Modernization, Contraceptive Use and Ideal Family Size in Yemen

Vijayan K. Pillai, M.S.W., Ph.D.
School of Social Work
University of Texas at Arlington
Box 19129
Arlington, TX 76019
Phone: 817 272 5353
Fax: 817 272 2046
E-mail: drpillai@yahoo.com

&

T. S. Sunil, M.P.H., Ph.D.
Department of Sociology
University of Texas at San Antonio
One UTSA Circle
San Antonio, TX 78249
Phone: 210-458-5617
FAX: 210-458-4620
E-mail: thankam.sunil@utsa.edu

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Abstract

The objective of this paper is to examine the role of modernization on two fertility-related variables, ideal family size and ever use of modern contraception in the Republic of Yemen. Modernization theory as well as Ryder's cohort-historical model is used to investigate the change in fertility variables across cohorts. Data from Demographic and Health Surveys (DHS) conducted in 1991 and 1997 in Yemen are used. It has been argued that in Islamic societies such as Yemen, the extent contraceptive use is more likely to be determined by the religious values than by external forces of change. However, our findings suggest that social context of contraceptive use in Yemen is not very dissimilar to the preconditions obtained in societies which have experienced improvements in contraceptive use during the stage of fertility decline. We have discussed in detail the policy implications of our findings.

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Introduction

Religious and cultural values in the Middle Eastern countries strongly discourage the use of birth control methods. Therefore, these countries face the threat of population explosion. The Middle East is of policy interest as there is widespread concern about the political, social and economic consequences of a "demographic time bomb" for the Arab region and the rest of the world. However, against widespread predictions that natural fertility regimes in the Middle Eastern countries will persist, almost all countries in the region, apart from Yemen, have experienced fertility declines in recent decades (Rashad 1999, 2000). Fertility rates in Yemen, closely followed by the Sultanate of Oman, are higher than the prevailing fertility rates in the Middle Eastern and North African states (DHS 1997).

In Yemen, marriage is nearly universal and the age at first birth is small, with a high tempo of fertility during the early years of marriage (Eltigani 2001b). The 1991-1992 DHS (Demographic and Health Survey) and 1997 DHS, report total fertility rates (TFR) of 7.6 and 6.7 respectively. One component of this low fertility decline in Yemen is a reduction in marital fertility (Eltigani 2001b). In particular, women over 35 years of age appear to have lower fertility levels. This provides some indication that the process of fertility decline in Yemen may follow the experiences of many Western nations where the fertility transition was heralded by a decline in marital fertility (Knodel & van de Walle 1986) during the course of modernization. Use of modern contraception within marriage was found to be a major factor in this decline.

Research on fertility in Yemen, has several limitations. First, available studies are primarily descriptive (Eltigani 2001a; 2001b). They provide little empirical explanation for the prevailing fertility levels in Yemen. Second, current explanations of fertility decline in the Middle East and North African (MENA) countries tend to focus on the role of period factors such as occurrence of war, state subsidizing the cost of children, women's low socio-economic status, and economic recessions on

fertility trends in MENA countries (Eltigani 2000; Rashad 1999; 2000). However, very few studies have examined the effect of modernization on Yemenis fertility. Third, little is known about the overtime effects of modernization variables on fertility changes in Yemen. The purpose of this paper is to examine the role of modernization on two fertility-related variables, ideal family size and ever use of modern contraception. More specifically, we propose a model based on the modernization explanation to examine the proportions that have ever used contraception in a sample of married 15-49 year old Yemenis women in the 1990s.

Contraceptive Use and Ideal Family Size in Yemen: Toward an Explanation

One of the explanations of fertility decline, the modernization hypothesis (Haghighat 2002) suggests that as the pace of industrialization and urbanization increases in developing countries, ideal family size preferences are likely to decline. Modernization brings about socio-economic development, improvements in human capital, as well as changes in people's physical environment. With socio-economic development, households' perceive a number of opportunities for social mobility (Petras & Veltmeyer 2003). The perception and pursuit of some of these opportunities have a tendency to reduce the family's ideals and encourage the use of modern contraception of either spacing or stopping fertility adjustments. The onset of fertility decline then, is characterized by a number of well-known strategies of family limitation. First, fertility declines within the state of marital union. Second, a large proportion of married women in high parities tend to use birth control to avert further births. Finally, the decline in fertility seldom accompanies reversals (Kirk 1996; Szreter 1993).

Over a period, the intensity as well as the spread of modernization may considerably improve the use of modern contraceptive methods. Ryder (1965) proposes a useful theoretical model, the cohort- historical, for examining the components of change in fertility determinants and their effect on fertility over time. Social change is seen as stemming from the fresh contacts new cohort members make with the contemporary social heritage (Ryder 1965). The interaction between the new cohort members and the existing social system makes it possible for the social system to influence members' characteristics. Conversely, the cohort members may bring about new rules of behavior/or alter the

environment so as to fulfill social and economic needs. Such normative and environmental changes can bring about inter-cohort differences.

The cohort-historical model provides two explanations for differences in fertility variables across cohorts. The first is called the compositional explanation and the second is called the processual explanation. The compositional explanation assumes that the independent effect of determinants on fertility related variables remain stable across cohorts. Given this, the changes in fertility related variables are due to changes in the mean or aggregate levels of the determinants across cohorts. The second, the processual explanation, suggests that even if the cohort composition with respect to the determinants remains stable across cohorts, changes in fertility would result from changes in the effects of the determinants. Therefore, changes in the proportion of the predictors as well as their effects may contribute growth in contraceptive use as well as ideal family size. These growth components are called compositional and processual.

The modernization hypothesis suggests that in Yemen, as the proportion of population with access to modern physical infrastructure (Weinstein, 1979) and investment in human capital increases over time, ideal family size is likely to decline and the proportion of those who have ever used contraception is likely to increase. As educational levels increase, socio-economic mobility is likely to increase over time. Furthermore, the value of education in modernizing economies for acquiring desirable positions, goods and services is also improving over time (Sprerandio 2000; Finkel 2002). Therefore, the impact of the modernization variables, education in particular, on ideal family size may vary over time.

Modernization has been closely associated with availability of basic needs, such as water and electricity. Modernization has ushered into developing countries flexible water delivery service systems including the provision of pipe water (Replogle 1999). With the availability of pipe water, the risk of morbidity, especially from water borne communicable diseases decreases considerably. The time and energy saved by the availability of water near homes, especially for women, will be diverted to other tasks. In particular, mothers are more likely to focus on tasks that improve their own health as

well as the quality of their children (Halberstein & Davies 1979). A shift towards improving children's quality is likely to reduce the demand for a large number of children (UNFPA, 2002). Therefore, those who have piped water supply are more likely to have small family size preferences than those who do not possess this facility. They are also more likely to have used modern contraception.

The returns of education are many. Education is positively associated with job status. More importantly, education provides a key access to the world of information and knowledge necessary to improve personal well-being in an increasingly global economy. The quality and quantity of information accessible, is rapidly increasing due to technological innovations. Even if educational levels do not change, the quantity and quality of information that can be obtained, processed, and utilized has improved considerably over time. Therefore, the importance of education for personal well-being is rapidly increasing. Women's perception of opportunities for participation in extra familial activities is likely to compete with fertility goals. As a result, over time, the effects of education on family size preferences and the odds of using contraception to avert births tend to become stronger. Therefore, we expect, changes in the proportion of educated women as well as an increase in the effect of education over time on family size preferences, and modern contraceptive use.

Finally, women's labor force participation is an important determinant of fertility. Women who hold jobs outside their homes are very likely to have smaller family size preferences and are also more likely to use modern contraception than those who are not working (Bogue 1990). In Yemen, there is small but steadily growing proportion of women who are engaged in work outside their homes. Vocational training programs have been set up in the main cities of Al-Hydaydah, Tai'z, and Sana'a to train para medical health professionals such as, birth attendants, nurse assistants, and midwives. These women gain employment in the health sector soon after the completion of the training program (Noman 1995).

Pritchett (1994) argues that reduction in ideal family size is an essential precondition for fertility decline. As ideal family size reduces, women are more likely to use contraceptives. In particular, women who have more children than what they consider as ideal and do not intend to have

any more children are more likely to have used modern contraceptives (Al-Gallaf et al. 1995). Therefore, a decrease in ideal family size is likely to increase the likelihood of ever use of contraception. A study on contraceptive use in 18 developing countries found that the effect of desired family size on contraceptive use, significantly varied across countries (Bongaarts 1991). The ideal family size is influenced by the current family size (Shah, Shah and Radovanovic 1998).

Methods

Data: This study uses data from Demographic and Health Surveys (DHS) conducted in Yemen. Two national surveys were conducted, in 1991/1992 and 1997, in Yemen. The 1997 Yemen Demographic and Maternal and Child Health Survey (YDMCHS) is the second national survey conducted in Yemen since the unification of the country. The YDMCHS-1997 was designed to collect data on households, and ever-married women of reproductive age (15-49). This survey interviewed 10,414 of the 11,158 eligible ever-married women in the age group *15-49* (Central Statistical Organization (CSO)[Yemen] and Macro International Inc. (MI), 1998). The survey conducted during 1991/1992 interviewed 5687 eligible women (Central Statistical Organization (CSO)[Yemen], Pan Arab Project for Child Development (PAPCHILD)[Egypt] & Macro International Inc. (MI) 1994). Responses from the "Maternal and Child Health Questionnaire" module are used in the present study. In this study three cohorts from each of the two survey are used: one 15-21 year olds, 22 to 31 years old and 32 years and older. Descriptions and coding of variables used in the study are given in Table 1.

Variables: Those who ever used any of the modern contraceptives such as the pill, Norplant, and intra uterine devices were coded 1 and the rest are in the reference group coded 0. The ideal family size (IDEAL) is a nominal variable with those who desired to have fewer than four children coded 1 and the rest in the reference group with large family size preferences. The data for this variable are obtained from the responses to the question “If you could go

back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?" Bongaarts (2001) suggests that once the fertility transition starts, family size drops rapidly. However, once fertility drops below about four births per woman, additional reductions occur, on average, at a substantially slower pace. Water and electricity, among the five independent variables, indicate the quality of modern basic physical infrastructure. Households with pipe water supply are coded 1 and the rest are coded 0. Similarly, those with electricity supply are coded 1 and the rest 0. Place of residence is a dichotomous variable with urban coded 1 and the rest 0. The remaining two variables, the level of education and extent of female participation in the labor force, are demographic variables. Those women who have some education are coded 1 and rest are in the category coded 0. Women who work outside their homes are coded 1 and the rest are coded 0. The control variable, children ever born (CEB), is measured from the responses to the question "Total number of children you have had during your life."

Three age cohorts are identified. They are 15 –21 year olds, 22-31 year olds and, the rest. The first age cohort, 15-21 year olds in the 1991 survey would be 21-27 year old during the course of the second survey, 1997 YDHS. However, the 15-21 year olds in the 1997 YDHs would have been too young, mostly below 15, to be a part of the 1991 YDHS. The second age cohort comprises mostly of women, who are steadily building their families. At ages beyond thirty the tempo of fertility slows down (DHS, 1997). Therefore, the last cohort of women consists of women who are 31. A large proportion of women, about 70 percent of them, have given birth to at least six children.

Analysis and Results

The proposed model of contraceptive use is presented in Figure 1.

Insert Figure 1 about here

This model is tested separately for each age group across the two samples, 1991 and 1997 YDHS.

Table 1 presents descriptive characteristics of all the 1991 and 1997 survey variables used in this study.

Insert Table 1 about here

Nearly 16 percent of the respondents in 1991 reported ever use of modern contraceptive methods. This percentage increased to about 24 percent in 1997. There was nearly a 50 percentage point increase in EVERUSE during 1991-1997.[1] The percentage of women who expressed preference for a small ideal family in 1997 was about 43.0. There is a 20 point increase in the percentage of women who prefer small ideal family size from 1991.

The percentage of households with electricity, and water slightly declined over time. The percentage of urban households increased by about 10 points during the two survey periods. There is a large increase, nearly 43 points, in the percentage of women with some education from the 1991 percentage with some education. Only a small proportion of women worked outside their homes. In 1991 about 13 percent women had worked outside their homes. This percentage nearly doubled to about 28 percent in 1997. The average number of children declined slightly during 1991-1997. Percentage change in modernization variables for these three age cohorts of women is presented in Table 2.

Insert Table 2 about here

We use multivariate regression to analyze the data. The dependent variables, EVERUSE, and IDEAL are nominal. It is therefore necessary to choose from a number of regression techniques such as logistic and probit, specifically designed for categorical dependent variables. Probit regression method is used here.[2] For a binary dependent variable, the probit model is $\Phi^{-1}(p) = \beta' X$ where Φ^{-1} is the inverse of the cumulative standard normal distribution function, referred to as probit or normit. The regression coefficient β is described as the amount of Z score change in the dependent variable for unit of change in the independent variable. The predicted probability, can be obtained from a Z – table. A goodness of fit measure is the pseudo R square that is calculated as the –2 * log likelihood (-

2LL plus the sample size). As the fit of the proposed model to the data increase, the pseudo R square values also increase.

Results from probit regressions of EVERUSE on the modernization variables for 1991 and 1997 survey data are presented in Table 3.

Insert Table 3 about here

The six columns in the table present the results from six probit regressions. The first three columns are for the 1991 data. The three regressions are for the three sub-groups, 15-21 year olds, 22-31 year olds and the greater than 31 year olds. The last three columns are for the 1997 data. The three regressions are for the three sub groups, 15-21 year olds, 22-31 year olds and the greater than 31 year olds. The first coefficient in each cell is the net effect. The net effect of each of the modernization variables on EVERUSE is compared across the three age cohorts. Within each age cohort, coefficients for the 1997 sample are compared with that of the 1991 sample.

In almost all age cohorts, those who have an urban place of residence are more likely to have ever used modern contraceptives. An exception to this is the 15-21 year olds in the 1991 samples. The likelihood of having ever used modern contraception is the same among both urban and rural residents. However, among the 15-21 year olds, the 1997 urban residents are significantly more likely to have ever used contraception compared with rural residents. A rural – urban differential in contraceptive use is found in most Arab societies during the early phase of fertility transition (Fargues 1997). This pattern is also observed in Yemen.

Those who have electricity connection are more likely to have ever used modern contraception than the rest. Among the 15-21 year olds, those who have electricity in 1997 are significantly more likely to have ever used contraception compared to those who have electricity in the 1991 sample. For the rest of the two age cohorts all the coefficients are positive and significant as expected. Those who have pipe water are more likely to have ever used modern contraceptives. This holds for all age cohorts in the 1991 and 1997 samples.

A second set of modernization variables, education and occupation, are associated with

individuals' capacity to participate in modern social and economic organizations. The net effects of occupation on ever use of contraception are not significant but positive across all three age groups in the two samples. Having some education considerably improves the likelihood of ever having used contraception when compared with those who have no education at all. All net effects are positive and significant. Surprisingly, there is a decline in the magnitude of its effect from 1991 to the 1997 sample across all age cohorts. This decline occurred along side an increase in the proportion of women with some education in all age groups from 1991 to 1997 (see Table 2). Small ideal family size increases the probability of having ever used modern contraception.

The probit regression results provide general support for the proposed modernization hypotheses in this study. The first set of modernization variables, PLACE, ELECT and WATER have significant positive influences on the likelihood of having ever used contraception. The effects, PLACE and ELECT on EVERUSE became more significant over time, especially among the young age cohort members, the 15-21 year olds. The magnitude of the effects of ELECT on EVERUSE among the 'greater than 31 year olds' in 1997 is more than twice its magnitude in 1991. Furthermore among the 22-31 year olds, the effect of electricity on EVERUSE in 1997 is at least 50 percent more than its effect on everuse in 1991. However, there was no significant change in the proportion of households with electricity in each of the age cohorts during 1991 and 1997. The trend in 'education' is in the opposite direction. The proportion with some education in each age cohort increased during 1991-1997 (see Table 2) while education effect decreased during the same period.

Almost al the net effects of ideal family size on EVERUSE are all significant at the .05 level and in the expected direction. The exception to this is the net effect for the 22 to 31 year olds in the 1991 sample. Therefore, those who have small ideal family size are more likely to have ever used contraception compared with those who hold large ideal family size.

The probit regressions of IDEAL on the modernization variables for 1991 and 1997 survey data are presented in Table 4.

Insert Table 4 about here

In almost all age cohorts, those who have an urban place of residence are more likely to report preference for small family size ideals than rural residents. The results are consistent across all age cohorts in the 1991 and 1997 samples. An exception to this is the 15-21 year olds in the 1997 samples. In their case, the rural–urban difference in the preference for small ideal family size is not significant. Those who have an electricity connection are more likely to show preference for small ideal family size than those who do not have an electricity connection. Here again, among the oldest age cohort members in the 1991 and 1997 samples, the electricity variable had no significant influence. Having pipe water is not significantly related to the preference for small ideal family size. Only among the oldest cohort members in the 1991 sample, this variable had a significant effect on ideal family size. In general, support for modernization hypotheses related to ideal family size are somewhat weaker than expected. Of the three variables, PLACE, ELECT, and WATER, the last was not a significant factor.

Between the two individual characteristics, education and occupation, only education appears to be of importance in accounting for ideal family size. Occupation, whether one had work outside the family, has inconsistent effects on ideal family across the age cohorts in the two samples. Only among the oldest cohort members in the 1997 sample, the net effects on ideal family size are positive and significant. The effect of education is significant and positive. Women with some education are more likely to prefer small ideal family size than those who have no education. Among the 15-21 year olds in the 1991 sample, education's effect is not significant. However, for the same age group, in the 1997 sample, the effect of education is as expected and significant. The effect of education declined among 22-31 year olds and greater than 31 year olds by about 50 percent from the 1991 level. In particular, the coefficient declined from 0.522 in 1991 among the greater than 31 year olds to 0.361 in 1997 among the same age group. However, as indicated earlier, there was an increase in proportion with some education in all age groups from 1991 to 1997. In sum, there is strong support for the education hypotheses and little support for the hypothesis related to work outside the home.

We had proposed that there is likely to be significant differences in the slopes of the education variable. These slopes are associated with the two outcome variables, EVERUSE and ideal family size

among sample respondents in the 1991 and 1997 surveys. The education slopes for the 15-21 year olds, 22-31 year olds, and the rest respectively, are expected to be significantly different across the two surveys. To empirically test these propositions, a number of new interaction terms are obtained. Multiplying each of the five independent variables with a dummy variable for survey membership generates these interactions. Respondents are coded 1 if they belong to the 1997 survey and zero other wise. Three similar probit regression equations containing all the main effects as well the interaction effects are evaluated for the 15-21 year olds, 22-31 year olds, and the rest separately for each of the two outcome variables, EVERUSE and ideal family size.

For the 15-21 year olds, none of the interaction terms for the outcome variable EVERUSE is significant at the 0.05 level. However, among the 22-31 year olds, the 1991 and 1997 cohort main as well the interaction effects of only one variable, ELECT are significant. The main effect (1991 & 1997) as well the interaction effects of education and ELECT are significant for the older age cohort, greater than 31 years.

For the 15-21 year olds cohort, none of the interaction terms for the outcome variable 'ideal family size' is significant at the .05 level. Similarly, the interaction terms in the equation for the 22-31 year olds are also not significant. However, among the oldest cohort, the main (1991 & 1997) as well the interaction effects of education are significant. In general, the expectation that the effects of education on EVERUSE and ideal family size are likely to be significantly different across the 1991 and 1997 sample survey is only partially supported. The effect of education on the two-outcome variables is significantly different for the oldest age cohort, those older than 31 years. Contrary to our expectation, the 1991 and 1997 effects of ELECT on EVERUSE are significantly different among the 22-31 year olds as well as those older than 31 years.

To determine the sources of change in the likelihoods of EVERUSE of contraception and IDEAL, it is essential to examine the compositional and processual changes over time. The regression standardization procedure can be used to decompose the difference in the mean level of the dependent variable (Iams & Thornton 1975; Teachman 1986). The model proposes that the differences in the

mean level of the 1991, and 1997 survey dependent variables can be decomposed into four parts. First are the differences due to different intercepts. Second are those due to different mean of the covariates. Third are differences due to different effect of the covariates and fourth are the interactions between differences in the means and differences in the effects of the covariates.

Given the regression equations for two groups, the differences in the intercept are obtained by subtracting the constant of the second group from the intercept of the first group. Subtracting the independent variable averages of the second group from the means of the variables of the first group and multiplying the differences by the regression coefficients of the second group variables provides a measure of the magnitude of the second component, the composition changes. The magnitude of the processual changes is found by subtracting the coefficients of the independent variables in the second group from the coefficients of the variables in the first group. The differences are multiplied by the means of the variables in the first group. The interaction component is obtained by multiplying the differences in the mean values of the variables by the differences in the coefficients of the two groups.

The formula is as follows.

$\overline{Y_{97}} - \overline{Y_{91}} = (C_{97} - C_{91}) + \Sigma\beta_{i91}(\overline{X}_{i97} - \overline{X}_{i91}) + \Sigma\overline{X}_{i91}(\beta_{i97} - \beta_{i91}) + \Sigma(\overline{X}_{i97} - \overline{X}_{i91})(\beta_{i97} - \beta_{i91})$ where $\overline{Y_{97}} - \overline{Y_{91}}$ is computed difference between the 1997 cumulative probability of having ever used modern contraceptives and 1991 cumulative probability of having ever used modern contraceptives. $(C_{97} - C_{91})$ is the difference in the 1997 and 1991 intercepts. $\Sigma\beta_{i91}(\overline{X}_{i97} - \overline{X}_{i91})$ is the composition component and $\Sigma\overline{X}_{i91}(\beta_{i97} - \beta_{i91})$ is the processual component.

The probit regressions of EVERUSE and IDEAL presented in Tables 3 and 4 as well as the test results of all the interaction effects provide crucial information with regard to the processual and compositional changes during the 1991 and 1997 surveys. Among all the slope changes from 1991 to 1997, the significant ones were confined to two variables, ELECT and EDUCN. More specifically, these pertain to the slopes of ELECT with EVERUSE among the '22-31 year olds' and "greater than

31 year olds'. In the case of education, they are related to its effects on EVERUSE among 'greater than 31 year olds' and, on IDEAL among the 'greater than 31 year olds'.

Compositional as well as processual changes may have contributed to the differences in the predicted values of the outcome variables between 1991 and 1997. Differences in the composition of the variables in the model from the 1991 level are presented in Table 5.

Insert Table 5 about here

Since the processual changes associated with only ELECT and EDUCN are significant, the decomposition results for these two variables are presented in Table 5. Table 5 presents the compositional, processual, and interaction components of the differences in the predicted likelihood of everuse for the 22-31 year olds and greater than 31 year olds, and ideal family size respectively for the greater than 31 year olds. An examination of the direction as well as magnitude of each component obtained from decomposition assists in evaluating the relative contribution of each component.

There is a 94 percent point increase in EVERUSE from the 1991 level among the 15-21 year olds. This change is primarily due to changes in the composition of the modernization variables. The slope changes in these variables during 1991-1997 were insignificant. Two variables, WATER and EDUCN, influence the likelihood of EVERUSE in 1991 and 1997. The change in the percentage of households from 1991 level is very negligible, less than one percent. There is a substantial increase in the percentage of women with some education, nearly 42 points, from the 1991 level. This increase is the most important source of increase in the proportion of everuse among the15-21 year olds. Among the 22-31 year olds, clearly a large proportion of the change in the likelihood of ever use of contraception can be ascribed to intercept change. Therefore, among women who are in the midst of family building, use of modern contraceptive is improving rapidly. The contribution of the variable ELECT to the increases in EVERUSE from 1991 to 1997 is mostly processual (see Table 5). The compositional component is relatively small and negative. There was a small decline, by about 10 percentage points in the number of households with electricity, during 1991-1997 (see Table 2). The share of the compositional component in this regard to the changes in the probability of modern

contraceptive use is not nearly as much as a fifth of the portion of the processual component. The greatest amount of compositional change occurred in education, and as shown in Table 2, there is a 30-percentage point increase in the category of women with some education, from the 1991 level. Therefore, processual changes in electricity and compositional changes in education appear to have contributed to the increase in the proportion of ever used contraception during 1991–1997 among the 22 – 31 year olds.

The slopes of two variables, electricity and education, are significantly different across the two surveys among the 'greater than 31 year olds.' Therefore, changes in the impact of electricity and education have played a role in the increase in the probability of modern contraceptive use. The intercept component is larger in magnitude than the processual component due to electricity. Its magnitude (0.290) is about 50 percent points larger than the processual (0.186). The compositional component is small as there is only a small change, about six percent, in the proportion of households with electricity from the 1991 level among the 'greater than 31 year olds' as presented in Table 2. The extent of slope changes in education contributed to a slight decrease in proportion of EVERUSE among 'greater than 31 year olds'. Increases in the likelihood of EVERUSE due to an improvement in the percentages of women in all age cohorts added little to improvement in EVERUSE from the 1991 level. Although the decline in the effect of education among the 'greater than 31 year olds' is significant, it is not an important source of improvement in EVERUSE during 1991-1997. Therefore, the contributions of the processual and compositional components are in the opposite direction. There is a 51 percent point increase in women with some education from the 1991 level among the 'greater than 31 year olds' (see Table 2). Notwithstanding this, there has been an increase in EVERUSE of contraception among the women with no education also. This is indicated by the large intercept component, nearly 0.290, accounting for the overtime improvement in EVERUSE. An increase in the percentage living in urban areas, an 11 point increase, as shown in Table 2, also contributes to the improvement in proportion EVERUSE.

There is a sixteen points increase in the percent that prefer to have an ideal family size of less

than four children from the 1991 level among the 15-21 year olds. Approximately fifty-seven percent of the young women, 15 to 21 years old, reported small ideal family size. As slope changes in the variables during 1991 to 1997 are not significant, they cannot account for the increase in the proportion of women who prefer small ideal family size. The influences of modernization variables on ideal family size among this young cohort of women are not consistent across the 1991 and 1997 samples. Only one variable ELECT has a significant and positive effect on IDEAL in 1991 and 1997. The proportion of households with electricity decreased from the 1991 level by about 18 percent points. This decline contributes to an increase rather than decrease in the proportion of households who prefer small ideal family size.

Among the 22-31 year olds, there is a 20 percent point increase from the 1991 level in the percentage of women who prefer small ideal family size. As in the case of the young cohort of women, effect changes in the variables during 1991 to 1997 are not significant, and therefore cannot account for the increase in the proportion of women who prefer small ideal family size. Three variables, urban residence, ELECT, and education have significant positive influences on the proportion that prefer small ideal family size. Among the three, there is roughly a 10 point decrease in the proportion of households with electricity from the 1991 level and a 10 point increase in the proportion with urban place of residence. These two counter forces do not account for the increase in the proportion of women who prefer small ideal family size. The percentage of women with some education increased impressively, by about 30 points, from the 1991 level (see Table 2). Although the slope changes in education are not significant, the increase in the proportion of literate women would account to an extent, for the increase in the proportion that prefers small ideal family size. Therefore, compositional change in education is an important reason for the increase in small ideal family size.

Significant changes in the impact of education have played a role in the change in the probability of preference for small ideal family size among members of the older than 31-year cohort. The share of the composition component is larger than the contributions of the slope differences to changes in preference for ideal family size. There is a 20 point increase from the 1991 level in the

percentage with some education (see Table 2). This increase is associated with a 0.018 unit increase in the composition component, almost offset by a decline of 0.011 units in the processual component of education during 1991-1997. Therefore, education does not account for the increases in the probability of preference for small ideal family size over time. Higher proportion of households with urban place of living in the 1997 survey compared to the 1991, is important in accounting for the increases in the proportion of women who prefer small ideal family size. Among the rest of the variables in the model, none had significant effect on ideal family size both during 1991 and 1997. The compositional and processual changes in these variables do not significantly contribute to the increases in the proportion of women who desire small ideal family size.

In sum, in all age cohorts, women having an urban place of residence or a residence with pipe water supply are more likely to have ever used modern contraceptives. In addition, availability of electricity promotes the use of modern contraceptives far more than urban residence or availability of pipe water. However, there was no significant change in the percentage of households with electricity in each of the age cohorts during 1991 and 1997. Regardless of this, the likelihood of modern contraceptive use among households with electricity considerably increased during 1991-1997 especially among at least two age cohorts, 22-31 year olds and greater than 31 year olds. As expected, those who have some education are significantly more likely to use modern contraceptives than those who have no education. Surprisingly, the probability of women with some education using modern contraception decreased during 1991-1997 among all age cohorts considered. This decline occurred along side an increase in the proportion of women with some education in all age groups from 1991 to 1997. Therefore, two modernization variables, EDUCN and ELECT, have dissimilar over time effects. While the estimated proportion of women who use modern contraceptives among women with some education decreases from the 1991 level, among householders with electricity, the estimated proportion using modern methods increases. However, the observed proportions of householders in each age cohort, with electricity, declined during 1991 and 1997. Ideal family size is a significant factor in improving modern contraceptive use.

Urban residence, availability of electricity and having some education improved the likelihood of preference for small ideal family size in almost all 1991 and 1997 age cohorts. Women with some education in the oldest age cohort in the 1997 survey, are significantly less likely to prefer small ideal family size than their counterparts in the 1991 survey. Therefore, among the older cohorts, the effect of education declined not only on the likelihood of modern contraceptive use but also on the preference for small ideal family size. The variables in the model provide a far better fit for 'ever use of modern contraception' than 'ideal family size'. The pseudo r –square, a measure of goodness of fit for the EVERUSE model is approximately 20 percent for each of the age cohorts. The psuedo r – square for the ideal family size model is below 10 percent for each of the age cohorts.

Discussion and Conclusion

Several attributes of contraceptive use among Yemeni women are noticeable. First, the percentage of women using modern contraceptives in the 1997 sample is considerably larger than the 1991 percentage. Contraceptive use currently plays an important role in spacing and stopping of fertility in Yemen, as was the case during the phase of fertility transition in Egypt and Morocco (Eltigani 2000). Second, contraceptive use is very low during the early stage of marital union. Below age twenty, the percentages using modern contraceptives are below ten at every age. Third, contraceptive use is more widespread among women older than 30 years. Fourth, at almost all ages greater than 20, the percentages of women in the 1997 sample using modern contraceptives are higher than percentages at the similar ages in the 1990 sample (see Figure 2).

Insert Figure 2 about here

Therefore, the use of modern contraception for fertility regulation among married women is gaining momentum, especially among the older cohorts (Fargues 1997). Levels of modern contraceptives use are considerably higher than they were a couple of decades ago (Allman & Hill 1978; Goldberg et al. 1983). The nearly 10.5% decline in fertility is due to increase in contraceptive utilization (Saxena & Jurdi 2002). Similar trends in contraceptive use have been observed during the early phase of European fertility transition (Knodel & van de Walle 1986). Even among the 15 to 21 year olds, those

in the 1997 sample are more likely to have ever used modern contraceptives than those in the 1991 sample. In Yemen, mean age at marriage is about 16 years and the proportion never married among 30-39 year old women is the lowest among all Arab counties (Rashad & Khadr 1999). Therefore, these two factors may not have played an important role in increasing contraceptive use in Yemen (Saxena & Jurdi 2003).

The percentages reporting current use in 1991 and 1997 are much smaller than percentages reporting ever use of contraceptives. The demand for large families is declining. More than 85 percent of currently married women have heard of at least one modern contraceptive method. This gap between current use and ever use is likely to be indicative of problems with regard to both accessibility and availability of modern contraceptives. It is likely that women who want to control births face several social restrictions in obtaining the modern methods. In Yemen, polygamy is prevalent. The age differential among spouses is also large. These characteristics often tend to bring about a feeling of powerlessness among women to make reproductive decisions including the use of birth control (Ba-Obaid & Bijleveld 2002). In addition, there may also be family planning agency related attributes that lead to severe attrition among women who have started on modern methods (Inaoka et al. 1999).

Yemen is a rural society. Almost 75 percent of the respondents in the 1997 survey claimed rural place of residence. In spite of being predominantly rural, the process of modernization has significantly influenced the degree of ever use of modern contraceptives among Yemenis women. As a result there is considerable difference in the rural–urban fertility levels. The TFR for urban areas (1991) is 5.6 whereas for rural areas it is 8.2 (Bahobeshi & Zohry 1995; Sathar & Casterline1988). Households with electricity supply are more likely to use modern contraceptives. This corroborates the finding reported by a number of recent studies from developing countries (De Jong, Robinson, Hoque & Cornwell 1989; Goldberg, Anderson, Miller & Dawam 1983; Hoque 1988; Piampiti 1986; Sirisena & Stoeckel 1986; Sokari-George, Emeruem & Dimkpa-Harry 1991).

The percentage of households in the 1991 and 1997 samples with either electricity or pipe

water remained the same. This lack of improvement in basic infrastructure may be attributed to the economic decline that Yemen has experienced in the recent years. The two decades prior to the unification of North and South Yemen in 1990 were a period of prosperity. The demand for labor in the oil producing neighboring countries resulted in large-scale migration of young males. Their remittances to their families improved the living standards in general (Myntti 1993). The unification of North and South Yemen ushered in an era of inflation. This was followed by a large increase in unemployment resulting from the return of several thousands of Yemeni workers in Saudi Arabia. These workers were sent back by Saudi Arabia due to the deteriorating political relationship between Saudi Arabia and Yemen on the issue of the 1990 Gulf War. The conflicts that arose after the unification led to a civil war that resulted in the allocation of scarce economic resources to war operations. The economic stress generated by periodic factors continued well into the end of the 1990s. During the same decade, owing to a number of government policies that encouraged abundant use of water for consumption and agriculture, ground water extraction passed well beyond the limit of sustainability. Cost of water has increased considerably, making it out of reach for a large segment of the population. Currently the economy suffers from unfavorable balance of payment, government deficit spending, and mounting foreign debts. Water scarcity, weak economic performance, and poverty have contributed to the stagnation of basic modern infrastructure development in Yemenis society.

Lack of basic infrastructure development, due to deteriorating economic conditions, has led to a decrease in the use of modern contraceptives. Due to population growth, the demand for pipe water supply is likely to increase. If this demand is not met, the demand for labor for undertaking household tasks such as fetching water for the family is not likely to decline. Households with pipe water supply were more likely to have small ideal family size than households with no pipe water. As the proportion of households with no pipe water supply increases, the demand for large family is more likely to increase along with a decrease in the use of modern contraceptives. Another component of the strength of basic infrastructure is the extent to which households have electricity supplies. Availability of

electricity is strongly associated with contraceptive use. During 1990-1997, the strength of this net relationship increased. Lack of increase in the proportion of households with electricity over time may be indicative of growing poverty in the society. Those who have electricity connection and have the ability to make monthly payments may belong disproportionately to more economically well of households.[3] The women in these households, especially those in older age groups in 1997, were more likely to have ever used modern contraceptives than older women in the 1991 sample. Therefore, it is likely that social class differences emerge in the use of modern contraceptives.

Women's occupation had no effect on the likelihood of ever use of contraception. However, the proportion of women who work are considerably greater among the women in the 1997 sample than in the 1991 across all age groups. We can only speculate on the reason for this. This may be a demographic response to the growing unemployment among men. Women may be involved in raising resources for household sustenance. Davis (1963) suggests that several demographic behaviors are merely responses to population pressure resulting from an improvement in life expectancy and a significant decline in infant mortality rates. Especially in agricultural societies, an increase in the number of dependent inhabitants per unit of land, results in agricultural intensification, necessitating an increase in agricultural inputs such as labor (Boserup 1965). When new labor saving agricultural technologies are not rapidly introduced as in the case of Yemen, agriculture may become labor intensive. However, in Yemen between 1991 ad 1997, the percentage of agricultural labor in the total labor force decreased from 61 percent to 50 percent . It is likely that men who are not able to find jobs now in oil producing countries such as Saudi Arabia will find low wage (cash) earning jobs in non-agricultural sectors. As a large proportion of men shift from agriculture to other sectors, the agricultural sector may increasingly rely on women's labor. Women may participate more in the agricultural sector in exchange for returns in cash or kind, contributing to an improvement in the welfare of the family. The basic diet in Yemen consists of sorghum and other cereals. In Yemen, labor exchanges are facilitated by the presence of strong kinship groups further consolidated by the prevalence of consanguineous marriages. Families in times of crisis perhaps draw upon each other's

resources, especially labor resources. The importance of kinship relationships and familial bonds continue to remain strong (Bruck 1997).

Yemeni women with some education are more likely to use modern contraceptive methods than women with no education. They are also more likely to have small ideal family size than the rest. The percentage of women with some education is higher among the 15 – 21 years old age cohort in the 1997 sample than the percentages of women with some education in the rest of the age cohorts. The proportion of women who have some education among the recent cohort of young women, 15- 21 years old, remains low. Although there has been an improvement in education, there is room for considerable improvement. Only 58 percent of the 6-15 year old children in Yemen were attending school in 1997. About 40 percent of those attending school were girls. Children from middle and upper income families are almost twice as likely to attend school than children from poor households (El-Kogali & El-Daw 2001).

The effect of education on contraceptive use among all age cohorts in 1997 were significantly lower than the effects of education on the likelihood of ever use of contraceptives among all cohorts in 1991. This decline may indicate some loss of ability among women with some education to make contraceptive decisions. Traditional attitudes toward women's role remain very strong (Bruck 1997). When economic conditions deteriorate, women's labor is likely to be more intensively used within the domestic sphere of production controlled by kin and extended family members. Under these conditions, women's education is devalued.

In the rural society of Yemen, contraceptive use has gained acceptance especially among the older age cohorts. Among members of the young cohort, 15-21 year olds, preference for small ideal family size is high. These decreases in some of the key indicators portend a decline in fertility in Yemen. The variables associated with contraceptive use in Yemen are education, urban place of residence, small ideal family size and availability of basic amenities such as, electricity and pipe water. Consumption of basic amenities often is a function of modern attitudes and socio-economic class membership. The set of variables associated with contraceptive use in Yemen are well known

and often associated with the preconditions necessary for demographic transition. Therefore, the claim that in Islamic societies, fertility regimes are immune from the process of modernization is not substantiated.

The results of this study suggest that modernization processes, which bring about economic development, are now inevitable for promoting modern contraceptive use in Yemen. The objectives of the national population strategy adopted in October 1991 (Bahobeshi & Zohry 1995) but revised in 1995, were to reduce total fertility rate to 6 births per woman by the year 2000; to increase the current use of contraception by 22% among women of reproductive age; and to make a family planning a free choice for couples and a basic human right. These goals have not been achieved. In 1997, even among the oldest age cohort, greater than 31 years old, about 30 percent had ever used modern methods. Percentage of current use is much lower.

To achieve the national goals, the government identified two strategies. They were, to increase women's education and increase availability of contraceptives (CSO & Macro International 1998). There is an urgent need to focus on girls' education. Currently, public expenditure on elementary level school education is low. Compared with other Arab countries such as Lebanon, the poorest quintile's share of public spending on basic education in Yemen is very low. Within the poor in Yemen, females do not receive even half of the benefits received by males from public spending on basic education (Yuki 2003). This study found that the effect of education on contraceptive use is declining. Therefore, it is necessary not only to improve educational facilities for girls and women but also improve their perception of opportunities for participation in the economy. In Bangladesh, such an approach focused on poverty alleviation targeting resources and services (rural credit services) to the poor and to women (Sajeda & Lloyd 1998). The current economic crisis facing the nation is of concern. It is necessary to ensure gender development approaches within economic development policies. Otherwise, current improvements in contraceptive use may not be sustained in the long run.

There are very few studies on the reasons for lack of continuity among women who start using one modern method or the other. Future studies are needed to understand the social and economic

constraints on modern contraceptive use among women who demand small ideal family size. In addition in this study, we have not considered the social context of marital union. Factors such as consanguineous marriage (Saxena & Jurdi 2003), ethnicity (Khattab, 2002; Al-Gallaf, Al-Wazzan, Al-Namash, Shah & Behbehani 1995), and risk of divorce may influence the likelihood of contraceptive use. The costs and benefits of Yemeni women's participation in work outside the household have not been adequately examined. Very little is known about the role of education on women's status and power within the household in the predominantly rural Yemeni society. The opportunity cost and benefits that accrue to women upon improving educational levels should be known.

Notes

1. The percentages currently using modern contraceptives are much smaller than percentages reporting ever use of modern contraception. In 1991 and 1997, only 7 percent and 10 percent respectively report current use.

2. There is one reason that compelled us to choose probit over the logistic. This is related to testing the several arguments proposed in this paper. One suggests that 'the specific changes in the slopes of education with the dependent variables are likely to differ across 1991 and 1997 survey samples. To examine this it is necessary to distinguish the contributions of slope changes in education from contribution to mean level changes in the modernization variables over time. Typically, this is accomplished using regression standardization approaches, which involve performing standard arithmetical operations on sets of linear equations. In the case of logistic, the left hand side (LHS) is a logit and is non-linear. As a result, standard arithmetical operations such as, subtraction and addition cannot be applied. Probit regression provides a LHS, which is not a logit, making it possible more readily to apply arithmetical operations necessary for decomposition procedures.

3. Only 36 percent of the households with a husband who belongs to any of the three categories: did not work, unskilled manual, or self-employed in agriculture, had electricity connection. Husbands in occupational categories such as, professional and clerical were morel likely to have electricity connection.

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Table 1. Background characteristics of population in Yemen.

Variable	Variable Name & Value	Percentage	
		1997	1991
Place of residence	PLACE		
Rural	0	71.7	74.5
Urban	1	28.3	25.5
Electricity	ELECT		
No	0	49.0	44.9
Yes	1	51.0	55.1
Source of drinking water	WATER		
Non-Pipe	0	57.6	57.3
Pipe	1	42.4	42.7
Occupation of woman	OCCUPW		
No work/regular work	0	73.4	88.1
Agri. self employed/	1	23.1	8.80
Professional/Service		3.5	3.1
Education of woman	EDUCN		
No education	0	78.9	85.3
Some education	1	21.1	14.7
Number of Children Ever Born	CEB		
Less than 4 Children	0	32.3	39.0
More than 4 Children	1	67.7	61.0
Ever use of contraception	EVERUSE		
Never used	0	75.5	83.6
Used some	1	24.5	16.4
Ideal family size	IDEAL		
4 or more	0	57.0	66.0
< 4	1	43.0	34.0
Age cohorts	AGE		
15-21		18.0	13.6
22-31		36.9	39.0
32 and above		45.1	47.4

Table 2: Modernization variables: Percentages in 1991 & 1997 YDHS

Cohort	Variables	1991	1997	Percent change: 1991-1997
15-21 years	PLACE	20.5	24.4	19.010
	ELECT	57.5	47.0	-18.308
	WATER	39.7	39.4	-0.601
	OCCUP	9.9	24.8	148.989
	EDUCN	26.7	37.8	41.740
	CEB (mean)	.965	.949	-1.646
	EVERUSE	4.9	9.5	93.849
	IDEAL	49.0	57.0	16.327
22-31yrs	PLACE	26.0	28.7	10.510
	ELECT	54.9	49.2	-10.341
	WATER	43.0	41.8	-2.855
	OCCUP	12.7	25.9	104.298
	EDUCN	20.0	26.0	30.107
	CEB (mean)	3.68	3.59	-2.390
	EVERUSE	17.0	24.7	45.577
	IDEAL	39.0	47.0	20.513
>31 Yrs	PLACE	26.5	29.5	11.408
	ELECT	54.6	50.9	-6.752
	WATER	42.9	44.1	2.833
	OCCUP	41.3	33.0	130.094
	EDUCN	6.9	10.3	51.055
	CEB (mean)	7.16	7.40	3.342
	EVERUSE	19.4	30.5	57.186
	IDEAL	29.0	35.0	20.648

Table 3. : Probit regression of EVERUSE on modernization variables, 1991 & 1997 Yemen DHS. Net effects including 'ideal family size' are given in parenthesis.

Ind. Var.	1991			1997		
	15-21	22-31	>31	15-21	22-31	>31
PLACE 0=rural	0.262 (0.251)	0.513* (0.582*)	0.583* (0.546*)	0.321* (0.310*)	0.635* (0.616*)	0.495* (0.478*)
ELECT 0=no electricity	0.425 (0.315)	0.344* (0.337*)	0.262* (0.263*)	0.494* (0.480*)	0.524* (0.523*)	0.595* (0.602*)
WATER 0=no pipe water	0.495* (0.437*)	0.490* (0.478*)	0.400* (0.402*)	0.359* (0.353*)	0.239* (0.242*)	0.277* (0.276*)
OCCUP 0=no work	0.138 (0.180)	0.038 (0.023)	0.042 (0.086)	-0.006 (-0.021)	-.003 (-.006)	-.004 (-.019)
EDUCN 0=no education	0.539* (0.505*)	0.491* (0.478*)	0.923* (0.902*)	0.476* (0.463*)	0.464* (0.447*)	0.630* (0.596*)
IDEAL	0.490*	0.098	0.240*	0.192*	0.145*	0.253*
Loglikelihood	-130.46* (-121.37*)	-839.47* (-832.67*)	-1112.01* (-1095.58)	-494.34* (-491.95*)	-1728.24* (-1720)	-2385.89* (-2367.03)
Pseudo R^2	0.17 (0.18)	0.19 (0.19)	0.19 (0.20)	0.15 (0.16)	0.19 (0.20)	0.17 (0.18)

*p<0.05

Table 4. Probit regression of ideal family size on modernization variables, 1991 & 1997 Yemen DHS. Net effects including 'Children ever born' are given in parenthesis.

Independent Variables	1991			1997		
	15-21	22-31	>31	15-21	22-31	>31
PLACE 0=rural	0.338* (0.707*)	0.317* (0.584*)	0.260* (0.505*)	0.133 (0.392*)	0.277* (0.445*)	0.239* (0.301*)
ELECT 0=no electricity	0.333* (0.583*)	0.189* (0.457*)	.000 (0.285*)	0.219* (0.393*)	0.103* (0.333*)	0.012 (0.182*)
WATER 0=no pipe water	0.189 (0.534*)	0.007 (0.409*)	0.184* (0.401*)	0.110 (0.294*)	0.015 (0.223*)	0.007 (0.133*)
OCCUP 0=no work	-0.0340 (-0.127)	-0.185* (-0.72)	0.102 (0.259*)	0.110 (-0.029)	0.036 (-0.068)	0.160* (0.087*)
EDUCN 0=no education	0.184 (0.484*)	0.389* (0.708*)	0.522* (0.972*)	0.260* (0.396*)	0.221* (0.429*)	0.361* (0.547*)
CEB	-0.080 (0.039*)	-0.083.* (-0.103*)	-0.060* (-0.072*)	-0.007 (-0.004)	-0.060* (-0.074*)	-0.024* (-0.038*)
Log likelihood	-520.40*	-1419*	-1562	-1238*	-2562*	-2969
Pseudo R^2	0.06	0.07	0.05	0.02	0.03	0.02

*p<0.05

Table 5 Decomposition of the regressions of EVERUSE (1991/1997 DHS) on modernization variables: the intercept, composition, processual and interaction components.

Dep. Var.	Ind. Var	Cohort	Intercept	Means	Effects*	Interaction	Total
EVERUSE	EDUCN	>31 Yrs	0.290	0.032	-0.021	-0.011	0.290
	ELECT	22-31 Yrs	0.267	-0.019	0.102	-0.011	0.339
	ELECT	>31 Yrs	0.290	-0.010	0.186	-0.013	0.453
IDEAL	EDUCN	>31 Yrs	-0.021	0.018	-0.011	-0.006	-0.019

* Controlling for all variables

Figure 1. Model of Modern Contraceptive Use in Yemen

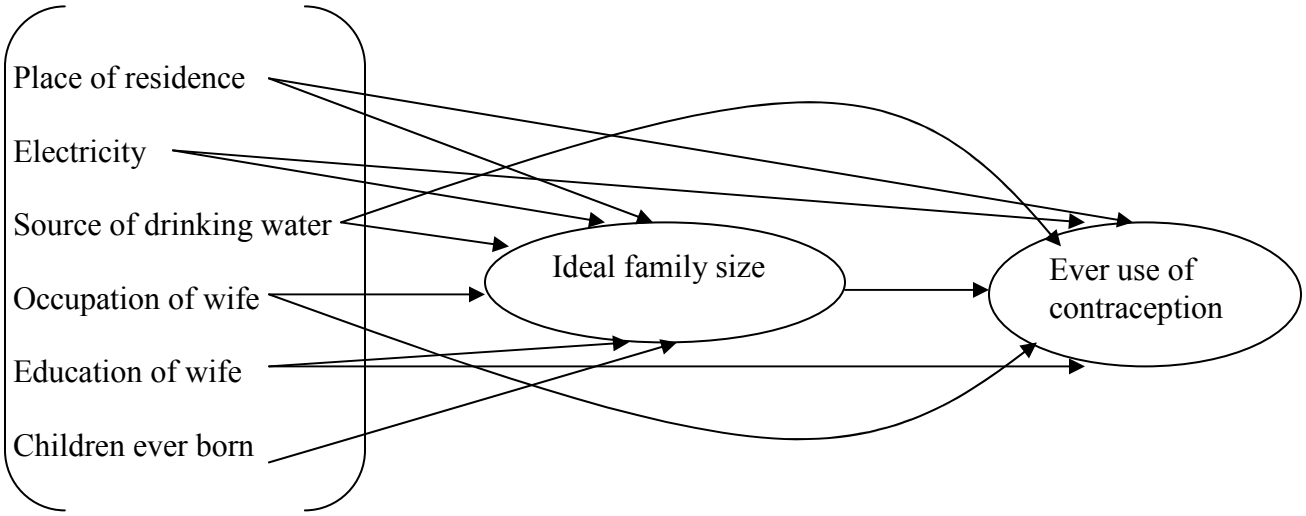

Figure 2. Contraceptive use rates by age in Yemen, 1991 and 1997.