAS96 found that most providers with post-1992 in-service training were at large, urban hospitals and those health centers and dispensaries that were fairly close to these hospitals. While this strategy may make sense from an operational standpoint, it makes it very difficult to measure program impact – the design is as about as far way from a controlled experiment as one can get. However, we used the longitudinal design of the facility survey to try and gain insight into the program impact associated with post -1992 in-service trained providers. Specifically, we used the 1991 facility data as baseline data,

since no provider in the sample could have post -1992 in-service training at that time, and compared the number of new acceptors and re-supply clients in 1991 to the number of clients at exactly the same set of facilities in the 1996 survey. This methodology is similar to the pretest-posttest design used in randomized experiments. The statistical method that we use is referred to a fixed effects method, where change in the number of re-supply and new acceptor clients is used as a dependent variable in a multivariate regression model (see Bertrand, et. al., 1996, for a discussion of the method).

We ran separate models for hospitals, health centers, and dispensaries. The complete specification of the regression model that we used is as follows. We used two dependent variables: the change in the number of new acceptors and the change in the number of re-supply clients for the last complete month before the survey. The dependent variable was divided by the number of family planning providers in the facility to control for size differentials within the three categories of facility. The major independent variable was whether or not the facility had two providers with post-1992 in-service training -- the program goal for all facilities. We need to also control for other factors that may have changed between 1991 and 1996. Since the TDHS91 and TDHS96 surveys were conducted in exactly the same clusters in 1991 and 1996, we could use data aggregated to the community level to see if there were shifts in important demographic variables between 1991 and 1996.

From the individual level model presented above, the two most important demographic variables are age and education. Using the same categories for age and education presented above, we calculated the change in the proportion of individuals in each age and education category and included these variables as regressors. Other control variables from the facility data were whether not there was a change in stock out status at the facility between 1991 and 1996, and whether or not there was a change in the outreach program. The final control variable was the population of the Ward in which the facility is located. This variable was obtained from the 1987 census and is included to control for the effect of population density. Unfortunately, the next census is scheduled for 1998, so we cannot use the change in population density.

In Table 3, we only present the estimated coefficient for the variable of primary interest: whether or not the facility has two providers with post-1992 in-service training. The results for the control variables were not often significant and were not of particular

interest. The coefficients presented represent the change in either the number of new acceptor or re-supply clients per family planning provider. A "*" indicates significant impact at the 5% level.

Table 3: Fixed Effects Results

Change per Family Planning Provider	Hospital (n=65)	Health Center (n=70)	Dispensary (n=153)
New Acceptors	7.23*	4.47	3.43
Re-supply	23.32*	4.42	11.12*

We see that we get significant effects for 3 of the 6 cells in the table. The new acceptors cell for dispensaries is close to significance at the 10% level, and the coefficient is stable when we run various outlier checks. The lack of significant results for health centers is consistent with the descriptive results for TSAS96 (see *Tanzania Service Availability Survey 1996*, Chapter 5). Even though the point estimates of the coefficients are positive for both new acceptors and re-supply clients for health centers, the standard errors are quite large and the point estimates change dramatically when we do outlier checks. Thus we see no evidence of training impacts for health centers. An explanation of this finding is clearly an important topic for future research.

The interpretation of the numbers in the tables is as follows. Consider the cell corresponding to new acceptors at hospitals. The 7.23 means that the impact of having two trained providers added to hospitals between the 1991 and 1996 surveys is to cause an increase of 7.23 new acceptors per family planning provider per month. We see that for both dispensaries and hospitals, the impact is greater on re-supply clients than on new acceptors. This is to be expected, since the volume of re-supply clients is simply higher. However, this result is encouraging in that it indicates higher retention rates when post-1992 in-service trained providers are present, and this means modern contraceptive continuation rates will be higher.

How does one reconcile these positive results for training impact with the leveling off of use between 1994 and 1996 and the fact that no training impact was found using the 1996 individual level data? First of all, the time period for the fixed effects estimates was 1991 to 1996, a period that encompassed the doubling of use between 1991 and 1994.

We needed to use this period since we could rule out the possibility of anyone having post-1992 in-service training in 1991. Second, the fact that the newly trained providers were highly concentrated in urban areas, which also contain the more highly educated women of relatively high socioeconomic status, makes it difficult to measure a training effect with just cross sectional data. However, the results indicate that a strategy that would create more newly trained providers in rural dispensaries may be quite promising in terms of increased use of modern methods.

V. Other Outcome Variables

Attempts to Measure the Impact of Quality

In addition to the results presented up to this point, and as mentioned above, we examined the effects of a variety of other facility quality measures. The first class of variables focuses on the availability of specific services at different facility types within certain distances of a cluster center. However, there was much correlation among services offered by facilities, especially among the immunizations, so any single measure did not serve to differentiate on quality. In the logical next step, we aggregated across services, creating a variety of index variables. Finally, we extended the aggregation across facility types, in an attempt to measure the effects of the best facility to which a woman had access. The constructed variables are specific to the MCH, HIV/AIDS and additional children desired models, and are discussed below.

For the MCH models, the quality indicator variables fall in the following classes: family welfare posters; antenatal care, delivery, child immunization, TT immunization and breast feeding counseling services; and BCG, polio, dpt, measles, hepatitis B and TT immunizations. The first two classes are hereafter referred to as the services, and the third are referred to as the immunization set. Due to the high correlation among services, facility-type effects were only available for family welfare posters, and few of these were significant. Access to hospitals with family welfare posters was the only measure with any impact: a positive effect on both antenatal care and trained deliveries.

To address the correlation problems, we created the following indicators of service availability: a variable conveying whether a facility offered at least one of the six services, a count of the number of these services offered, a count of the provision of the six possible immunizations, a count of the components of the immunization set which were provided

but out-of-stock, and an overall quality variable conveying the number of the offerings provided out of a total of 16. Again, the results were fairly weak, but there were some significant effects across the various models. None of the measures showed any effect in the urban antenatal care specifications, and only a few were significant in the rural specification, with an equal number of correct and incorrect signs. The results were only slightly better in the tetanus models, with a negative effect from out-of-stock immunizations at health centers within 5 kms being the only consistent result. The trained delivery results differed greatly by urban/rural residence. While for the urban specifications there were few significant results, and none with the correct sign, the rural specifications showed significant positive effects for the hospital, health center and dispensary service availability indices. Finally, the only effect in any of the immunization models was a significant negative impact of out-of-stock immunizations at hospitals within 5 kms. Aggregating across facility types, we next created a count of the number of services offered by the best facility, a count of the number of available immunizations in-stock at the best facility, and again an overall count variable conveying the number offerings provided, out of a possible 16, by the best facility. The results were slightly better for the rural models than the urban models, although few of the results were noteworthy. The best service-providing hospitals and health centers showed some significant positive effects, especially on trained deliveries and immunizations.

For the HIV/AIDS models, we looked at the effects of access to facilities with AIDS counseling and testing. Again, the rural models seemed to have more significant results, although not all in the correct direction. Dispensaries and hospitals with AIDS testing showed some significant positive effects on a rural woman knowing two sources of AIDS prevention, and health centers and dispensaries offering AIDS counseling changed both urban and rural women's sexual behavior after learning about AIDS. In addition to these intuitive results, however, there was one perverse outcome. Access to a hospital offering AIDS testing significantly reduced sexual behavior changes and the testing or desire to be tested for AIDS. As a community level measure, we explored the effects of access to any facility offering AIDS counseling and testing. In general, access of this type positively influenced both knowledge and behavior, but the number of significant results were limited. For the additional children desired specifications, we only looked at the effects of access to facilities with family welfare posters. Few results were significant, and those that showed influence were mixed. Access to hospitals within 5 kms and health

centers within 6-10 kms lowered additional children desired, while access to Marie Stopes clinics at both distances and health centers within 6-10 kms increased additional children desired. All of these results are for urban women only.

To recap, access to quality services at a particular facility, or the best facility, seems to have little influence on any of the program related outcome variables, although some interesting exceptions occasionally surface. A possible explanation may be that the supply side of the actual market for services may be poorly modeled by the facility and indicator variables in use in this analysis. As mentioned more than once in this document, important facilities in the market area around the population cluster may not have been surveyed. To the extent that these facilities were also the ones where the quality of the services encouraged knowledge and/or practice improvements in our measures, this would bias the results away from finding a significant service related impact.

MCH Related Outcome Variables

In addition to the exploration of the family planning system presented above, we ran similar regressions to try and find program impacts on MCH related variables, although the "program" as now defined is more broad, since maternal and/or child health measures are necessarily influenced by more factors than a more narrow decision such as contraceptive use. For this reason, as in the demand for children equation, it may be more difficult to find program effects, or to separate out what aspects of the broad based program actually have an influence on the outcome of interest. This is in fact what we see. One of the priorities of the Ministry of Health of Tanzanian Government is the provision of medical care during pregnancy and at delivery, which is essential for the survival of both the mother and infant. Our analysis will focus on several measures of this type of care, along with other variables of interest. For outcomes dealing with pregnancy and delivery risk exposures, the sample is all women that have had a birth in the last three years. An extra condition on the immunization coverage variable is that the child is at least one year old.

Antenatal Care. The 1996 TDHS indicates very high utilization of antenatal care in Tanzania for most pregnancies (97 percent). Results from the multivariate analysis of antenatal care from both urban and rural areas are presented in Table 5a. The age and education effects are as one would expect. Younger women (age 15-19) are more likely

to receive antenatal care than the older women, and the respondent's and partner's education, especially in rural areas, have a major impact on the use of antenatal care. We did not see any significant positive effects of education in urban areas. This pattern is very similar to the one seen for additional children desired. Recall that we believe partner's education to be the best indicator of social and economic status. With the asset measures, only the presence of bicycles in rural households has impact on greater use of antenatal care.

We turn now to program effects. For this and the subsequent regressions, we use general access measures, since we are trying to measure general program effects, not family planning program effects. All but one of the general access measures are positive, but only two are positive and significant: health centers 6-10k away and dispensaries 6-10k away in the rural sub-sample. No urban access measure was significant, in what is by now a familiar pattern. An interesting trend in the rural sample is that all 6-10k access measures show more of an effect than within their 5k counterparts, although both are positive relative to the omitted category of access greater than 10k or no access.

Tetanus Toxoid. Tetanus toxoid injections are given during pregnancy for the prevention of neonatal tetanus, a common cause of death among infants in many settings around the world. Table 6a presents the results from the regression analysis for receiving tetanus toxoid injections among ever pregnant women. In this case, most age and education effects are insignificant, which probably indicates widespread use of this practice across all strata of society. The 1-6 years of education group in the rural sample have a higher probability of receiving the injection, relative to women with no education. Partner's education measures are not significant in this regression, although most of the effects are in the expected direction, and there are a few significant results for household assets, which we do not discuss here.

For program effects, the impact of the accessibility of health service delivery points is disappointing. The coefficient signs are just as likely to be negative as positive, and the only significant effect was a perverse one: the presence of a hospital within 6-10k lowered the likelihood of receiving the injection relative to having no hospital available. Again, this could simply be an indication the practice of tetanus toxoid vaccinations is fairly widespread or that they are well targeted to high risk areas.

***Trained delivery*.** An important element in reducing health risks of mothers and children is increasing the proportion of babies that are delivered in medical facilities and delivered by trained health personnel. The 1996 TDHS data show that about 47 percent of births were assisted by trained health worker (doctor, nurse, or health aide). Results from the regression analysis are shown in Table 7a. Strong age effects are evident for both urban and rural areas; older women are more likely to deliver their babies by trained health personnel. Mother's education is also closely related to better supervision at delivery, with the strongest effect in both samples being 8+ years of education. Results also show that the respondent's education has a major impact, although we must proceed with caution here, due to the fact the this is an interaction term. In actuality, most of the total partner effects are negative. For example, having a partner in the rural sample reduces the likelihood of having trained help for delivery. Having a partner with 1-6 years of education, although it is better than having a partner with no education, also lowers the trained delivery likelihood (total effect is -.560+.192=-.368). Finally, almost all asset variables are positive, although once again only few are significant.

Turning to program effects, all urban access measures are insignificant, and are just as likely to be negative as positive. The rural sample, however, looks much better. We have strong positive effects due to accessibility for every type of facility within 5k, and a marginally positive effect for dispensaries in the 6-10k range. This is not surprising, since this variable is much more closely linked to using a facility than other, more general health measures.

***Child immunization*.** The results of the determinants of child immunization are presented in Table 8a. Again, the sample is all children born to women in the TDHS in the past three years that are at least one year old. Age appears to have little effect, although what trend there is seems to point to children born to older mothers being better off. Parental education also seems to have a positive impact on the immunization of children, although only the effect of women with 7 years of (completed primary) education is significant. Both partner's education and the asset ownership variables seem to have little effect, as does the birth order of the child.

Program effects. The effect of availability of health services on childhood vaccination is different for urban and rural areas. In rural areas, the presence of hospital within 5k and the presence of a dispensary 6-10k are both strongly significant and positive,

and all but one of the non-significant results are positive. For urban areas, most of these relationship are reversed. The only significant coefficient is the perverse effect of having a health center within 5k, and 3 of the 5 non-significant effects are actually negative. This is yet more evidence that the presence of medical services seems to have more of the desired effect in rural areas. However, the positive effects of the presence of a dispensary are evident in both the urban and rural sample.

AIDS/STD Outcomes

The next set of regressions focuses on the risks and behaviors associated with the contraction and prevention of AIDS and HIV. AIDS and HIV infection have been identified as serious health and socioeconomic problems in Tanzania. More than 80 percent of both women and men have knowledge of AIDS. Those who have knowledge of AIDS were asked in the survey if they thought it was possible to prevent AIDS, and if so, how. They were also asked whether and how they had changed their sexual behavior to prevent getting AIDS.

Knowledge of two ways to prevent AIDS. Results for this regression are presented in Table 9a. Strong and significant age effects are evident for both urban and rural areas, with the general trend that older women are generally more knowledgeable. Education has a strong effect and extremely significant effect on the knowledge of AIDS transmission. The trends are the same for both the urban and rural samples, and the largest effect is in the two highest education category indicators. Partner's education total effects are also significant, positive, and have the same general trend in both samples, and even several of the asset indicators are positive in the urban sample.

There are two types of program variables to explore here. The regions that belong to the AIDS focus strategy actually fare worse than the rest of the country, and this effect is significant in the rural sample. This is probably due to the targeting of the program to high risk areas. The results of the accessibility to health care facilities are markedly different for urban and rural respondents. All effects are negative but insignificant in the urban sample, while most are positive in the rural sample. The two significant effects are for the hospitals within 5k (positive), and for health centers 6-10k (negative).

AIDS-Changing Behavior. In 1996 TDHS respondents who have heard of AIDS and ever had sexual intercourse were asked if they had changed their sexual behavior to

prevent getting AIDS. Eighty-two percent were reported changing their sexual behavior. Multivariate results are presented in Table 10a, and show some of the now familiar patterns. Women of older age groups are actually less likely to have changed their behavior than the youngest age group (reference category is 15-19 years old), but most of the effects are non-significant. Women with any education are significantly more likely to have changed their behavior in response to their perceived risk of AIDS, and the effect seems to increase with the level of education in each sample. Partner's education effects are quite interesting. The base effect for both samples is highly negative and significant, indicating that they are much less likely to change their behavior in response to AIDS. This effect is mitigated somewhat by increases in a partner's education, but the total education effects are still negative.

Once again, there are two types of program variables to explore in this regression. There is no evident relationship between the accessibility of any of the health facilities and the likelihood of changing behavior. However, the regions that participate in the focus program show marginally positive results on behavior change in both the urban and rural samples, a result rendered more powerful due to the fact that these are high risk regions where finding program effects should be more difficult.

VI. Conclusions

The purpose of this report was to examine the determinants of a wide range of fertility and reproductive health outcome variables that are of importance to the Family Planning Unit of the Government of Tanzania. The explanatory factor that is most consistently associated with positive outcomes is the level of education of the respondent. The second most consistently significant individual-level explanatory factor was the level of education of the respondent's partner. While we hypothesize that the partner's education is a proxy for the socioeconomic status of the household, these results clearly underscore the importance of continued investments in education in conjunction with investments in programs to improve the quality of the reproductive health program in Tanzania.

Overall, the results were quite mixed with respect to program variables. Our results clearly indicate that program variables are associated with a broad range of positive

outcomes, even with controls for education. However, there is no consistent pattern of significance and, with respect to their impact on modern contraceptive use, the effects of some important variables appears to have diminished through time. While listening to radio dramas is associated with increased modern contraceptive use, the impact appears to have diminished between 1994 and 1996. Access to hospitals is a consistently significant predictor of modern method use, but its affect also appears to be less in 1996 than 1994.

Maternal and child health services are readily available in the urban areas. Nonetheless, universal use is far from being achieved. While the services may be available, information may not be available concerning the quality of these services. Moreover, information concerning where and why these services are important may not have been communicated to women, accounting for the underutilization. More attempts at targeting acceptable messages appear warranted for the urban women. While rural women likely suffer from the same factors and conditions that adversely affect service utilization of urban women, they are also affected by unavailability of services. Means of providing services to rural women needs to be a priority of Tanzanian government.

Unfortunately, in spite of the use of very detailed survey instruments that measured a wide variety of facility quality related factors, these measures were of little importance in the multivariate models. We offer several possible explanations:

1. Probably the most important quality factor is in-service training for the staff of facilities. Our descriptive work clearly shows that there has been a tremendous increase in the number of staff with this in-service training in the past few years. Unfortunately, the trained personnel are concentrated in urban facilities that are probably already of significantly higher quality than facilities in Tanzania in general.

2. There are difficult problems of reverse causality for some variables. For example, it is probably the case that facilities with large numbers of clients are more likely to experience stock out problems than facilities with less demand.

3. The DHS facility sample design does not fully capture the market of services from which a potential user can choose from – especially in urban areas. By only visiting the nearest facility of each type to the sample

cluster, we may not be getting data from the facility that individuals are most likely to use. Consider a simple example. Suppose that the closest facility to a community with a high level of contraceptive use does not have trained family planning providers, and few women use this facility because a facility with trained providers is farther away but accessible. Since we would not have data for this second facility, we would conclude from this simple example that the presence of trained providers is not a factor in the high level of use in this community.

The longitudinal nature of the facility level data allowed us to control for the urban placement of in-service trained providers but it will be important to redo this analysis as the training program spreads to rural areas. Improvements in future survey designs that will allow us to capture the market for services that individuals face should also result in better tests for the impact of quality on these important outcome variables in the future.

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APPENDIX: Descriptive Statistics on Regression Variables and Regression Results

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
DEPENDENT VARIABLES:				
Additional children desired	2.442	2.14	2.948	2.805
Woman used modern contraceptive method	0.239	0.427	0.093	0.291
Woman used traditional contraceptive method	0.054	0.226	0.042	0.2
Woman used no contraceptive method	0.707	0.455	0.865	0.342
Woman used antenatal care	0.987	0.113	0.957	0.204
Woman received tetanus shot	0.841	0.366	0.735	0.441
Birth delivered by a trained professional	0.829	0.377	0.412	0.492
Child immunized	0.738	0.44	0.648	0.478
Woman knows two sources of AIDS prevention	0.416	0.493	0.26	0.439
Woman changed behavior since learning of AIDS	0.858	0.35	0.751	0.432
Woman tested for AIDS	0.081	0.273	0.033	0.178
Woman tested, or desired to be tested, for AIDS	0.74	0.439	0.677	0.468
INDIVIDUAL-LEVEL EXPLANATORY VARIABLES:				
Woman's age 15 to 19	0.218	0.413	0.212	0.409
Woman's age 20 to 24	0.244	0.43	0.194	0.396
Woman's age 25 to 29	0.187	0.39	0.172	0.378
Woman's age 30 to 34	0.125	0.331	0.141	0.348
Woman's age 35 to 39	0.113	0.317	0.11	0.313
Woman's age 40 to 44	0.069	0.254	0.087	0.282
Woman's age 45 to 49	0.043	0.203	0.082	0.275
Woman's education 0 years	0.144	0.351	0.319	0.466
Woman's education 1 to 6 years	0.158	0.364	0.213	0.409

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Woman's education 7 years	0.565	0.496	0.447	0.497
Woman's education 8 or more years	0.133	0.34	0.021	0.144
Woman has a partner	0.597	0.491	0.685	0.464
Partner's education 0 years	0.053	0.224	0.161	0.367
Partner's education 1 to 6 years	0.092	0.289	0.155	0.362
Partner's education 7 years	0.295	0.456	0.314	0.464
Partner's education 8 or more years	0.152	0.359	0.05	0.219
Household owns bicycle	0.268	0.443	0.374	0.484
Household owns motorcycle	0.021	0.142	0.009	0.093
Household has electricity	0.379	0.485	0.026	0.16
Household has good water	0.764	0.425	0.271	0.445
Household has good sanitation	0.07	0.255	0.009	0.096
No religion	0.008	0.09	0.118	0.323
Moslem	0.511	0.5	0.29	0.454
Catholic	0.261	0.439	0.341	0.474
Protestant	0.214	0.41	0.247	0.432
Woman listens to radio	0.744	0.436	0.343	0.475
Woman listens to FP radio drama	0.536	0.499	0.153	0.36
Woman has other sex partner	0.228	0.42	0.147	0.354
Mortality rate	0.031	0.017	0.029	0.016
Resident of one of nine regions where AIDs Project operates (Tabora, Shinyanga, Dodoma, Morogoro, Iringa, Tanga, Kilimanjaro, Arusha, Dar)	0.627	0.484	0.447	0.497
Birth order of child	2.991	2.246	3.937	2.631
Age of child in months	16.428	9.938	15.639	9.76

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Gender of child	0.542	0.499	0.504	0.5
FACILITY-LEVEL EXPLANATORY VARIABLES:				
1. FAMILY PLANNING ACCESS				
Hospital with FP within 5 km	0.632	0.482	0.083	0.276
Hospital with FP within 6-10 km	0.134	0.341	0.111	0.315
Health Center with FP within 5 km	0.466	0.499	0.17	0.376
Health Center with FP within 6-10 km	0.149	0.356	0.15	0.357
Dispensary with FP within 5 km	0.507	0.5	0.428	0.495
Dispensary with FP within 6-10 km	0.025	0.156	0.207	0.405
UMATI clinic within 5 km	0.387	0.487	0	0
UMATI clinic within 6-10 km	0.042	0.2	0.041	0.197
Marie Stopes Clinic within 5 km	0.316	0.465	0	0
Marie Stopes Clinic within 6-10 km	0.06	0.237	0.017	0.131
Any facility with FP within 5 kms	0.937	0.243	0.569	0.495
Any facility with FP within 6-10 kms	0.3	0.458	0.423	0.494
2. STOCK OF CONTRACEPTIVES (last 30 days)				
a. Pills				
Hospital with pills in stock within 5 kms	0.632	0.482	0.086	0.281
Hospital with pills in stock within 6-10 kms	0.098	0.297	0.101	0.301
Health Center with pills in stock within 5 kms	0.414	0.493	0.134	0.341
Health Center with pills in stock within 6-10 kms	0.144	0.351	0.136	0.343
Dispensary with pills in stock within 5 kms	0.516	0.5	0.391	0.488
Dispensary with pills in stock within 6-10 kms	0.031	0.174	0.173	0.379
UMATI clinic with pills in stock within 5 kms	0.387	0.487	0	0

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
UMATI clinic with pills in stock within 6-10 kms	0.042	0.2	0.041	0.197
Marie Stopes clinic w. pills in stock within 5 kms	0.316	0.465	0	0
Marie Stopes clinic w. pills in stock w/in 6-10 kms	0.06	0.237	0.017	0.131
b. Condoms				
Hospital with condoms in stock within 5 kms	0.635	0.482	0.095	0.293
Hospital with condoms in stock within 6-10 kms	0.114	0.318	0.109	0.312
Health Center with condoms in stock within 5 kms	0.42	0.494	0.167	0.373
Health Center w/ condoms in stock w/in 6-10 kms	0.149	0.356	0.145	0.352
Dispensary with condoms in stock within 5 kms	0.473	0.499	0.379	0.485
Dispensary w/ condoms in stock within 6-10 kms	0.024	0.152	0.175	0.38
UMATI clinic w/ condoms in stock within 5 kms	0.171	0.376	0	0
UMATI clinic w/ condoms in stock w/in 6-10 kms	0	0	0.023	0.15
Marie Stopes clinic w/ condoms in stock w/ 5 kms	0.252	0.434	0	0
Marie Stopes clinic, condoms in stock w/in 6-10 kms	0.004	0.061	0	0
c. IUDs				
Hospital with IUDs in stock within 5 kms	0.661	0.474	0.095	0.293
Hospital with IUDs in stock within 6-10 kms	0.114	0.318	0.109	0.312
Health Center with IUDs in stock within 5 kms	0.427	0.495	0.07	0.255
Health Center with IUDs in stock within 6-10 kms	0.122	0.327	0.104	0.305
Dispensary with IUDs in stock within 5 kms	0.384	0.487	0.04	0.197
Dispensary with IUDs in stock within 6-10 kms	0.008	0.09	0.016	0.126
UMATI clinic with IUDs in stock within 5 kms	0.387	0.487	0	0
UMATI clinic w/ IUDs in stock w/in 6-10 kms	0.042	0.2	0.041	0.197

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Marie Stopes clinic w/ IUDs in stock w/in 5 kms	0.316	0.465	0	0
Marie Stopes clinic w/ IUDs in stock w/in 6-10 kms	0.06	0.237	0.017	0.131
d. Injections				
Hospital with injections in stock within 5 kms	0.548	0.498	0.062	0.241
Hospital with injections in stock within 6-10 kms	0.106	0.308	0.094	0.292
Health Center w/ injections in stock within 5 kms	0.402	0.49	0.136	0.343
Health Center w/ injections in stock w/in 6-10 kms	0.149	0.356	0.124	0.33
Dispensary with injections in stock within 5 kms	0.433	0.496	0.363	0.481
Dispensary w/ injections in stock within 6-10 kms	0.024	0.152	0.18	0.384
UMATI clinic w/ injections in stock within 5 kms	0.387	0.487	0	0
UMATI clinic w/ injections in stock w/in 6-10 kms	0.042	0.2	0.041	0.197
Marie Stopes clinic w/ injections in stock w/in 5 kms	0.304	0.46	0	0
Marie Stopes clinic w/ injections in stock w/in 6-10 kms	0.06	0.237	0.017	0.131
3. TRAINING				
Hospital with at least two staff trained in FP from 1992-96 within 5 kms	.436	0.496	0.031	0.174
Hospital with at least two staff trained in FP from 1992-96 within 6-10 kms	0.114	0.318	0.039	0.194
Health Center with at least two staff trained in FP from 1992-96 within 5 kms	0.137	0.343	0.046	0.209
Health Center with at least two staff trained in FP from 1992-96 within 6-10 kms	0.008	0.087	0.038	0.191
Dispensary with at least two staff trained in FP from 1992-96 within 5 kms	0.133	0.34	0.026	0.16
Dispensary with at least two staff trained in FP from 1992-96 within 6-10 kms	0.009	0.095	0.006	0.078

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
UMATI clinic with at least two staff trained in FP from 1992-96 within 5 kms	0.289	0.453	0	0
UMATI clinic with at least two staff trained in FP from 1992-96 within 6-10 kms	0.042	0.2	0.017	0.131
Marie Stopes with at least two staff trained in FP from 1992-96 within 5 kms	0.18	0.384	0	0
Marie Stopes with at least two staff trained in FP from 1992-96 within 6-10 kms	0.004	0.061	0	0
4. GENERAL ACCESS				
Hospital within 5 kms	0.699	0.459	0.109	0.311
Hospital within 6-10 kms	0.148	0.355	0.124	0.33
Health Center within 5 kms	0.512	0.5	0.18	0.384
Health Center within 6-10 kms	0.149	0.356	0.165	0.371
Dispensary within 5 kms	0.746	0.436	0.579	0.494
Dispensary within 6-10 kms	0.046	0.209	0.239	0.426
Any health facility within 5 kms	0.981	0.138	0.707	0.455
Any health facility within 6-10 kms	0.334	0.472	0.474	0.499
5. SERVICE AVAILABILITY				
Number of services (1-5) offered by hospital within 5 kms	3.193	2.386	0.544	1.557
Number of services (1-5) offered by hospital within 6-10 kms	0.718	1.729	0.621	1.649
Number of services (1-5) offered by health center within 5 kms	2.071	2.214	0.899	1.921
Number of services (1-5) offered by health center within 6-10 kms	0.647	1.557	0.824	1.855
Number of services (1-5) offered by dispensary within 5 kms	2.424	2.059	2.637	2.433

Table 1a				
	Urban		Rural	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Number of services (1-5) offered by dispensary within 6-10 kms	0.212	0.973	1.164	2.1
Number of services (1-5) offered by UMATI clinic within 5 kms	0.029	0.168	0	0
Number of services (1-5) offered by UMATI clinic within 6-10 kms	0	0	0	0
Number of services (1-5) offered by Marie Stopes clinic within 5 kms	1.319	1.954	0	0
Number of services (1-5) offered by Marie Stopes clinic within 6-10 kms	0.24	0.949	0.07	0.523
6. STOCK OF IMMUNIZATIONS				
Number of immunizations (1-6) available, but out of stock, at hospitals w/in 5 kms	0.086	0.522	0.009	0.192
Number of immunizations (1-6) available, but out of stock, at hospitals w/in 6-10 kms	0	0	0.101	0.581
Number of immunizations (1-6) available, but out of stock, at health centers within 5 kms	0.265	0.476	0.394	1.311
Number of immunizations (1-6) available, but out of stock, at health centers within 6-10 kms	0.16	0.601	0.204	0.919
Number of immunizations (1-6) available, but out of stock, at dispensaries within 5 kms	0.434	1.272	0.76	1.712
Number of immunizations (1-6) available, but out of stock, at dispensaries within 6-10 kms	0.076	0.622	0.338	1.161
Number of immunizations (1-6) available, but out of stock, at UMATI clinics within 5 kms	0	0	0	0
Number of immunizations (1-6) available, but out of stock, at UMATI clinics within 6-10 kms	0	0	0	0
Number of immunizations (1-6) available, but out of stock, at Marie Stopes clinics within 5 kms	0.136	0.343	0	0
Number of immunizations (1-6) available, but out of stock, at Marie Stopes clinics within 6-10 kms	0.004	0.061	0	0

Table 2a. Additional children desired				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	-0.294	-2.5	-0.523	-5.27
Woman's age 25 to 29	-1.041	-8.38	-1.386	-12.74
Woman's age 30 to 34	-1.312	-8.29	-2.166	-16.68
Woman's age 35 to 39	-2.129	-11.77	-2.864	-20.92
Woman's age 40 to 44	-3.013	-9.53	-3.62	-18.24
Woman's age 45 to 49	-2.316	-5.29	-3.6	-16.51
Woman's education 1 to 6 years	-0.628	-2.34	-0.61	-4.82
Woman's education 7 years	-0.868	-4.56	-0.602	-5.07
Woman's education 8 or more years	-0.796	-3.86	-0.924	-5.08
Woman has a partner	0.091	0.39	0.424	2.87
Partner's education 1 to 6 years	-0.595	-2.18	-0.697	-4.94
Partner's education 7 years	-0.39	-1.75	-0.615	-4.95
Partner's education 8 or more years	-0.477	-1.83	-1.031	-5.65
Household owns bicycle	-0.056	-0.54	0.073	0.79
Household owns motorcycle	-0.221	-1.13	-0.382	-1.49
Household has electricity	-0.215	-2.06	-0.08	-0.41
Household has good water	-0.231	-1.63	-0.106	-1.18
Household has good sanitation	-0.322	-1.68	0.24	0.83
No religion	-0.997	-1.76	0.86	4.06
Hospital within 5 km	-0.374	-1.88	-0.285	-1.7
Hospital within 6 to 10 km	-0.39	-1.7	-0.049	-0.28
Health Center within 5 km	-0.121	-0.73	-0.137	-0.93
Health Center within 6 to 10 km	0.225	0.95	0.018	0.12
Dispensary within 5 km	-0.22	-1.18	0.079	0.44

Table 2a. Additional children desired				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	-0.092	-0.29	0.118	0.59
UMATI clinic within 5 km	0.395	2.19	--	--
UMATI clinic with 6 to 10 km	0.551	0.98	--	--
Marie Stopes Clinic within 5 km	-0.261	-1.35	--	--
Marie Stopes Clinic with 6 to 10 km	0.006	0.02	--	--
Woman listens to radio	-0.107	-0.71	-0.158	-1.69
Woman listens to FP radio drama	0.047	0.38	-0.09	-0.84
Mortality rate	5.439	1.22	4.41	1.13
Constant	4.927	14.33	4.834	15.33

Table 3a. Contraceptive Method Choice for Urban Areas				
	Traditional vs None		Modern vs None	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	0.927	2.11	1.21	4.74
Woman's age 25 to 29	0.937	1.86	1.438	4.61
Woman's age 30 to 34	1.343	2.82	1.299	4.67
Woman's age 35 to 39	1.42	2.51	1.671	5.09
Woman's age 40 to 44	0.572	1.07	2.109	6.79
Woman's age 45 to 49	0.425	0.43	1.469	3.83
Woman's education 1 to 6 years	-0.441	-0.45	0.815	3.49
Woman's education 7 years	0.635	0.88	1.05	5.03
Woman's education 8 or more years	1.332	2.03	1.164	4.49
Woman has a partner	0.267	0.35	0.097	0.37
Partner's education 1 to 6 years	-0.472	-0.65	-0.234	-0.95
Partner's education 7 years	-0.265	-0.37	0.262	1.09
Partner's education 8 or more years	0.631	0.82	0.411	1.49
Household owns bicycle	-0.127	-0.39	-0.085	-0.55
Household owns motorcycle	0.453	0.62	0.122	0.34
Household has electricity	0.109	0.33	0.056	0.32
Household has good water	0.055	0.11	0.047	0.23
Household has good sanitation	-0.025	-0.04	-0.093	-0.39
No religion	1.736	1.25	0.146	0.16
Hospital with FP within 5 km	-0.048	-0.11	0.024	0.12
Hospital with FP within 6 to 10 km	0.219	0.46	0.118	0.47
Health Center with FP within 5 km	-0.555	-1.44	-0.423	-2.34
Health Center with FP within 6 to 10 km	0.118	0.24	0.221	0.98
Dispensary with FP within 5 km	-0.143	-0.51	-0.166	-1.07

Table 3a. Contraceptive Method Choice for Urban Areas				
	Traditional vs None		**Modern vs None**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary with FP within 6 to 10 km	1.344	0.94	0.003	0.01
UMATI clinic within 5 km	0.153	0.48	0.607	3.31
UMATI clinic with 6 to 10 km	-1.188	-1.03	-0.08	-0.24
Marie Stopes Clinic within 5 km	0.705	2.36	-0.024	-0.11
Marie Stopes Clinic with 6 to 10 km	-1.488	-2.04	-0.982	-3.31
Woman listens to radio	0.979	1.83	-0.087	-0.5
Woman listens to FP radio drama	0.159	0.48	0.276	1.82
Constant	-5.185	-5.99	-3.476	-10.03

Table 4a. Contraceptive Method Choice for Rural Areas				
	Traditional vs None		Modern vs None	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	1.044	3.3	1.729	7.86
Woman's age 25 to 29	1.16	3.54	1.827	7.84
Woman's age 30 to 34	1.445	4.15	2.155	8.8
Woman's age 35 to 39	1.5	4.51	2.33	9.17
Woman's age 40 to 44	1.883	4.18	2.501	8.78
Woman's age 45 to 49	1.358	3.07	2.388	7.62
Woman's education 1 to 6 years	0.607	2.2	0.672	3.9
Woman's education 7 years	1.065	4.12	0.863	5.03
Woman's education 8 or more years	1.173	2.66	0.832	2.63
Woman has a partner	0.225	0.78	-0.239	-1.17
Partner's education 1 to 6 years	0.107	0.4	0.267	1.35
Partner's education 7 years	0.464	1.74	0.626	3.29
Partner's education 8 or more years	0.322	0.87	0.977	4.2
Household owns bicycle	-0.766	-4.05	0.091	0.68
Household owns motorcycle	-0.89	-0.78	0.696	1.57
Household has electricity	0.217	0.51	0.302	1.46
Household has good water	0.068	0.33	0.116	0.9
Household has good sanitation	--	--	--	--
No religion	-0.265	-0.75	-2.309	-4.18
Hospital with FP within 5 km	0.414	1.88	0.475	2.88
Hospital with FP within 6 to 10 km	0.789	3.2	-0.176	-0.96
Health Center with FP within 5 km	-0.063	-0.25	0.37	2.11
Health Center with FP within 6 to 10 km	-0.075	-0.3	-0.556	-2.34
Dispensary with FP within 5 km	-0.033	-0.15	-0.176	-1.2

Table 4a. Contraceptive Method Choice for Rural Areas				
	Traditional vs None		**Modern vs None**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary with FP within 6 to 10 km	-0.356	-1.17	-0.167	-0.88
UMATI clinic within 5 km	--	--	--	--
UMATI clinic with 6 to 10 km	-0.129	-0.31	0.064	0.15
Marie Stopes Clinic within 5 km	--	--	--	--
Marie Stopes Clinic with 6 to 10 km	0.184	0.37	-0.031	-0.07
Woman listens to radio	0.2	1.18	0.335	2.71
Woman listens to FP radio drama	0.367	1.92	0.427	3.8
Constant	-5.264	-12.63	-5.012	-16.17

Table 5a. Woman received antenatal care				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	-0.139	-0.11	0.207	0.57
Woman's age 25 to 29	--	--	0.456	1.2
Woman's age 30 to 34	-1.1	-0.55	0.409	0.9
Woman's age 35 to 39	-1.932	-2.52	0.104	0.17
Woman's age 40 to 44	--	--	-0.36	-0.52
Woman's age 45 to 49	--	--	1.089	1.15
Woman's education 1 to 6 years	-0.776	-1.1	0.526	2
Woman's education 7 years	1.831	1.27	1.106	3.63
Woman's education 8 or more years	--	--	0.466	0.43
Woman has a partner	1.498	0.87	-0.571	-1.7
Partner's education 1 to 6 years	--	--	0.689	1.86
Partner's education 7 years	-1.224	-0.65	0.7	2.26
Partner's education 8 or more years	--	--	0.404	0.66
Household owns bicycle	-0.551	-0.78	0.971	3.07
Household owns motorcycle	--	--	--	--
Household has electricity	--	--	--	--
Household has good water	-0.528	-0.32	-0.016	-0.05
Household has good sanitation	--	--	--	--
No religion	--	--	-0.984	-3.45
Hospital within 5 km	0.925	0.8	0.126	0.29
Hospital within 6 to 10 km	0.7	0.56	0.678	1.32
Health Center within 5 km	1.071	1.11	0.619	1.41
Health Center within 6 to 10 km	-1.364	-1.39	1.228	2.63
Dispensary within 5 km	0.56	0.39	0.618	1.24

Table 5a. Woman received antenatal care				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	--	--	1.171	2.4
UMATI clinic within 5 km	--	--	--	--
UMATI clinic with 6 to 10 km	--	--	--	--
Marie Stopes Clinic within 5 km	--	--	--	--
Marie Stopes Clinic with 6 to 10 km	--	--	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Birth order of child	0.184	0.49	0.061	0.74
Constant	3.092	1.89	1.305	3.03

Table 6a. Woman received tetanus during pregnancy				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	-0.05	-0.11	-0.054	-0.32
Woman's age 25 to 29	-0.227	-0.47	0.011	0.06
Woman's age 30 to 34	-0.218	-0.36	-0.049	-0.24
Woman's age 35 to 39	0.309	0.39	0.064	0.26
Woman's age 40 to 44	-1.593	-1.51	0.101	0.32
Woman's age 45 to 49	0.012	0.01	0.358	0.92
Woman's education 1 to 6 years	-0.41	-0.93	0.358	2.33
Woman's education 7 years	-0.388	-1.03	0.121	1.01
Woman's education 8 or more years	-0.688	-1.35	0.503	1.07
Woman has a partner	0.798	1.41	-0.171	-0.98
Partner's education 1 to 6 years	0.389	0.54	0.149	0.9
Partner's education 7 years	-0.267	-0.51	0.139	0.92
Partner's education 8 or more years	0.069	0.1	0.217	0.86
Household owns bicycle	0.419	1.16	0.088	0.89
Household owns motorcycle	-1.457	-1.89	0.866	1.4
Household has electricity	-0.245	-0.73	-0.124	-0.28
Household has good water	-0.071	-0.25	0.249	2.15
Household has good sanitation	2.461	1.64	0.098	0.22
No religion	0.129	0.14	-0.389	-2.42
Hospital within 5 km	-0.01	-0.03	-0.099	-0.49
Hospital within 6 to 10 km	-1.006	-2.96	-0.026	-0.15
Health Center within 5 km	0.282	1.12	-0.086	-0.61
Health Center within 6 to 10 km	-0.337	-1.27	0.071	0.51
Dispensary within 5 km	0.084	0.36	0.015	0.08

Table 6a. Woman received tetanus during pregnancy				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	-0.452	-0.72	0.194	1.04
UMATI clinic within 5 km	--	--	--	--
UMATI clinic with 6 to 10 km	--	--	--	--
Marie Stopes Clinic within 5 km	--	--	--	--
Marie Stopes Clinic with 6 to 10 km	--	--	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Birth order of child	-0.127	-1.43	-0.057	-1.88
Constant	2.163	3.21	1.092	4.17

Table 7a. Baby delivered by a trained professional				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	0.164	0.48	-0.004	-0.03
Woman's age 25 to 29	0.789	2.08	0.103	0.56
Woman's age 30 to 34	1.36	2.54	0.36	1.7
Woman's age 35 to 39	2.207	3.3	0.936	3.53
Woman's age 40 to 44	4.402	3.43	1.543	4.9
Woman's age 45 to 49	3.43	2.64	1.404	3.42
Woman's education 1 to 6 years	0.132	0.38	0.369	2.52
Woman's education 7 years	0.548	1.67	0.797	6.27
Woman's education 8 or more years	2.96	2.17	2.391	3.71
Woman has a partner	0.462	1.16	-0.56	-3.12
Partner's education 1 to 6 years	-0.705	-1.95	0.192	1.07
Partner's education 7 years	-0.103	-0.29	0.333	2.2
Partner's education 8 or more years	0.103	0.17	0.921	3.63
Household owns bicycle	0.29	1.17	0.058	0.56
Household owns motorcycle	1.12	1.03	0.322	0.75
Household has electricity	1.035	3.29	1.358	2.54
Household has good water	0.53	1.9	0.059	0.43
Household has good sanitation	-1.935	-2.89	0.544	1.23
No religion	-0.872	-0.92	-0.682	-3.16
Hospital within 5 km	-0.322	-1.09	0.509	1.89
Hospital within 6 to 10 km	-0.559	-1.15	0.04	0.18
Health Center within 5 km	-0.168	-0.39	0.491	2.37
Health Center within 6 to 10 km	0.055	0.1	0.096	0.5
Dispensary within 5 km	-0.612	-1.43	0.649	2.99

Table 7a. Baby delivered by a trained professional				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	1.585	1.34	0.434	1.71
UMATI clinic within 5 km	--	--	--	--
UMATI clinic with 6 to 10 km	--	--	--	--
Marie Stopes Clinic within 5 km	--	--	--	--
Marie Stopes Clinic with 6 to 10 km	--	--	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Birth order of child	-0.317	-3.1	-0.183	-5.55
Constant	1.27	2.15	-0.893	-3.17

Table 8a. Child Given Immunization				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	-0.44	-0.96	0.186	0.86
Woman's age 25 to 29	0.029	0.06	0.178	0.81
Woman's age 30 to 34	-0.198	-0.33	0.366	1.3
Woman's age 35 to 39	0.063	0.07	0.456	1.3
Woman's age 40 to 44	1.132	0.8	0.599	1.55
Woman's age 45 to 49	0.446	0.23	1.094	2.12
Woman's education 1 to 6 years	0.628	1.57	0.017	0.11
Woman's education 7 years	0.061	0.19	0.488	3.39
Woman's education 8 or more years	0.641	1.17	0.557	0.82
Woman has a partner	1.12	1.55	-0.163	-0.79
Partner's education 1 to 6 years	-0.46	-0.56	0.076	0.42
Partner's education 7 years	-0.304	-0.43	0.318	2.02
Partner's education 8 or more years	-0.501	-0.63	0.167	0.57
Household owns bicycle	-0.251	-1	-0.025	-0.2
Household owns motorcycle	-1.035	-1.18	0.032	0.06
Household has electricity	0.555	1.63	0.191	0.37
Household has good water	-0.481	-1.56	0.034	0.22
Household has good sanitation	-0.432	-0.62	-0.148	-0.3
No religion	-0.045	-0.04	-0.816	-3.97
Hospital within 5 km	-0.403	-1.14	0.577	3.04
Hospital within 6 to 10 km	-0.538	-1.53	0.161	0.62
Health Center within 5 km	-0.573	-2.11	0.136	0.51
Health Center within 6 to 10 km	-0.588	-1.6	-0.106	-0.62
Dispensary within 5 km	0.328	0.86	0.187	0.87

Table 8a. Child Given Immunization				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	0.371	0.52	0.49	2.21
UMATI clinic within 5 km	--	--	--	--
UMATI clinic with 6 to 10 km	--	--	--	--
Marie Stopes Clinic within 5 km	--	--	--	--
Marie Stopes Clinic with 6 to 10 km	--	--	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Birth order of child	-0.008	-0.07	-0.049	-1.25
Sex of child	-0.086	-0.32	-0.108	-1.03
Age of child in months	-0.015	-0.82	0.025	3.06
Constant	1.661	2.11	-0.432	-1.1

Table 9a. Woman Knows 2 Sources of AIDS Prevention				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	0.507	3.42	0.407	3.65
Woman's age 25 to 29	0.712	4.42	0.37	2.94
Woman's age 30 to 34	1.014	5.88	0.608	4.76
Woman's age 35 to 39	0.867	3.5	0.814	5.81
Woman's age 40 to 44	0.789	3.38	0.867	5.72
Woman's age 45 to 49	0.829	2.62	0.586	3.84
Woman's education 1 to 6 years	0.401	1.98	0.492	5.1
Woman's education 7 years	0.722	3.69	0.728	7.67
Woman's education 8 or more years	1.353	5.57	1.424	7
Woman has a partner	-0.493	-1.93	-0.078	-0.61
Partner's education 1 to 6 years	0.69	2.44	0.211	1.77
Partner's education 7 years	0.619	2.69	0.336	3.01
Partner's education 8 or more years	0.635	2.47	0.546	3.14
Household owns bicycle	0.16	1.2	0.121	1.55
Household owns motorcycle	-0.321	-0.65	0.262	0.58
Household has electricity	0.328	2.82	0.405	1.78
Household has good water	0.321	2.01	-0.068	-0.76
Household has good sanitation	0.246	1.21	0.113	0.35
No religion	0.555	1.09	-0.499	-2.8
Hospital within 5 km	-0.193	-0.89	0.418	2.79
Hospital within 6 to 10 km	-0.015	-0.06	0.064	0.44
Health Center within 5 km	-0.201	-1.32	0.019	0.15
Health Center within 6 to 10 km	-0.012	-0.05	-0.232	-1.88
Dispensary within 5 km	-0.127	-0.73	0.102	0.78

Table 9a. Woman Knows 2 Sources of AIDS Prevention				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	0.289	1	0.059	0.42
UMATI clinic within 5 km	0.211	0.99	--	--
UMATI clinic with 6 to 10 km	0.294	0.67	--	--
Marie Stopes Clinic within 5 km	0.344	1.6	--	--
Marie Stopes Clinic with 6 to 10 km	0.001	0	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Other sex partner	0.331	2.39	0.408	4.19
Resides in one of the nine focus regions	-0.121	-0.77	-0.227	-2.39
Constant	-1.947	-6.3	-2.182	-11.64

Table 10a. Woman Changed Behavior After Learning About AIDS				
	Urban		Rural	
Variable	Coef	t-stat	Coef	t-stat
Woman's age 20 to 24	-0.201	-0.85	-0.194	-1.52
Woman's age 25 to 29	-0.07	-0.25	-0.162	-1.17
Woman's age 30 to 34	-0.316	-1.14	0.112	0.79
Woman's age 35 to 39	-0.076	-0.28	0	0
Woman's age 40 to 44	-0.227	-0.61	-0.246	-1.65
Woman's age 45 to 49	-0.212	-0.57	-0.364	-2.35
Woman's education 1 to 6 years	0.207	0.96	0.28	2.78
Woman's education 7 years	0.635	2.89	0.717	8.23
Woman's education 8 or more years	1.159	3.68	0.893	2.88
Woman has a partner	-1.125	-4.02	-1.155	-8.59
Partner's education 1 to 6 years	0.703	2.62	0.086	0.76
Partner's education 7 years	0.881	3.6	0.056	0.48
Partner's education 8 or more years	0.871	2.56	0.013	0.08
Household owns bicycle	0.122	0.64	0.034	0.42
Household owns motorcycle	-0.766	-1.53	0.394	0.84
Household has electricity	0.065	0.32	-0.003	-0.01
Household has good water	0.129	0.64	0.265	2.84
Household has good sanitation	1.119	2.32	-0.486	-1.22
No religion	-0.312	-0.66	-0.791	-7.27
Hospital within 5 km	-0.123	-0.49	0.199	1.38
Hospital within 6 to 10 km	-0.135	-0.51	-0.116	-1.01
Health Center within 5 km	0.006	0.03	0.129	0.98
Health Center within 6 to 10 km	0.244	0.92	0.015	0.12
Dispensary within 5 km	0.139	0.53	0.051	0.41

Table 10a. Woman Changed Behavior After Learning About AIDS				
	Urban		**Rural**	
Variable	**Coef**	**t-stat**	**Coef**	**t-stat**
Dispensary within 6 to 10 km	-0.403	-1.5	0.006	0.04
UMATI clinic within 5 km	-0.086	-0.34	--	--
UMATI clinic with 6 to 10 km	-0.059	-0.21	--	--
Marie Stopes Clinic within 5 km	-0.281	-1.08	--	--
Marie Stopes Clinic with 6 to 10 km	-0.098	-0.22	--	--
Woman listens to radio	--	--	--	--
Woman listens to FP radio drama	--	--	--	--
Other sex partner	-0.476	-2.78	-0.731	-6.72
Resides in one of the nine focus regions	0.252	1.29	0.137	1.57
Constant	1.596	3.71	1.669	10.2