

**Determinants of Contraceptive Method Choice in
Rural Tanzania between 1991 and 1999**

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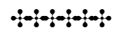
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Determinants of Contraceptive Method Choice in Rural Tanzania
Between 1991 and 1999

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Abstract

Four pooled Demographic and Health survey data sets are used to examine the determinants of contraceptive method choice in rural Tanzania in the period 1991 to 1999. The individual data is linked to facility surveys conducted in the same communities so that the impact of Tanzania's family planning program can be examined. The very large sample size allows us to disaggregate method choice into five categories, including a separate category for condoms, even though this is a very low prevalence country. In addition, we are able to examine the impact of pharmacies. The results show that contraceptive use increased dramatically in the early years of the period and then leveled off. The facility information also shows an initial substantial increase in facility quality and then a leveling off and decline. The pharmacy results run counter to this prevailing trend.

I. Introduction

Except in the area of family planning, the general health status of the Tanzanian population has been stagnant or improved only slightly over the last ten years. Tanzania is one of the poorest countries in the world with a GNP per capita of about US \$240 per year (World Bank 1999).¹ With a very low per capita expenditure on health of about US \$36 per year, Tanzania is ranked 174 among 191 countries.² Like many countries in Sub-Saharan Africa, Tanzania has been coping with the HIV epidemic spreading throughout the country and infecting 8 percent of the adult population by the late 1990s. Available data on health statistics (such as mortality, morbidity and nutrition) reflect these trends. They suggest that only limited or no improvement has been made in the general health of the Tanzanian population in the last decade. Family planning, however, appears to run contrary to this trend with a decrease in the total fertility rate from a high of 6.7 children per woman in 1980, to about 5.5 in 1995, and an increase in contraceptive prevalence for modern methods from 6.6% in 1991 to 15.6% in 1996.³ This more than doubling in the contraceptive prevalence however masks the fact that most of the gains in family planning growth in modern methods occurred between 1992 and 1996. Between 1996 and 1999 contraceptive prevalence grew by only 2.3 percentage points.⁴

One reason for this countervailing trend may be the initiation of programs by the government of Tanzania, which has undertaken an intensive effort to control population over the past decade. With funding from a host of donor agencies, the government formulated a new family planning initiative that significantly upgraded the family planning services in existing facilities and carried out an information and education campaign that provided family planning messages through the media (with radio soap operas) and directly to the public. This paper will inform the debate on what features of the family

¹This is for 1999.

²WHO World Health Report 2000.

³Fertility rates are taken from World Health Statistics Annual, 1998 and modern methods prevalence is taken from "Levels and Trends of Contraceptive Use as Assessed in 1998".

⁴Tanzania Reproductive and Child Health Survey 1999 report.

planning program seem to have affected contraceptive method choice in Tanzania and how the impact of those features has changed through time. It provides a contribution to the literature on family planning program evaluation for five reasons. First, the research is based on a period of time that encompasses the entire life of one donor agency's family planning initiative -- the United States Agency for International Development (USAID). USAID has been one of the largest donors to the family planning program in Tanzania over this time and has provided a significant portion of its budget.⁵ Our data start in 1991, a year before the initiation of the Government of Tanzania's family planning program, and continue through 1999. We can therefore assess and inform the debate on the impact that donor funding and program decisions (choices) can have on the success of family planning programs.

Second, the data contain demographic, socioeconomic and family planning information on women, as well as data on the facility characteristics of family planning services available to women within their communities. The data is made up of four pooled cross-sections gathered in 1991, 1994, 1996, and 1999. Because our data is "longitudinal" in the sense that many of the same facilities were visited in all four survey panels, we are able to investigate the issue of leveling off of contraceptive use in Tanzania. In particular, we can study both supply and demand factors that are hypothesized to explain the leveling off of contraceptive use in Tanzania. We can determine what the initial impact of the family planning program components were when they were first initiated, as well as their continuing impact over time.

Third, pooling all four cross-sections of the data set enables us to focus on rural women only even though this is a very low prevalence country. When we consider family planning characteristics, such as access to services, women in urban areas typically face a family planning supply market with a choice of many facilities located close by work and home. This means that access to family planning is a vague concept because it is difficult for a woman to distinguish what she perceives her market to be since identifying her market is difficult and concepts such as distance to a facility are hard to define. With rural

⁵Internal memo at MEASURE estimates that about US 4.5 million in 1998 was given to family planning programs.

women, we are more likely to be able to disentangle the effects of access. The market they face is a lot more obvious because their choices are restricted by the density of facilities and geographic distance. Characteristics such as distance to the nearest facility are therefore more easily measured.

Fourth, the wealth of data allows us to go a step further than previous studies on the effect of family planning program components on contraceptive method choice in Tanzania. In past research, all modern methods were aggregated into one outcome. This was necessary because of the very low prevalence of contraceptive use in Tanzania, especially in the early 1990's. In our analysis, the large sample size obtained by pooling four data sets allows us to disaggregate the modern methods category into type of modern methods and hence consider condoms separately from other types of modern methods. With the evolving AIDS epidemic in East Africa and the dual role that family planning programs now play in both encouraging healthy sexual behavior and providing family planning, this type of analysis is extremely timely since we are able to assess the impact of different components of the family planning program on condom use in Tanzania over the 1990s.

Finally, over the last decade, the government of Tanzania has undertaken a decentralization campaign to encourage the private provision of family planning services. Within the private sector, pharmacies have been cited as an increasing source of contraception for many users.⁶ Since we have facility information on pharmacies for our first and last surveys (1991 and 1999), we are also able to study the impact that access to pharmacies has on contraceptive choice and if that impact has changed through time.

The plan of this paper is as follows. In the next section, we provide background information on the family planning program in Tanzania and its evolution into a reproductive health program. Information on trends in source of contraceptive method are also present. Section III presents the conceptual framework for our empirical analysis, describes the data sets and provides descriptive statistics

⁶The Tanzania Reproductive and Child Health Facility Survey 1999.

on both the individual level data and the facility level data. Multivariate results and simulations are presented in Section IV and we conclude in Section V.

II. Background

Components of the Program

In 1992, the government of Tanzania developed its first National Population Policy (NPP). The policy was developed to address a very high total fertility rate of about 6.3 children (DHS 1991), an under five mortality rate of 141 per 1,000, a low per capita GNP (equivalent to 110 US dollars), and with an overall population of 27 million people. With substantial funding from donor agencies, the NPP and subsequent population policies have been implemented by the Ministry of Health through its Reproductive and Child Health Unit (RCHU), which later became the Reproductive and Child Health (RCH) Section.

The major donors for family planning in Tanzania are the United States Agency for International Development (USAID), the United Nations Population Fund (UNFPA), the British Overseas Development Administration, the German Association for Technical Cooperation and the International Planned Parenthood Federation (IPPF). Most of the assistance provided by USAID and UNFPA is channeled through the RCH Section, while IPPF assistance is centered around its own set of clinics in urban areas that provide family planning.⁷ The RCH section oversees a large network of government run hospitals, health-centers and dispensaries throughout the country.

UNFPA provided \$21 million of support over a five-year period during the mid-nineties. The funding from USAID began in 1990 and had an initial bilateral funding level of \$20 million over seven years. Over the subsequent decade, USAID was one of the largest donors in support of the population,

⁷In addition to the IPPF or UMATI clinics, some urban areas are also served by Marie Stopes clinics. However, neither of these organizations have clinics in rural areas of Tanzania, which is the focus of this paper.

health and nutrition initiatives in Tanzania, providing an average allocation of 11 million US dollars per year.

In 1998, the two main programs receiving ongoing support from USAID in Tanzania were the FPSS program and the Tanzania Aids Project (TAP). At this time, 6.5 million dollars were allocated towards the FPSS budget (30% for child survival activities and 70% for family planning). The overall goal of the FPSS project was to “improve the health and well being of women and children by enhancing the opportunity to choose freely the number and spacing of children” (Shutt, et. al., 1994). The major components of the program were to train health providers in the provision of family planning, to provide logistical support for the provision of family planning supplies and to develop an information, education and communication (IEC) program to promote family planning. Over the decade, with these objectives in mind, the government of Tanzania has made a substantial effort to integrate family planning programs into maternal and child health programs. By 1997, the government had taken several steps to integrate family planning programs into maternal and child health programs, including the initiation of a reproductive and child health program. This program was continued through 1999.

The remaining \$4.5 million of funding supported TAP. TAP worked largely through the non-governmental organization (NGO) sector, however, it also supported the National AIDS Control Program (NACP) with a goal of preventing the further spread of HIV and improving the welfare of AIDS orphans. TAP activities included establishing NGO networks and clusters, supplying information along with condoms in social marketing efforts to encourage HIV preventive practices, and improving health care providers’ diagnosis and treatment of HIV/AIDS and other sexually transmitted diseases.

The government of Tanzania has been slow to respond to the epidemic. The NACP was set up within the Ministry of Health by the government of Tanzania in 1987 with the aim of addressing the increasing HIV prevalence. They set up three medium term campaigns: 1987-1991, 1992-1996, 1998-2002, however, shortage of funds and lack of political commitment has hampered the implementation of

the campaign through much of the nineties.⁸ During the initial stages of the AIDS epidemic, government sponsored activities focused on mobilizing the health sector through training health workers and ensuring blood safety. The focus then expanded to increasing knowledge and awareness of healthy sexual behavior to the sexually active population.

The Salama brand of condom was introduced by the NACP and in 1988 social marketing programs began with funds from the USAID Aidscom project. Sales were however very low, with about 150,000 units over a one and a half year period, and in 1993 Population Services International (PSI) took over the condom program. PSI launched a new and innovative social marketing program that included package redesign, increasing the number of local distributors, and increasing the number and type of retail outlets that sold condoms. They also used modern marketing techniques and advertising campaigns. These efforts increased the sale of condoms to over \$10 million between 1995 and 1997.⁹

As part of the family planning initiative, a national mass media campaign promoting family planning was launched. The radio drama *Twende na Wakati* began broadcasting in July 1993 and airing of *Zinduka!* began in October 1993. Both dramas are still on the air, with *Twende* being supported by UNFPA and *Zinduka* by USAID. Since 1993, a number of new radio dramas targeting youth have been introduced. Radio is still considered to be one of the best sources for disseminating family planning messages. Another component of the IEC effort was the Greenstar logo that was introduced in 1993. The objective of this IEC campaign was to promote family planning services through identification with a logo or brand. Promotional messages were launched using both print and electronic media. This campaign continues today.

⁸“AIDS in Africa During the Nineties: Tanzania.” 2001 MEASURE Evaluation Project Special Report.

⁹Information found on the PSI website (see bibliography for reference).

Trends in Sources for Family Planning

In the ten years since the inception of the FPSS program, the number of women looking to government facilities for their modern methods of family planning services seems to have leveled off or decreased slightly (see Table 1). Between 1991 and 1996 there was an increase in the use of government facilities, but by 1999 the numbers had decreased to 76% in rural mainland Tanzania. This plateau in contraceptive availability began to be recognized in the middle of the decade. Investigation of the phenomena at that time revealed that two things were happening. First, family planning facilities were experiencing stock-outs and supplies were not getting from the warehouse to the clinics, and second, there were very few trained providers in family planning facilities within rural areas. At this time, there seemed to be a lull in program activity as the focus of the program became more logistic and the program's orientation moved from provision of services to logistical or management issues.

The role of the private sector in providing family planning in rural areas has been increasing over the last decade. The decentralization of the health care system has led to the privatization of health services throughout Tanzania. Table 1 shows that over the decade, there was an increase from 1.1% in 1991 to 2.4% in 1999 in the number of women reporting medical private facilities as the source or their current modern method of family planning. Therefore, private for profit facilities are becoming somewhat more important in the provision of services as the government moves to decentralize public services and enhance private investment – this change is much more dramatic in urban areas.¹⁰ Also noticeable is the increasing role of pharmacies as an alternative source of modern methods. In 1991, only 2% of women listed pharmacies as a source, whereas 4.3% in rural areas listed them as a source in 1999.

¹⁰MEASURE Evaluation Technical Report Series, No. 7.

III. Conceptual Model and Data Sources

Conceptual Framework and Statistical Methods

In Tanzania, improvements in the family planning sector have taken place on both the supply and demand sides over the last ten years. As outlined above, the government and the private sector have worked to increase the availability of family planning services while at the same time undertaking information and educational campaigns set up to influence the demand for these services. In our analysis, we estimate a reduced form model for type of family planning services where both demand and supply side variables are included as explanatory variables.

Even though we estimate a reduced form model, our analysis is guided by structural models of fertility in which contraceptive use is an endogenous determinant. These models take into account both demand and supply side factors that affect contraceptive use and ultimately fertility (see, for example, Easterlin and Crimmins 1985; Rosenzweig and Schultz 1985; Schultz 1989; and Buckner, Tsui, Hermalin, and McKaig, 1995). The simple form of these models hypothesize that exogenous individual background factors, such as the woman's age and education, and household background factors, such as household assets, as well as 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 which, in turn, affects fertility.

Reduced form models can only determine the total effect of a certain variable on contraceptive method choice. These models say nothing about causal effects or the pathways through which the variable affects contraceptive preference. For example, an educational campaign may affect fertility preferences which in turn alter the choice to use contraception. To examine the causal pathways, we would have to estimate the structural model. The advantage that reduced form models have over structural models is that they are easier to estimate and there is no need to worry about identification problems which tend to make structural estimation controversial and unstable. In addition, the reduced form model makes it straightforward to examine total program effects on contraceptive method use and how these effects change over time.

We model choice of type of contraceptive method using the multinomial logit model. The statistical specification is as follows:

$$\ln\left[\frac{P(C_{ij}=k)}{P(C_{ij}=1)}\right] = X_{ij}\beta_k + t\delta_k + P_{ij}\alpha_k + tP_{ij}\gamma_k + \mu_{ij}$$

(1)

Where the dependent variable is the log odds that woman i ($i=1,2,\dots,N_{ij}$) from panel t and community j used contraceptive method k relative to contraceptive method 1. The X 's represent characteristics of the respondents such as age, education, and religion. The t 's represent a set of three dummy variables for the 1994, 1996, and 1999 panels. The P 's represent program variables, such as access to family planning services and whether or not the respondent heard a family planning message. We allow the P 's to have time varying impacts by interacting the program variables with panels. Since there are 4 panels in the data set, we estimate main effects for the first panel (1991) and then interactions with panels 2, 3, and 4.

The final term in equation (1) is a community specific error term (μ) that is allowed to vary through time. The community specific error term allows individuals within the same community to have correlation in their choice of contraceptive method due to unobserved community level factors (attitudes of community leaders towards contraception, for example). The statistical implications of this specification are that standard methods will yield correct point estimates of the coefficients but standard errors will be biased downwards, which means t statistics will overstate significance. We correct for this problem by using Ecker, Huber, White standard errors (see Angeles, Guilkey, and Mroz, 2002).

Our study expands upon the work of Dietrich et al 1998, which used the first three panels of the Tanzania data sets. In their study, data limitations restricted the analysis to a more aggregated dependent variable – contraceptive method defined as a choice of traditional, modern, or none (Dietrich et al.1998). The richness of our data, however, allows us to go a step further and examine a more disaggregated variable, contraceptive type. We are therefore able to study the determinants of oral contraceptives,

condoms, other modern, and traditional types of contraception in Tanzania. By disaggregating, we are able to actually study how program effects and access to facilities affect the actual type of contraception used. In light of the AIDS epidemic, where barrier methods are now promoted as methods of both disease and birth control, our research will help to determine what affects contraceptive type chosen. In our research we are able to determine what factors, for example, influence the use of condoms and how the influence of these factors have changed over the last 10 years.

Individual Level Data

The data for these analyses is made up of three sources: the Tanzanian Demographic and Health Survey (TDHS), the Tanzania Service Availability Survey (TSAS), and the Tanzania Reproductive and Child Health Survey 1999 (TRCHS) facility supplement. The TDHS conducted four population based national surveys between 1991 and 1999. The first DHS survey was conducted in 1991/92. This was followed by the Tanzania Knowledge, Attitudes and Practices Survey (TKAPS) in 1994 and two more DHS surveys in 1996 and 1999. All four surveys have the same questions, however, the two later surveys included more detailed sections of questions on AIDs, maternal mortality, and female circumcision. This analysis uses the Woman's Questionnaire, which collects information from eligible women aged 15-49. The topics included in this questionnaire of interest to our research are basic background characteristics and use of family planning.¹¹

The sample was created by merging all four panels of the TDHS data with the various facility surveys for the same time periods. Our sample includes only rural women within mainland Tanzania and in clusters that can be matched with the facility data.¹² Women with missing information on key variables in our analysis were dropped. Table 2 provides information on the sample size.

Our final sample is made up of 18,500 women living in rural areas. Table 3 provides descriptive statistics on the sample of women extracted from the four TDHS surveys for this analysis. The table

¹¹See Dietrich, Guilkey, and Mancini for a brief outline of the survey methodology and content of the 1991/92, 1994 & 1996 panels of the Tanzania DHS.

¹²All clusters in Zanzibar were dropped from the sample.

shows that our sample is relatively young, with an average age of 28 years, and of limited education. About 98% of rural women have seven or fewer years of education. About 69% report having a partner and 95% of these partners have seven or fewer years of education. A large proportion of women report having a religion, with only 14% of the entire sample reporting no religious affiliation.

In our sample, modern contraceptive prevalence rose from 3% in 1992 to 11% in 1999. Most of the growth in modern contraceptive prevalence across the 9 year period of study, has come from the steady growth of hormonal methods, such as pill, from 2% in 1991/1992 to 7% in 1999. Despite the integration of STD/HIV services into family planning services and the promotion of condoms, the increase in condom prevalence is disappointing. There were 31 out of 7088, 48 out of 3042, 46 out of 6028, and 43 out of 2342 condom users in the four panels, representing a slight upward trend.

An important component of the information and educational campaign (IEC) in family planning is delivery of family planning messages directly and through dramas on the radio. About 36 percent of rural women report listening to the radio. As Table 3 shows, the number of rural women with exposure to family planning messages has increased over the last ten years. The number of women, however, who reported being exposed to radio dramas decreased over time from a high of 19 percent in 1996 to 7 percent in 1999. Note that in 1992 the TSAS survey did not collect data on radio dramas so we have no statistics for this year.

Facility Level Data

The facility data comes from three facility surveys known as the Tanzania Service Availability Survey (TSAS) conducted between 1991-1996 and a fourth survey, the Tanzania Reproductive and Child Health Facility Survey (TRCHS facility supplement), conducted in 1999. The TSAS survey was carried out in 1991, 1994, and 1996 and was introduced to assess the availability, or supply, of family planning and health services in communities or enumeration areas from the 1988 census that were selected for the individual level data.¹³ Facilities were selected if they were reported by a group of knowledgeable village leaders as being a source of health and family planning services for their community and they were within 30 km (about 5 hours walking distance) of the community center. The closest facility of each type was visited and the relevant facilities for rural areas were dispensaries, health centers, and hospitals. In later surveys, Marie Stopes and UMATI clinics were visited, but these facilities are exclusively in urban areas and were not relevant for this analysis of rural contraceptive method choice. Pharmacies were also visited in 1991 and 1999 (but not in 1994 or 1996) and some of these pharmacies were sufficiently close to rural clusters and are used in the analysis.

These three data sets are longitudinal in the sense that they are for the most part from the same facilities so that valid comparisons can be made across time (see table 4 for the distribution of matched facilities in these surveys). The survey collected data on health services and health care provision, and included information such as the availability of medications, the presence of equipment and supplies, the level and training of family planning providers, the availability of family planning methods, and the number of clients visiting each facility.¹⁴

Table 4 shows the relative sample sizes of the facilities surveyed for mainland Tanzania. Note that the number of each type of facility is less than the total number of clusters. The main reason for this

¹³See 1991 DHS report Pg.179 for a description of the sampling strategy.

¹⁴See Dietrich, Guilkey, and Mancini for an in-depth description of the sampling methods used and the content of successive panels of the TSAS.

is that there were no facilities within 30 kilometers of the community. In addition, in a small number of cases, facilities refused to participate in the survey. However, these were typically large urban facilities.

The 1999 facility supplement has a new improved sampling methodology. Whereas the TSAS surveyed one facility of each type that was closest to the cluster center (but not exceeding 30 km), the TRCHS facility supplement surveyed all the health facilities within two concentric cluster rings of the cluster center. This means that unlike the TSAS, we now have information on the entire market potentially supplying family planning services for women in the center of the two rings.¹⁵ The TSAS and the TRCHS facility supplement are comparable across time because the TRCHS sampled a subset of clusters (about two thirds of the rural clusters) sampled by the TRCHS in 1996. This means that the facilities in previous surveys were surveyed again in 1999, if they fell within two concentric rings of the cluster center, along with new facilities considered to be within two concentric cluster rings of the surveyed cluster. Table 4 shows that the number of facilities that actually overlap with the 1996 panel is somewhat less than in the previous intentionally longitudinal series (1991/92 to 1996). This is due to the fact that only a subset of the 1996 rural clusters were surveyed in 1999.

The topics covered in the 1999 survey were the same as in the previous facility surveys, however, the design changed substantially in 1999 to meet the needs of "stakeholders." The wording of key questions, however, remained the same so comparability across years is not meaningfully impaired.

Only the TSAS 1992 and the TRCHS 1999 collected data on pharmacies. In 1999, pharmacies were once again surveyed because of, among other reasons, anecdotal evidence suggesting the growing importance of the role played by the private sector in the provision of family planning services.

There are 262 clusters represented in our sample. These clusters are all rural and do not include clusters in Zanzibar. For this analysis, we merged the TDHS and the facility surveys by cluster so that each woman has both demographic and socio-economic information and facility information on her market for family planning. In previous work with the 1991, 1994, and 1996 data, we found that access

¹⁵See Appendix A of Tanzania Reproductive and Child Health Facility Survey 1999 for a more in depth explanation of the sampling methodology.

within 5 km was an important determinant of contraceptive method choice, we thus use this variable in the current analysis. In 1999, we have a far richer facility data set, however, we need to match the information in 1999 to the earlier data sets, so we define access to each type of facility within 5 km for this data as well. We restrict our model to examining the effect of hospitals, health centers, dispensaries, and pharmacies with family planning services, regardless of operating authority (i.e. public or private).

Table 3 shows the characteristics of the market that the women face. Access to facilities offering family planning services has increased somewhat over time. Dispensaries have the largest share, with 35% of the women having a dispensary within 5 km of the cluster center. The growth in dispensaries with family planning increased from 30% to 40% in 1994, before dropping off to 35% and remaining at that level from 1996 to 1999. Health centers have also become more important, with 22% of women living within 5 kilometers of one in 1999. The results reported in Table 3 for pharmacies are somewhat misleading. As is clear from the data, few rural women have access to pharmacies, and the 1999 sample only used a subset of the rural clusters that were in the 1991 survey. When we used only a sample with clusters that matched across time we found that the number of women that had a pharmacy within 5 km increased from 13% to 15%. Thus, there was actually a slight increase in access to pharmacies for women in this matched set of clusters.

In early specifications of the model, we also included variables on trained family planning providers and stock-outs to determine the effect of facility quality on the demand for family planning services. The effect was insignificant for both. One explanation of the insignificant finding is that if you have access to a variety of family planning facilities, the effect of stock-outs and trained family planning providers would be obscured by the effect of choosing to go to a specific type of facility first, then the quality characteristics of the facility can only appear as interaction effects in the multinomial logit model. Given the low levels of contraceptive use in Tanzania, it would be difficult to obtain significance for second order effects. Nevertheless, Tables 5 and 6 show the trends in these two measures of facility quality because we felt that they are important and could be associated with the leveling of contraceptive use in Tanzania, even though they were not significant in our multivariate model.. These data include

both urban and rural clusters in mainland Tanzania and are taken from the 1996 TSAS and the 1999 TRCHS reports.

The results reported in Table 5 for 1991/92, 1994, and 1996 are for a matched set of facilities – facilities that were surveyed in all three years. Unfortunately, because only a subset of clusters were visited in 1999, a matched sample that extends through 1999 would result in a small number of facilities, so we matched the 1999 sample to facilities that were also surveyed in 1996. The results for all methods and facility types show a clear pattern: an initial increase in contraceptives seen in stock between 1991/92 and 1994 during the early years of the FPSS program, a leveling off or decrease between 1994 and 1996, and some further decrease in most cases in 1999.

Unfortunately, in the 1991/92 facility survey, condoms were listed under medications and interviewees were asked whether or not they were available at the facility but the interviewer did not verify that condoms were actually seen in stock. We know from comparing the availability question results to the seen in stock question results for contraceptive methods that the availability questions overstate whether or not the method is actually in stock in the facility. In 1999, the survey only asked whether or not condoms were seen in stock, we therefore have no direct comparison of the actual availability of condoms in the facilities between 1991/92 and 1999. However, 64% of the facilities said that condoms were available in 1991/92, which is probably an overstatement of actual availability, and 68% of the facilities had condoms seen in stock in 1999. Thus, there is evidence that the actual availability of condoms in pharmacies has in fact increased between the two surveys.

Table 6 displays information from the Tanzania Reproductive and Child Health Facility Survey, 1999, that shows the trends in staff training over the period under study. Prior to 1996, the facility survey did not have questions on when the facility staff were trained or by whom. We therefore report only the percentages for the 1996 and 1999 survey. Across this three year period, there was a significant increase in the number of facilities with at least one trained provider. This number is not broken out by urban and rural however, so we do not know if there was any increase in the number of trained providers in rural areas, which had been cited in previous studies as the place with the most unmet need.

Other Exogenous Variables

Dichotomous variables for each panel were included in the model to reflect the changes that may be occurring in the market for family planning across time that cannot be controlled by observable variables. As shown in equation (1), these survey panel variables were also interacted with the program variables, family planning message, radio drama, and having a facility within 5 km. This will allow us to distinguish, for example, between the effect of having the hospital when it first introduces family planning services, versus changes in the effect of having access to family planning services at the hospitals across time.

IV. Multivariate Results and Simulations

Because the pharmacy information was only gathered in 1991/92 and 1999, we specify two models based on equation (1). The first includes all time periods, but does not include the pharmacy variables. The second includes only two time periods (1991 and 1999), but also includes pharmacy access variables. Because pharmacies typically only stock condoms and pills, we had separate categories for pill and condom in the multinomial logit model and grouped injection into the “other modern method” category. The final category was traditional methods. The results are presented in Tables 7 and 8.

The Model Without Pharmacy Variables

Table 7 presents the without pharmacy results for choice of contraceptive method. We use the choice not to use a method as the base category, so the coefficients represent the effect of the variables on the log odds of choosing a particular method to the choice of no method. As is well known for the multinomial logit model, the choice of the base method is arbitrary and all other comparisons can be generated by simple subtraction. We do not present the multinomial logit results for traditional methods, yet we do include results for traditional methods in the simulations that follow. When we say that a

variable is statistically significant, we use a 5% (1.96 in absolute value) cut-off for a two-tailed test of the null hypothesis that the true value of the coefficient is zero unless we state otherwise.

Before turning to specific variables, we first discuss the panel dummies. The omitted category is a dummy for 1991/92 and we see that the log odds of using the pill increase for every panel relative to 1991 and the increase is larger with each succeeding panel. The pattern for condoms is similar, except that 1994 and 1999 dummies variables are larger than the 1996 dummy, but the coefficient for 1996 is still large, positive, and statistically significant. The dummies for other modern methods are also positive and increasing through time, but only the 1999 dummy is statistically significant. The overall pattern suggests that exogenous forces that are not explicitly controlled by specific variables in our model have had a positive effect on contraceptive use over the past decade. Possible factors may be the overall pace of development and reductions in infant mortality over the past decade. We now turn to a discussion of the effect of variables that we measure in our data sets.

We use a simple linear specification for the age of the respondent to keep the specification of control variables as parsimonious as possible. Our program effects are robust to more complicated specifications for age. Age is both a positive and significant predictor of pill use and other modern methods. For condom use, age is negative but insignificant. As expected, the respondent's education has a positive and significant effect for all education levels for all types of modern methods. Generally, the more education a woman has, the more likely she is to use a modern method. The effect of listening to a radio is also a positive and significant predictor of pill use and other modern method use, and it is positive and almost significant at the 10% level for condom use. The control for listening to the radio is important since we also include whether or not the woman heard a family planning radio drama in the six months preceding the survey, and what we want to measure is an additional effect over simply listening to the radio. We see that listening to the radio has a positive and significant effect for both pill use and other modern contraceptive use, and it is close to significance at the 10% level for condom use.

The final two socioeconomic status controls are whether or not the respondent reports that she has no religious affiliation and the level of education of her partner. We see that no religious affiliation has a

negative and significant effect on all modern methods. The partner's level of education is interactive, in the sense that a woman who does not have a partner receives a "0" for this variable. We see that the main partner effect is insignificant and the impact of partner's education is uniformly positive and significant, except for condoms for education levels 1 to 6 (negative and insignificant) and education 7 (positive and almost significant at the 10% level). In preliminary specifications we tried an asset index as an additional status control but it was insignificant. It appears that partner's level of education is the most effective control for status in this sample.

The controls for age, education, and socioeconomic status behave much as one would expect, so we now turn to the focus of the paper, the impact of the program variables and how that impact has changed through time. The first program variable is whether or not the respondent reported having heard a family planning message in the last six months. It is well known that the impact of this variable on contraceptive use is probably overstated since it may be the case that respondents who remember hearing a message may be more likely to use a method of contraception. In spite of this bias, we include this variable because, when we run the model without it, the effects of the other program variables are unchanged and it is interesting to see how its impact has shifted through time, even though its estimated impact is probably biased upwards at each point in time. For pill use, we see that the main effect of having heard a family planning message is positive and highly significant. However, the interactions for 1996 and 1999 are large and negative, but drop a little below significance at the 5% level. A similar pattern is true for condoms, except that all interaction terms are negative and large, but all effects except the main term are imprecisely measured. The results for other modern methods follow the opposite pattern. The main effect is insignificant yet the interactions are positive, but all except the 1996 interaction are imprecisely measured. These results may be indicative of an emphasis on injection use in the family planning program during this period.

The only facility access variable that has a significant effect on pill use is the presence of a hospital with family planning within 5 km of the cluster center. However, while the main effect is positive and strongly significant, all interactions are negative and imprecisely measured. If you just

compare the point estimates, it appears that the effect of access to facilities on pill use has completely died out by 1999. A similar pattern is seen with the impact of access to hospitals on condom use and other modern methods: a strongly significant main effect that dies out across panels of the survey. The results for health centers and dispensaries are disappointing in the sense that there are a few significant coefficients. Only two out of twenty four estimated coefficients are significantly different from zero at the 5% level of significance. However, the overall pattern of point estimates is similar to the results for hospitals. Main effects are typically positive and interaction terms are typically negative.

The Model With Pharmacies

As shown in Table 1, pharmacies have become a more important source of contraception even in rural areas over the last decade. We also know from the pharmacy surveys conducted in 1991/92 and 1999 that condoms have been increasingly available. Therefore, we use the 1991/92 and 1999 data where access to pharmacies is measured to examine the impact of pharmacies on contraceptive use. The focus is on condom use, although some pharmacies in both 1991/92 and 1999 stock the pill. Table 8 reports the results of the multinomial logit estimation. The specification was identical to Table 7, except we only include a 1999 interaction because we only use 1991/92 and 1999 data. We only report the estimation results for access to a pharmacy within 5 km of the cluster. The results for the other variables was very similar to those reported in Table 7.

We see that the pharmacy results stand in stark contrast to the results for access to hospitals, health centers, and dispensaries. There is weak evidence that the impact of access to pharmacies has increased in a positive direction for both the pill and other modern methods and there is strong evidence that the impact of access to pharmacies on condom use is positive in 1999. We quantify the size of the effects in the simulations presented below.

Simulations

In order to gain some insight into the magnitude of the impact of the program variables on contraceptive use, we carry out a number of simulations with both versions of the model. We use the estimated coefficients in each of the four years to predict contraceptive type use for each woman in our sample if a particular program variable is set to zero (for example, no dispensary within 5 km) and then average over the women in the sample. We call this “none” in the tables. We then set the same variable to one (for example, there is a dispensary within 5 km of the woman’s village) and predict contraceptive type use keeping all other variables constant. We call this “full.” We are therefore able to obtain the impact of what would happen if everyone in our sample was exposed to a particular program. The simulated effects of all women being treated with a particular program are presented in Tables 9 and 10.

Table 9 reports the percentage change when specification 1 is used to simulate the effects. The effect of the program variables on predicted use of modern contraception differs with time. In 1991/92, the first years of the program the effect is positive for all program variables. The typical result is that the percentage difference between the no program and program columns diminishes in later years. For example, the impact of access to a hospital with family planning almost doubles in 1991/92, but only causes a 50% increase in 1996 and the change is negative by 1999. However, it is important to point out that the 1999 interaction term is imprecisely measured. Similar results are obtained for the family planning message variable.

Table 10 shows the results for the simulation of specification 2 of our model. We only present results for the impact of pharmacies in this table and can only use 1991/92 and 1999 data sets. We see a larger impact of pharmacies in 1999 for all three modern methods. However, while the results for pill and other modern methods are somewhat interesting, the simulations are based on coefficients of the year interaction terms with access to pharmacy in the pill versus no method and other modern that are not statistically significant. The year 1999 interaction with access to pharmacies is strongly positive, however, so the more than doubling of simulated use of condoms with access to pharmacies is most interesting.

V. Conclusions

In the early years of the 1990's, there was a concerted effort by the government of Tanzania and several donors to try to reduce fertility in Tanzania through a substantial upgrade to the family planning delivery system. The program had three main components. (1). Better logistical support for fixed facilities so that they would have a variety of methods available. (2). Improved training for family planning providers. (3). An information campaign with family planning radio dramas as an important component. The result of this effort was a dramatic increase in modern contraceptive use between 1991/92 and 1994 and then a leveling off for the remainder of the decade.

This paper uses unique data in an attempt to examine the determinants of a woman's choice of contraception during this period. Ideally, we would have liked to have included all the components of the program as separate explanatory variables for method choice. Unfortunately, after including access to facilities and interaction with access through time, we were unable to include facility characteristics related to the program, specifically whether contraceptives were seen in stock and the presence of trained providers, as additional explanatory variables. However, we do see that the effect of having heard a family planning message and having heard a family planning radio drama mirror the descriptive statistics: strong impact early and diminished impact later in the decade. These results may indicate that these programs may be getting stale and may thus need updating.

Even though we cannot include facility characteristics as determinants, we see that there was a dramatic increase in the availability of modern methods in all types of facilities between 1991/92 and 1994 and then a leveling off, and even a decrease in some cases, for the remainder of the decade. This pattern mirrors the impact of access to facilities on method choice through the decade, so we have circumstantial evidence that the leveling off of modern use in the later half of the decade is related to stock out problems that became more prevalent during the same time period.

One result that runs counter to the disappointing results discussed above is that the impact of access to pharmacies on condom use seems to have increased between 1991/92 and 1999. Unfortunately, differences in the wording of questions about the availability of condoms in pharmacies makes the tie to

increased use somewhat tenuous. However, it does appear that pharmacies were more likely to have condoms in stock in 1999, and this increased availability may be the reason for the large increase in the impact of access to pharmacies. Unfortunately, pharmacies are only available to a small percentage of rural women. However, the results do seem to indicate an increasing role for the private sector in the delivery of family planning methods in rural Tanzania. This could be very important, since the evidence suggests that public sector provision needs to be reinvigorated if it expects to play a major role in increasing contraceptive prevalence.

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Table 1. Source of Supply for Modern Contraceptive Methods for Rural Women (percent)				
Year	1991/92	1994	1996	1999
Public	74.81	78.72	83.64	76.38
Medical Private	1.13	1.6	2.04	2.36
Private Pharmacy	1.88	2.13	2.42	4.33
Other	22.23	17.55	11.90	16.93

Table 2. Sample Sizes for the Four Surveys				
Year	1991/92	1994	1996	1999
Total Number of Women	8718	4225	8120	3390
Number of Rural Women	7088	3042	6028	2342

Table 3. Descriptive Statistics

Year	1991/92	1994	1996	1999	Average
Year Dummy Variable	0.38	0.16	0.33	0.13	
Women's education 0 years	0.39	0.36	0.32	0.32	0.36
Women's education 1 to 6 years	0.22	0.22	0.21	0.29	0.22
Women's education 7 years	0.38	0.40	0.42	0.38	0.40
Women's education 8 or more years	0.02	0.02	0.04	0.01	0.02
Age of Woman	28.14	28.32	28.49	28.03	28.27
Woman listens to the radio	0.35	0.44	0.37	0.24	0.36
No religion	0.17	0.15	0.11	0.13	0.14
Partner					0.69
Partner's education 0 years	0.00	0.19	0.17	0.09	0.10
Partner's education 1 to 6 years	0.18	0.20	0.15	0.15	0.17
Partner's education 7 years	0.24	0.30	0.30	0.21	0.27
Partner's education 8 or more years	0.05	0.04	0.06	0.01	0.05
Woman heard a family planning message	0.36	0.42	0.43	0.40	0.40
Woman heard a radio drama		0.15	0.19	0.07	0.10
<u>Family Planning Services</u>					
Hospital with family planning within 5 km	0.05	0.08	0.08	0.09	0.07
Health Center with family planning within 5 km	0.09	0.06	0.16	0.22	0.12
Dispensary with family planning within 5 km	0.30	0.35	0.40	0.37	0.35
Pharmacy with family planning within 5 km	0.18			0.14	0.09
<u>Current Contraceptive Choice</u>					
Pill	0.02	0.03	0.04	0.03	0.03
Condom	0.00	0.02	0.01	0.02	0.01
other modern (IUD, diaphragm, injection, male & female sterilization)	0.02	0.03	0.04	0.05	0.04
Traditional (calendar, withdrawal, mucus, other)	0.03	0.06	0.04	0.07	0.05
None	0.93	0.86	0.87	0.83	0.87

Table 4. Sample Size in Facility Surveys			
Year	Hospitals	Health Centers	Dispensaries
1991/92	81	89	218
1994	89	118	230
1996	90	123	253
1999	88	62	255
Matched 1991/92, 1994 & 1996	78	82	194
Matched 1996 & 1999	64	38	90

Table 5. Percent of Family Planning Facilities Where Contraceptives Seen in Stock												
	Hospital				Health Center				Dispensary			
Survey year	91	94	96	99	91	94	96	99	91	94	96	99
Pill	92	98	97	91	83	94	95	86	84	96	88	92
Injection	84	97	82	84	34	90	80	84	20	84	81	82
Condom	82	89	83	84	97	82	87	78	97	87	75	80

Table 6. Percent of facilities with at least one or two trained family planning providers, matched mainland facilities		
	1996	1999
Hospitals	58	75
Health Centers	34	50
Dispensaries	8	21

Table 7. The determinants of contraceptive method choice 1991-1999

	Pill		Condom		Other Modern (including injections)	
	Coefficient	t statistic	Coefficient	t statistic	Coefficient	t statistic
Age of Woman	0.02	3.36	-0.01	-0.82	0.11	15.22
Women's education 1 to 6 years	0.50	3.36	0.42	1.28	0.74	5.25
Women's education 7 years	0.73	4.67	0.97	3.58	1.06	6.40
Women's education 8 or more years	0.87	3.32	1.09	2.72	1.27	4.43
No religion	-1.98	-4.41	-1.07	-2.06	-0.92	-3.68
Woman listens to the radio	0.33	2.81	0.29	1.61	0.29	2.83
1994 panel effect	0.12	0.33	2.09	5.51	0.20	0.75
1996 panel effect	1.11	4.28	1.28	2.49	0.39	1.60
1999 panel effect	1.39	4.20	2.72	6.42	1.21	4.11
Woman listens to radio drama	-----	----	----	----	----	----
Interacted 1994 & radio drama	-0.04	-0.10	0.47	0.84	-0.23	-0.57
Interacted 1996 & radio drama	-0.58	-1.70	0.33	0.64	-0.79	-2.30
Interacted 1999 & radio drama	0.88	2.95	0.22	0.47	0.81	2.65
Family Planning Message	1.09	5.23	1.20	2.60	0.11	0.59
Interacted 1994 & Family Planning Message	0.07	0.19	-1.01	-1.84	0.49	1.76
Interacted 1996 & Family Planning Message	-0.47	-1.83	-0.99	-1.75	0.87	3.40
Interacted 1999 & Family Planning Message	-0.69	-1.93	-0.46	-0.84	0.34	1.18
Woman has a partner	-0.22	-1.07	-0.46	-1.27	0.20	1.28
Partner's education 1 to 6 years	0.65	3.76	-0.11	-0.27	0.26	1.76
Partner's education 7 years	1.12	6.44	0.56	1.61	0.38	2.43
Partner's education 8 or more years	1.25	5.70	1.27	3.11	0.76	4.10
Hospital with FP within 5km	0.82	3.12	1.80	4.01	1.11	4.40
1994 panel & Hospital with FP within 5km	-0.53	-1.51	-0.94	-2.03	-0.30	-0.67
1996 panel & Hospital with FP within 5km	-0.33	-0.94	-0.95	-1.55	-0.77	-2.31
1999 panel & Hospital with FP within 5km	-1.14	-1.68	-2.53	-3.45	-0.70	-1.42
Healthcenter with FP within 5km	0.18	0.48	0.93	1.59	0.46	1.27
1994 & Healthcenter with FP within 5km	-0.31	-0.68	-0.58	-0.72	0.25	0.51
1996 & Healthcenter with FP within 5km	0.37	1.03	-0.55	-0.79	-0.09	-0.20
1999 & Healthcenter with FP within 5km	0.31	0.62	-1.60	-2.17	-0.69	-1.41
Dispensary with FP within 5 km	0.28	1.21	0.40	0.99	-0.13	-0.54
1994 & Dispensary with FP within 5 km	-0.05	-0.15	-0.35	-0.68	0.11	0.30
1996 & Dispensary with FP within 5 km	-0.56	-2.18	-0.44	-0.88	0.22	0.73
1999 & Dispensary with FP within 5 km	-0.40	-1.11	-0.65	-1.22	0.09	0.22
Constant	-6.27	-22.41	-6.96	-14.10	-8.60	-25.08

Table 8. Multinomial Results using 1991/92 and 1999 Data: Pharmacy Coefficients Only						
	Coefficient	t-statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
	Pill		Condom		Other Modern	
Pharmacy with FP within 5km	0.37	1.28	-0.18	-0.40	0.37	1.33
1999 & Pharmacy with FP within 5km	0.20	0.43	1.14	2.06	0.44	0.99

Table 9. Simulated Effect of Moving From No Services to Full Service (%)								
	1991/92		1994		1996		1999	
	<u>None</u>	<u>Full</u>	<u>None</u>	<u>Full</u>	<u>None</u>	<u>Full</u>	<u>None</u>	<u>Full</u>
Hospital with FP within 5km								
None	93.4	84.4	86.9	82.7	87.3	82.4	83.2	86.7
Pill	1.6	3.0	2.7	3.2	3.9	5.8	3.5	2.7
Condom	.0	0.17	1.4	3.0	.7	1.5	1.8	.1
Other Modern	1.4	3.6	2.8	5.6	4.2	5.4	4.8	.7
Traditional	3.3	7.3	6.2	5.4	3.9	5.0	6.8	2.3
Health Center with FP within 5km								
None	93.0	91.0	86.7	82.5	87.3	83.9	82.6	86.5
Pill	1.7	1.9	2.8	2.2	3.7	5.9	2.9	5.0
Condom	.4	.9	1.5	2.0	.7	1.0	1.9	1.0
Other Modern	1.5	2.3	2.9	5.3	4.1	5.5	5.2	4.4
Traditional	3.4	3.9	6.0	7.9	4.1	3.6	7.4	3.0
Dispensary with FP within 5km								
None	93.0	92.3	86.6	86.0	86.7	86.8	82.6	84.8
Pill	1.5	2.0	2.5	3.1	4.5	3.4	3.5	3.2
Condom	.4	.6	1.6	1.6	.8	.8	1.9	1.5
Other Modern	1.7	1.4	3.2	3.1	4.2	4.6	5.0	5.0
Traditional	3.4	3.7	6.1	6.1	3.8	4.4	7.1	5.6
Hearing a radio drama								
None	92.8	87.8	87.8	81.4	87.5	84.9	84.3	75.0
Pill	1.7	3.6	2.1	4.3	3.7	4.8	3.1	6.2
Condom	.4	.5	1.3	2.4	.6	1.1	1.7	1.8
Other Modern	1.6	3.2	2.8	4.3	4.4	4.3	4.6	8.5
Traditional	3.5	5.0	5.9	7.6	3.8	4.9	6.3	8.4
Hearing a family planning message								
None	94.7	90.4	88.9	84.4	90.0	82.5	86.0	81.0
Pill	1.0	2.6	1.3	3.7	2.9	5.1	2.9	4.2
Condom	.1	.7	1.5	1.7	.7	.3	1.2	.9
Other Modern	2.6	1.6	2.4	3.8	2.6	9.4	4.2	9.3
Traditional	1.6	4.7	6.0	6.4	3.7	2.6	5.8	4.6

Table 10. Simulated Effect of Moving From No Service to Full Service (Pharmacy Data)				
	1991/92		1999	
	<u>None</u>	<u>Full</u>	<u>None</u>	<u>Full</u>
Pharmacy with FP within 5km				
None	93.0	91.8	84.7	76.4
Pill	1.6	2.2	3.1	4.7
Condom	.5	.4	1.4	3.3
Other Modern	1.5	2.1	4.4	8.3
Traditional	3.5	3.6	6.3	7.3