DETERMINANTS OF FERTILITY IN UZBEKISTAN, 1996
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I.INTRODUCTION

1.1.Country Background

The Republic of Uzbekistan, located in the regions of Central Asia, an independent state after the break-up of the Soviet Union with the very favorable natural and geographical conditions. Uzbekistan lies between two big rivers of Amudarya and Syrdarya. From the north-east, the Republic is bordered by Kazakhstan , in the east and south-east by Kirgistan and Tajikistan, in the west by Tukmenistan and in the south – by Afganistan.

Although Uzbekistan possessed rich natural resources and skilled labour force, - per capita income, labour productivity, and real wages had experienced negative growth during 1980's. Since 1991, reforms have been initiated to reverse these trends and overcome their diverse side effects caused by the break up of the Soviet Union. The Government of Uzbekistan has followed a path of gradual economic transition to a market-based economy. The transition to a market-based economy, however brought profound challenges for this former centrally planned Soviet economy. Uzbekistan's economy was integrated within the larger regional and Soviet economy during the Soviet era. Uzbekistan's role within the Soviet economy was that of primary producer. Primary products (particularly cotton) and natural resources (notably gold) dominated Uzbekistan's economy for a long time. This division of labour resulted in underdeveloped and highly specialized industrialization. That is, highly concentrated in cotton-related industries but at a relatively low level of technological sophistication.

The population of Uzbekistan is the largest of the Central Asian republics, comprising more than 40 % of the total population of the five countries. Table (1) represents some indicators of Central Asia's Republics, as can be seen in 2001 total fertility rate (TFR) is estimated at 2.7 which is the highest among the other countries of the region: Kazakhstan, Kirgystan, Tadjikistan and Turkmenistan.

Since independence and during the period 1991-2001 the population of Uzbekistan grew by about 19 % to reach 25.1 million. There was steady downward decrease in the

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annual population growth over the period – from 2.3 % in 1991 to 1.7 % in 2001. The total birth rate declined from 33.3 in 1991 to 22.0 per 1000 in 2001. Each year, around 660 thousand child are born in Uzbekistan.

Table (1)
Population, Total Fertility Rate of Republics of Central Asia

Central Asia Republics	Population (mln) Mid year 2001	TFR mid year 2001
Kazakhstan	14.8	1.8
Kirgystan	5.0	2.4
Tadjikistan	6.2	2.4
Turkmenistan	5.5	2.2
Uzbekistan	25.1	2.7

Source: World Population – data Sheet of the Population, Reference Bureau

The death rate stood at 6.1 per 1000 in 1990 and declined by 1.1 points in 2001. The population of Uzbekistan is exceedingly young. Around 38 % of the population are under 16 years of age. Barbieri (1996) stated that "These figures suggest that the demographic transition in Uzbekistan is well under way", however, it is too early to conclude this. The classical demographic transition theory specified that changes in social structure were fundamental causal forces that shaped human fertility (Smith, 1989).

The effects of rapid population growth on development prospects has led Uzbekistan to revise its pro-natalist policy and is now promoting family planning services to improve reproductive health. Socio-economic differentials in fertility are a fundamental source of evidence on the underlying determinants of fertility.

1.2. Objectives of the Study

This study an attempts to highlight the proximate determinants of fertility in Uzbekistan during 1996.and to identify the contribution of each one of them in inhibiting total fertility rate. This could be guidelines for the planners and policy makers to direct their policy interventions in reducing fertility and improving reproductive health. Achievement of these goals may lead to harmonizing the population growth with the development. The main objectives of the study are:

-   to identify the levels and trends of fertility;

-   to examine the proximate determinants of fertility, and its contribution of each in reducing fertility levels.

1.3. Literature Review

The level of fertility has been one of the most important factors determining the demographic situation of a given country. It is affected by many factors, some of them are biological but the most of factors are social, economic and cultural. The raise of mass economic welfare and the spread of basic education are the central features of the development process in decreasing the level of fertility.

Reviewing the literature of the proximate determinants of fertility indicates that Henry (1953) was the first person who constructed mathematical models of reproductive process. But, the relationship between fertility and its proximate determinants was recognized with David and Blake in 1956. They defined these intermediate variables as "the biological and behavioral factors through which social and economic variables influence fertility". These proximate variables did not receive wide acceptance in quantitative studies.

The first widely used proximate determinants were developed by Bongaarts in 1983. He distinguished between the factors influencing indirectly the fertility level (socio-economic and environmental variables) and the proximate determinants, which affect fertility directly, and he proposed a multiplicative model to calculate the effect of each one of them on the fertility level.

According to Bongaarts (1978) the magnitude of natural fertility was influenced by seven determinant factors i.e.:

1- Proportion married among women;

2- Contraceptive use and their effectiveness;

3- Prevalence of induced abortion;

4- Duration of postpartum infecundability;

5- Fecundability or frequency of intercourse;

6- Spontaneous intrauterine mortality;

7- Prevalence of permanent sterility.

Bongaarts and Potter (1983) concluded that only first four factors have major roles in determining the magnitude of fertility. Fertility is a function of two principal components namely: the intermediate of proximate variables which affect fertility directly and socio-economic, cultural and enviromental variables which affect fertility indirectly (Bongarts and Potter, 1983; Hill, 1985).

1.4.   Methodology

The operational methodology involves two major stages: the first stage deals with descriptive analysis of levels and trends of fertility; the second stage represents Bongaarts aggregate model (1978) of the proximate determinants of fertility. Thus the contribution of the main proximate determinants in reducing fertility will be concluded

The model as follows $TFR = C_m x C_c x C_a x C_i x TF$

Where

TFR – Total Fertility Rate;

TF – Total Fecundity;

C_m – Index of Marriage (equals 1 if all women of reproductive age are married and 0 in the absence of marriage);

C_c – Index of Contraception (equals 1 in the absence of contraception and 0 if all fecund women use 100 % effective contraception);

C_i – Index of Postpartum Infecundability (equals 1 in the absence of lactation and 0 if the duration of infecundability is infinitive);
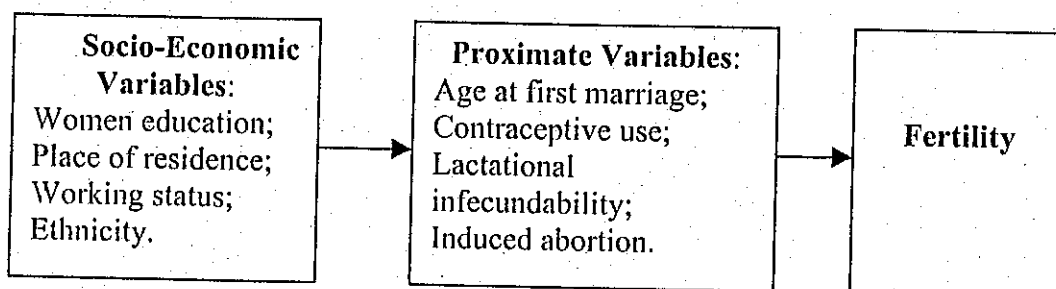
C_a – Index of Induced Abortion (equals 1 in the absence of induced abortion and 0 if all pregnancies are aborted).

1.5.Conceptual Framework

The observed fertility rate can be affected by variation in any of intermediate variables as proposed as by Davis and Black (1956). However, Davis and Black framework was hard to use because of the absence of suitable data in the intermediate fertility variables. In addition, the framework omitted the effects of lactational amenorrhea which seem to be a major error (Bongaarts, 1978).

These variables have been further developed and compressed by Bongaarts and Potter (1983) into proximate determinants of fertility in order to facilitate quantification and accounting of the respective contribution of each in the termination of fertility.

Relationship among the determinant of fertility can be drawn as below:

Socio-Economic Variables: Women education; Place of residence; Working status; Ethnicity.	→	Proximate Variables: Age at first marriage; Contraceptive use; Lactational infecundability; Induced abortion.	→	Fertility

In the suggested framework the fertility is influenced by two classes of determinants:

1. Proximate variables which are the biological and cultural behavioral factors through which the socio-economic and environmental background variables must operate to influence fertility.

2. Socio-economic and environmental background variables influence fertility indirectly by modifying the proximate determinants.

1.6. Source of Data

The main data source for this study is Uzbekistan Demographic and Health Survey (Uz DHS), which was carried out in 1996 by the Ministry of Health and was supported by the United States Agency for International Development. It is a nationally representative sample. The survey interviewed 4415 women aged 15-49 years, among them 3316 are ever-married.

II.THE ANALYSIS OF NUPTALITY AND FAMILY PLANNING

2.1.Current Marital Status

Marital status is a major proximate variable affecting the level of fertility. The incidence, frequency and stability of marriage as well as norms and practices govering re-marriage of divorced and widowed women are important measures of nuptiality which to influence fertility.

The system of classifying the population by marital status vary from country according to prevailing marriage laws and customs. In Uzbekistan, there are five categories through which individuals are categorized, which are single, married, widowed, divorced, living together and not living together. The data presented in Table (2) show the distribution of women by age group and current marital status. Data reflected that marriage is universal, 67.9 % of all women are married. The table shows also that 12.6 % of women in age group 15-19 are married. The proportion of single women seems to be declining sharply between age 15-19 and 20-24, whereas the proportion of married increases between the same age groups.

Table (2)
Percent Distribution of Women by Current Marital Status,
According to Age, Uzbekistan 1996

Age group	Marital Status						Total	Number of Women
	Never Married	Married	Living together	Divorced	Widowed	Not living together		
15-19	87.1	12.6	0.2	-	0.1	-	100	943
20-24	24.9	71.0	1.3	0.1	2.5	0.2	100	816
25-29	6.6	87.0	1.3	0.3	4.1	0.7	100	700
30-34	2.3	88.0	3.1	2.7	3.7	0.2	100	619
35-39	1.4	88.0	2.8	3.3	4.3	0.2	100	576
40-44	0.5	87.4	1.6	5.0	4.3	0.1	100	437
45-49	1.5	79.0	2.2	9.0	6.8	1.5	100	324
Total	24.9	67.9	1.6	2.0	3.1	0.4	100	4415

Source: obtained from Uz DHS, 1996

The proportion married usually decline in the older age groups as the effects of marital disruption cumulate, thus contributing to the reduction of fertility rates toward the end of the childbearing years.

The other aspects which can be observed in this table is marital instability, reflected by proportion widowed and divorced. As expected the probability of widowed increases by ages according to mortality risk. The lower divorced in young age could be due to high probability of marriage and high divorce in old age may be accompanied by children which make remarriage difficult.

2.2. Age at First Marriage

One of the most important areas of nuptality is age at first marriage. Generally, it is assumed that earlier age at marriage would lead to a large completed family size of females due to long exposure period of childbearing, if no contraception adopted (UN, 1973).

Early marriages are typical for Uzbekistan. The legal age for marriage is 17 years for women and 18 for men. In 1996, the number of young girls who got married before reaching 20 years of age was 45.5 %, while the number of men who married at the same age was only 8 %. It can be explained not only by existing traditions and deeply-rooted family values, but also by some economic factors. In 1990 the average marriage age in Uzbekistan was 24 for men and 22.1 for women, in 1997 it was 23 for men and 20.1 for women (www.unfpa.org).

Table (3) shows the median age at first marriage by some characteristics. The median age at first marriage is 19 years when women 15-49 are considered.

With regards to urban-rural differentials, rural women marry earlier (18 years) than urban women (19 years). The lowest median age, 18.71 years is found in the Vergana Valley and the highest (19.96 years) in Tashkent city.

Table (3)
**Median Age at First Marriage Among Women age 15-49 years,
by Current Age and Selected Background Characteristics, Uzbekistan, 1996**

Background Characteristics	Current Age							Women Age 15-49
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
Residence								
Urban	17.11	18.75	19.68	20.42	20.60	20.05	20.56	19.78
Rural	16.96	18.72	19.20	19.61	18.96	18.77	18.77	18.90
Region								
North	17.35	18.78	19.84	19.94	19.78	19.48	18.63	19.29
South	17.00	19.24	19.50	20.36	19.98	19.09	19.69	19.52
Central	16.93	18.92	19.41	19.71	19.60	19.83	20.82	19.42
Vergana Valley	16.79	18.32	19.03	19.46	18.79	18.64	18.81	18.71
Tashkent	16.92	18.63	19.51	20.94	20.61	21.00	20.58	19.96
Educational Level								
Primary	-	-	19.00	-	-	19.00	16.33	16.67
Secondary	17.00	18.67	19.28	19.70	19.42	19.19	19.30	19.08
Higher	19.44	19.44	20.48	21.93	21.50	21.45	22.44	21.19
Total	**17.03**	**18.74**	**19.43**	**20.03**	**9.76**	**19.50**	**19.93**	**19.34**

Source: calculated from Uz DHS, 1996

The data presented in the table also indicates that uneducated women had a lower median age at first marriage (16.67 years) than those with secondary (19 years) and higher (21 years).

2.3. Current Fertility Level

As we know, the rate of childbearing is lowest in the youngest and oldest age groups, and fertility reaches a maximum in the age groups 20-29. As can be seen from Table (4) and Figure (1), Age-Specific Fertility Rate (ASFR) indicate typically the same age pattern of fertility curve in the four periods which starts with a low level at age 15 and rises up to a peak in the age group 20-24 and then declined gradually to reach a minimum at the oldest age group 45-49. The decline in ASFR's results in an overall decline in the TFR from 4.5 in 1976 to 3.4 in 1996.

Table (3)
Trends in ASFR and TFR per 1000 women in Uzbekistan

Mother's Age	Number of Years Preceding the Survey			
	0-4	5-9	10-14	15-19
15-19	56	53	53	53
20-24	277	293	298	308
25-29	204	258	289	299
30-34	123	158	201	[238]
35-39	44	76	[107]	-
40-44	15	[46]	-	-
45-49	[8]	-	-	-
TFR	3.6	4.4	4.7	4.5

Source: ASFR obtained from UZ DHS, 1996
TFR calculated

The decline fertility in all age groups which can be attributed mainly due to the improvement in contraceptive use, and other related biological and environmental factors conducive to high fertility.

Figure (1)
ASFR per 1000 Women for the Number Years Preceding the Survey
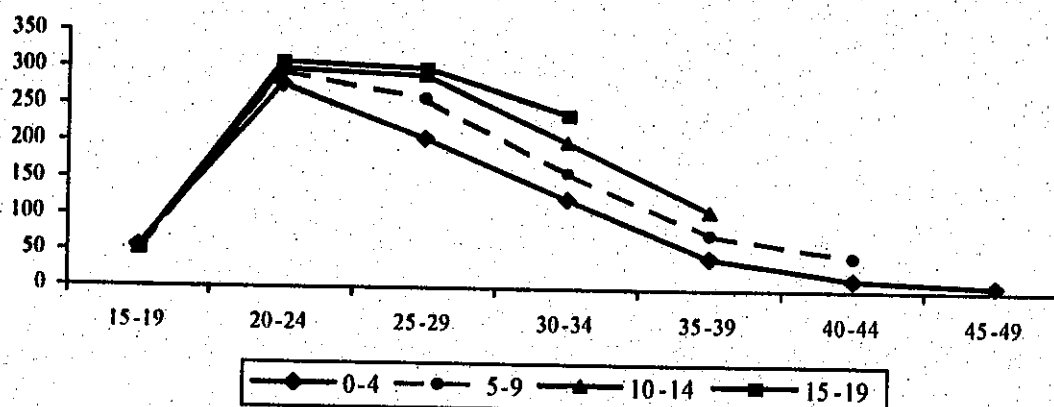
The analysis of differential in the current level of fertility by place of residence is presented in Table (5) which shows a substantial variation in fertility level. Among rural

women TFR is over three children (3.74) and decreases to around 2 children (2.71) in urban areas. Both rural and urban women experience their peak childbearing years during their early twenties (20-24).

Table (5)
Age-Specific Fertility Rate, Total and General Fertility Rates and Crude Birth Rate for the Three Years Preceding the Survey

Age Groups	Place of Residence		Total
	Urban	Rural	
15-19	60	62	61
20-24	218	294	266
25-29	154	190	176
30-34	86	132	114
35-39	22	50	39
40-44	4	13	9
45-49	0	(6)	3
TFR (15-49)	2.71	3.74	3.34
GFR	99	137	123
CBR	23	29	27

Source: obtained from Uz DHS, 1996

During Soviet era the government has adopted pro-natalist policies, that lead high growth rate of population in Uzbekistan (3.4 % in 1970). The USSR's pro-natalist policy gave for women significant benefits. Maternity leave began after thirty weeks of pregnancy and continued for 126 days at full pay. Women were entitled to 3 years of unpaid leave without prejudice to their pension entitlements. All women caring for children under two years old received a monthly benefit equal to 20 % of the minimum wage. Women with five or more children (accounting for 57 % of families in the 1989 census) retirement age was set at 50 instead of the female with less children retirement age was 55 (Pomfret and Anderson). Since introduction of market economy the social benefits are fall down.

According to Heleniak reasons for the decreasing births rates during transition period include:

- Uncertainly about economic conditions and social policies that relate to family welfare and child bearing. Transition economy has resulted in a significant fall in living standards for most of the population. The real average per capita income was halved from 1991 to 1996. High inflation is also another critical factor, where according to the Ministry of Macroeconomy, the annual inflation rate for 2000 was 26.5 % (www.adb.org);

- Changing relative cost of having and raising children. The decline in the level of government services such as child care, health and education over the last 10 years has in fact made the experience of relative poverty far worse than during the Soviet period (www.adb.org);

- Increased poverty. The official relationship between the minimum wage and poverty does not acknowledge the fact that minimum wage levels do not cover the actual cost of living. There are now more groups at risk of poverty than 10 years ago. At risk of poverty are still largely rural people and vulnerable groups (such as single mothers and single pensioners). Poverty occurs most frequently in families with a large number of children (38.3 % of families have four or more children, and 19.6 % of the families have three children) (www.adb.org.);

- Reducing subsidizes and privileges of pro-natalist income and welfare policies that were given during Soviet era;

- Increasing availability of modern contraceptive.

2.5. Total Fertility Rate and Mean Children Ever Born

As can be seen from Table (6), urban-rural differentials are in the expected direction, urban mean children ever born (MCEB) being lower than that for rural areas. The reason behind that urban women have higher chance of job opportunity which could raise their age at first marriage, also higher prevalence of contraceptive use compared to rural.

Table (6)
TFR for Three Years Preceding the Survey and MCEB
to Women Age 40-49, by selected Background Characteristics

Background Characteristics	TFR (15-49) (F)	MCEB (40-49) (P)	Changes P/F
Place of Residence			
Urban	2.71	3.60	1.33
Rural	3.74	5.45	1.46
Region			
North	3.45	5.78	1.67
South	3.43	5.25	1.53
Central	3.34	4.50	1.35
Vergana Valley	3.59	4.65	1.30
Tashkent city	2.30	2.80	1.22
Educational level			
Primary	3.53	5.27	1.50
Secondary	3.13	3.77	1.20
Higher	2.78	3.42	1.23

Source: obtained from Uz DHS, 1996

There exist a negative relationship between fertility and educational level of women. Such as, uneducated women have more children (5.27) than women with secondary and above (3.77). The highest level of TFR was reported in the North region 1 (5.78) of the

country. Although comparison of completed fertility among women age 40 or more with the TFR can provide an indication of fertility decline over time.

III.FAMILY PLANNING

3.1. Knowledge of Contraception

Knowledge is a precondition to informed choices, high probability of adoption and continued use.

In Uzbekistan almost all women (89 %) know at least one method. Also 89 % of respondents know at least one modern method and 32 % know at least one traditional method. Women know, on average, four methods of contraception. Currently married women know an average of four methods, while women who have never had sex know on average two methods (Uz DHS, 1996).

3.2.Current Use of Contraception

In general, the use of contraceptive plays a key role in limiting the fertility level. As can be noticed in Table (7) the current use of contraception among currently married women is 55 %, 51.3 % using modern methods and 4.2 % traditional methods. The table shows that the most widely used method is IUD 45.8 % followed by condom and pill (1.7 %), and injectables (1.4 %), female sterilization (0.7 %).

In traditional methods withdrawal (2.8 %) is widely used. Modern method use is most prevalent in the 35-39 age groups, while traditional method use peaks in the 40-44 age group. The relatively higher rate in the use of contraception among middle aged women than the younger and older women might be attributed to the fact that the middle aged women might be in the verge of achieving their desired family size while those in the younger ages are still in the early stage to achieve their desired family size; and moreover, older women are likely to be traditional in their views and may think that they are infecund, therefore, more likely to be reluctant to use contraception.

percentage of currently married women using contraception increases from 53.0 % of less educated women to 58.1 % among women with higher education. Such positive relationship is expected because earlier educated women are more exposed to mass media communication and are more receptive to new ideas of family planning than those with no or little education.

Great variation in contraception by place of residence exists, with 56.4 % of the women in urban areas are current users, 55.1 % of rural women use any methods.

The level of current use is only 49.6 % in the Central Region , whereas it exceeds 64.6 % in Tashkent city. Modern methods use is higher than traditional use in all regions.

3.3. Postpartum Amenorrhea

As can be noticed in Table (8) women with primary level of education seem to have a shorter period of amenorrhea (4.8 months) than secondary or higher educated women.

Table (8)
Median Duration of Postpartum Amenorrhea, Uzbekistan, 1996

Background Characteristics	Postpartum Amenorrhea	Number of Births
Age		
<30	5.1	1019
30+	7.1	361
Place of Residence		
Urban	4.3	428
Rural	6.0	951
Educational Level		
Primary	4.8	879
Secondary	5.9	367
Higher	5.1	133
Total	5.3	1379

Source: obtained from Uz DHS, 1996

The median length of amenorrhea is longest (7.1 months) for the women who are 30 and over. Women less than 30 years old have a median amenorrhea length of 3.4 months.

Figure (2) shows that the longest duration of amenorrhea was observed among the Region 4 (6.5 months) while the shorter duration of amenorrhea was found in Tashkent city (3.3 months).

Figure (2)

Median Duration of Postpartum Amenorrhea by Region, Uzbekistan, 1996
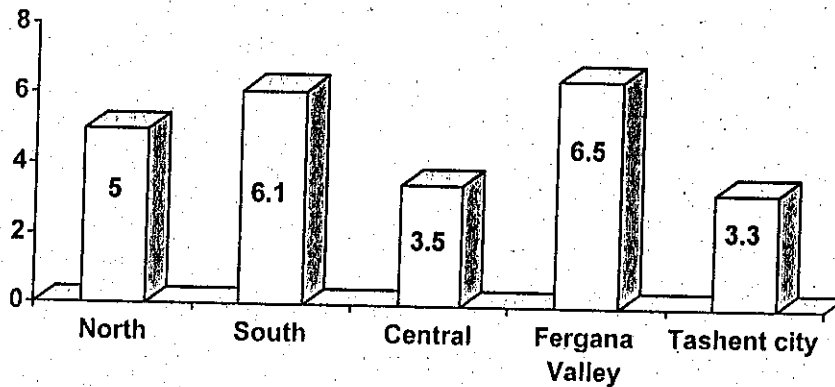
3.4.Induced Abortion

In Uzbekistan as well as in other republics of the former Soviet Union, induced abortion has been for years a primary method of fertility control. Induced abortion was first legalized in the Soviet Union in 1920 but was banned in 1936 as part of a pro-natalist policy emphasizing population growth. This decision was reversed in 1955 when abortion for nonmedical reasons was again legalized throughout the former Soviet Union (Uz DHS, 1996). Between 1956 and 1973 the number of abortions increased by 231 %, even though of the health services were not efficient and long delays discouraged less determined women. Abortion remained the most widely used method of birth control until the 1980s when the Uzbek health services were giiven some autonomy from the regime imposed by Russia (S. Narzykulova and etc, 1980) (Table 9).

Table (9)

Number of Abortions and Number of IUDs fitted per year, 1973-1993

Year	IUD s	Ratio of Abortions to births (%)	Year	IUD s	Ration of Abortions to births (%)
1972	-	35	1983	151545	29
1973	-	32	1984	90530	29
1974	-	33	1985	76453	29
1975	-	33	1986	92244	30
1976	-	32	1987	128732	31
1977	-	33	1988	172356	37
1978	-	31	1989	213552	34
1979	-	30	1990	200891	31
1980	-	30	1991	575600	23
1981	-	29	1992	614200	20
1982	55589	29	1993	670500	18

Uzbek

Sixteen percent of all women reported that they had had an induced abortion, and 14% of all pregnancies in the three years before the survey had ended in abortion (Uz DHS, 1996)

The prevalence of abortion experience rose as age, number of live births and level of education increased. No women younger than 20 reported having had an abortion; however, the proportion rose from 13 % of 20-24-year-olds to 34 % of women aged 35 or older. Likewise, only 1% of women with no live births had had an abortion, compared with 13 % of those with one live birth and 27% of those with four or five live births. A similar trend was observed with respect to educational level. The proportion of women reporting an abortion rose from 11% of those with primary or secondary education to 23 % of women with vocational schooling and 29% of women with higher education.

Residence and ethnicity were also associated with differences in levels of abortion. Urban women were more than twice (24 %) as likely as rural women (11 %) to report an abortion, while Uzbek women were about half (14 %) as likely to do so as were women of

3.5.Median Duration of Breastfeeding

Infant feeding practices are generally agreed to have important health and demographic consequences. Among the most significant of these is the now well-established fertility inhibiting effect of breastfeeding (Gigi, 1982).

The Uz DHS, 1996 results of breastfeeding patterns have been discussed only on the basis of the differences in the mean values of certain characteristics. As can be noticed average duration of breastfeeding among all women is considered reasonable, more than one year (14.4 months). Table (10) shows that urban women are expected to breastfeed their children for shorter duration, i.e. (13.89 months), compared with rural women (14.82 months). Among the five administrative divisions of the country, the average duration of breastfeeding has been lowest in Tashkent city (13.10) and highest in Region 4 (16.64 months).

There is clear indication that breast-feeding duration is negatively associated with the educational level of the mother. Respondents having secondary level of education were found to breast-feed on average for 14.43 months, which decreases to 13.65 months for mothers with a higher education.

Table (10)
Mean Duration of Breastfeeding for Selected Variables

Characteristics	Means (in months)
All country	14.41
Place of Residence	
Rural	14.82
Urban	13.89
By Region	
North	13.63
South	13.70
Central	14.21
Vergana Valley	16.64
Tashkent city	13.10
Secondary	14.43
Higher	13.65
Ethnicity	
Uzbek	14.54
Others	13.88

Source: calculated from Uz DHS, 1996

The differential in breast-feeding duration by ethnicity shows that Uzbek women breast-feed on average for 14.5 months while their counterparts breast-feed for 13.88 months.

Opportunities for working away from home in non-agricultural jobs are greater in cities. Such jobs are generally incompatible with breastfeeding. Working mothers may stop breastfeeding because of a lack of child care facilities at their place of work.

IV. PROXIMATE DETERMINANTS OF FERTILITY

Proximate variables are known for their direct effects on fertility as they mark the exposure of women to pregnancy risks during her reproductive span. The four principal proximate determinants are considered inhibitors of fertility because fertility is lower than its maximum value as a result of delayed marriage, and marital disruption, the use of contraception and induced abortion, and postpartum infecundability induced by breastfeeding (Bongaarts, 1983).

4.1.Index of Marriage

Beginning of actual reproduction is marked by entry into marriage. However, widowhood, separation and divorce affect the potential time spent in reproduction in a given

community. As a result, overall fertility of married women are used to determine the index of marriage

$$C_m = \frac{TFR}{TM}$$ TM- Total Marital Fertility Rate

The index of marriage were found for urban (0.48), and for rural (0.58) (Table 11). At the same time C_m were calculated for women according to educational level, women holding low educational level index of marriage is 0.56, more by 0.9 point than women with higher education.

The index of marriage show an unexpected result for urban women which is higher than the women in rural, in spite of later marriage among urban women than rural counterparts. Such an unexpected result may be due to higher remarriage rate among urban than rural women. The results also indicate that the fertility reducing impact of non marriage is greater among educated women. It could be explain by the late marriage, high proportion of women remained single and divorced compared to uneducated women and women living in other regions.

4.2.Index of Contraception

The index of contraception varies inversely with prevalence and use effectiveness of contraception practiced by couples in the reproductive age groups. If contraceptive practice is absent or completely inefficient, Cc = 1.0. With increasing prevalence and effectiveness, Cc declines below 1.0 (Bongaarts and Potter, 1983). Cc value is inversely related with its prevalence and use-effectiveness (Bongaarts, 1978; Bongaarts and Potter, 1983).

The index of contraception is calculated by the following formula:

$$C_c = 1 - 1.08 x Uxe$$

Cc   index of contraception
U   contraceptive prevalence rate
e   average use-effectiveness of contraception
1.08   sterility correction factor

Using the proportion of respondents currently practicing contraception with specified method, the overall effectiveness of contraception (e) was computed as 0.51 for Uzbekistan, 0.46 for urban and 0.49 for rural. Similarly, the use effectiveness (e) for women in the North Region is 0.60, higher than in Tashkent city (Table 12).

The value of (e) for urban and higher educated women is higher in comparison to their counterparts, because the higher proportion using IUD which are considered to be more effective in preventing the pregnancy.

The index of contraception for whole country is 0.45, for urban and rural are 0.50 and 0.47 respectively.

As expected, contraception has greater reducing effect on fertility among urban, higher educated and the Region women than rural, not educated, and the Region women.

4.3.Index of Abortion

The number of births averted per induced abortion is largely independent of the age of the woman. The number of births averted per induced abortion is strongly related to the practice of contraception, an induced abortion avers about 0.4 births, while about 0.8 births are averted when moderately effective contraception is practice.

So, the births are averted per induced abortion, b, may be estimated with the equation:

$$b = 0.4 (1+u)$$

The index of induced abortion is defined as the ratio of the observed TFR to the estimated TFR without induced abortion:

$$C_c = \frac{TFR}{TFR + 0.4x(1+u)xTA}$$

TFR + b x TA   estimated TFR without induced abortion

The index of abortion were calculated for women living in urban (0.82), in rural (0.93), and women with primary (0.92), and secondary (0.83) and above (0.81). The index of abortion is lower in Tashkent city (0.72) in comparison to other regions (Table 13).

The results reveal that abortion has less effect on fertility reducing among rural, less educated, and especially the women living in Fergana valley . It also indicates less use of contraceptives among them. As a result of this, observed TFR is very high in rural areas (3.74), among uneducated women (3.53).

4.4.Postpartum Period

A woman who does not use contraceptive, exposure to the risk of pregnancy, the length of next conceiving is affected by prolonged breasfeeding. The long intervals of infecundability exert a powerful fertility inhibiting effect because a large proportion of the oductive years are spent in the amenorrheic state (Bongaarts, 1983).

Index of postpartum indecundability is calculated by the following formula;

$$C_i = \frac{20}{18.5 + i}$$

Ci - Index of postpartum indecundability;

i average duration of postpartum indecundability caused by breastfeeding;

18.5 is the composed of 7.5 months of waiting time to conception, 2 months of time added by spontaneous intrauterine mortality and 9 months for full-term of pregnancy.

The index Ci value is 0.84 for Uzbekistan and also for urban and rural areas, while it is different in all regions. The lower index of lactation in the Fergana Valley (0.80), implies that it had a strong effect on fertility reduction among women in Tashkent city than other regions.

Similarly, the index of lactation is lower among women with secondary educational level (0.82), than those with higher (0.85) (Table 14). This implies that effect of lactational infecundability declines with increasing level of education.

4.5.An Aggregate Model Analysis

Results of the application of the model is presented in Table 15 shows that the fertility inhibiting effect of the proximate determinant on fertility in Uzbekistan, by place of residence and educational level with an observed and estimated total fertility rates.

Table (15)
**Estimated of Bongaarts Indices of the Proximate Determinants
by the Place of Residence and Educational Level for Uzbekistan, 1996**

Intermediate Fertility Value	Total	Place of Residence		Educational Level		
		Urban	Rural	Primary	Secondary	Higher
Current Contraceptive Use (u)	0.45	0.50	0.47	0.47	0.40	0.44
Use Effectiveness (e)	0.51	0.46	0.49	0.49	0.56	0.51
Duration of Post Part. Inf (I)	5.3	4.3	6.0	0.86	0.82	0.85
Estimate of Indices						
Index of Marriage (Cm)	0.53	0.48	0.58	0.56	0.51	0.45
Index of Contraception (Cc)	0.45	0.50	0.47	0.47	0.40	0.44
Index of Post Part Infec (Ci)	0.84	0.88	0.82	0.86	0.82	0.85
Index of Abortion (Ca)	0.88	0.82	0.93	0.92	0.83	0.81
TF	15.3					
Estimated TFR Cm*Cc*Ci*Ca*15.3	2.3	2.6	3.1	3.2	2.1	2.1
Observed TFR	3.34	2.71	3.74	3.53	3.13	2.78
Corrected TF=(obs TFR/est.TFR)*15.3	22.2	15.9	18.4	16.8	22.8	20.2
Difference between ETFR and OTFR	-1.04	-0.11	-0.64	-0.33	-1.03	-0.68

Results show that index of marriage and contraception, followed by induced abortion are very low not only for the country, but also for urban/ rural areas, and educational level, indicating the high percentage reduction in fertility.

The effect of breastfeeding shows a very small fertility inhibiting effect.

As noticed in Table (15) the difference between observed and estimated total fertility is 0.5 for total and urban, 0.7 for rural. This difference might be due to other factors not included in the model as waiting time to conception.

V.SUMMARY

5.1.Conclusion

This study stems from the need for reducing fertility level as the most important components of population growth on the one hand and improving the quality of human being on the other.

The analysis indicates that variation in four factors marriage, contraception, lactation, and induced abortion are the primary proximate causes of fertility differences among subgroups within a population (Bongaarts, 1978).

So, above analysis which carried out throughout this study lead to the following conclusions:

- The index of contraception shows greater reducing effect on fertility among urban, higher educated and the Central region women;

- The results of the index of abortion reveal that it has less fertility-inhibiting effect among less educated (0.92), rural (0.93) and the Fergana vallley women (0.93);

- Generally speaking, the analysis of four proximate determinants of fertility show that index of abortion (Ca) play a more important role in the reduction of fertility, whereas index of breastfeeding has a less fertility-inhibiting effect in the country.

5.2.Recommendations

From what has been found in course of this study, the following policy implications could be suggested:

- Raising public awareness, understanding on the impact of high fertility on the various aspects of development and commitment at all levels are vital;

- Promotion of female education has to achieve priority status in government plans. Education is very important as an indicator of status because it has a pervasive impact on

fertility, and because it interacts with other socio-economic, cultural and demographic factors affecting fertility;

- Establishing out reach and face to face communication activities in both urban and rural areas of the region in order to educate the less motivated and encourage new family planning acceptors to continue using the methods;

- Specific educational policies on female reproduction can be designed in an effective and efficient manner to emphasize acquisition of jobs, skills, new values and information. This could cause education to have its negative effects on fertility. Higher female education will improve their status, which indirectly affects their family size;

- More efforts should be done for longer and more intensive breastfeeding for fertility reduction and child health;

- High level of literacy, wide availability of television and radio communication and public exposure to high-quality information need to provide a favorable climate for the use

contraceptive use;

- UNFPA support can be provided for prevention of abortion, management of the consequences of abortion, post-abortion and family planning.

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Table (7)

Percent Distribution of Currently married Women by Contraceptive Method Currently Used, by Background Characteristics, Uzbekistan 1996

Background Characteristics	Any Method	Modern Methods						Traditional Methods				Not Currently Using	Total	Number of Women
		Any Modern Method	Pill	IUD	Injectables	Condom	Female sterilisation	Any Traditional	Periodic Abstinence	Withdrawal	Douche /Other			
Age Groups														
15-19	15.8	15.0	1.5	12.9	-	0.6	-	0.8	-	0.4	0.4	84.2	100	125
20-24	35.5	32.2	1.7	28.8	0.6	0.8	0.2	3.3	0.4	2.7	0.2	64.5	100	599
25-29	55.1	53.	2.2	47.8	1.0	1.8	0.4	2.0	0.5	1.4	0.1	44.9	100	640
30-34	68.9	63.2	1.0	58.1	2.3	1.4	0.3	5.7	1.1	4.3	0.4	31.1	100	572
35-39	74.7	70.3	2.6	62.3	2.1	2.1	1.0	4.3	0.9	3.0	0.6	25.3	100	520
40-44	64.2	56.6	1.8	48.4	1.8	3.2	1.3	7.6	2.9	3.9	0.8	35.8	100	383
45-49	42.3	36.9	-	32.9	0.6	1.3	2.1	5.0	2.3	2.3	0.7	57.7	100	264
Place of Residence														
Urban	56.4	50.2	2.0	42.0	1.6	3.8	0.8	6.0	2.3	2.9	1.0	43.6	100	1168
Rural	55.1	52.0	1.4	48.2	1.4	0.4	0.6	3.1	0.4	2.7	-	44.9	100	1935
Educational Level														
Primary	53.0	49.4	1.1	45.3	1.5	1.1	0.4	3.6	0.4	3.2	0.1	47.0	100	1903
Second	60.7	56.6	2.8	48.6	1.7	2.3	1.2	3.9	1.1	2.2	0.8	39.3	100	830
Higher	58.1	50.0	2.0	42.9	0.6	3.3	1.0	8.0	5.1	2.1	0.9	41.9	100	366
Region														
1	64.0	61.7	0.3	59.3	1.5	0.3	0.3	2.3	1.8	0.4	0.1	36.0	100	319
2	52.9	49.6	0.6	44.5	2.1	1.6	0.8	3.3	0.7	2.5	-	47.1	100	705
3	49.6	44.2	2.0	38.5	1.5	1.8	0.5	5.4	0.7	4.7	-	50.4	100	884
4	57.8	56.6	2.0	52.9	0.8	0.2	0.7	1.2	0.5	0.7	-	42.2	100	917
Tashkent	64.6	48.8	3.7	34.2	1.6	8.1	1.1	14.9	4.9	6.8	4.1	35.4	100	278
Total	55.6	51.3	1.7	45.8	1.4	1.7	0.7	4.2	1.1	2.8	0.4	44.4	100	3102

Table (11)
Index of Marriage

Age Group	All Country			Place of Residence					
				Urban			Rural		
	Proportion Married m (a)	ASFR f(a)	ASFMR g (a) = f (a)/m (a)	Proportion Married m (a)	ASFR f(a)	ASFMR g (a) = f (a)/m (a)	Proportion Married m (a)	ASFR f(a)	ASFMR g (a) = f (a)/m (a)
15-19	0.126	0.061	0.4841	0.124	0.060	0.4839	0.128	0.062	0.4844
20-24	0.710	0.266	0.3746	0.660	0.218	0.3303	0.764	0.294	0.3848
25-29	0.870	0.176	0.2023	0.831	0.154	0.1853	0.911	0.190	0.2086
30-34	0.880	0.114	0.1295	0.824	0.086	0.1044	0.942	0.132	0.1401
35-39	0.880	0.039	0.0443	0.833	0.022	0.0264	0.931	0.050	0.0537
40-44	0.874	0.009	0.0103	0.817	0.004	0.0049	0.956	0.013	0.0136
45-49	0.790	0.003	0.0038	0.710	-		0.911	0.006	0.0066
		TFR =3.34	TM=6.2		TFR=2.71	TM =5.6		TFR =3.74	TM=6.4
Cm	0.53			0.48			0.58		

Table (12)
Index of Contraception

Contraceptive Methods	Use Effectiveness of Methods	Country	Place of Residence		Educational Level			Region				
			Urban	Rural	Primary	Secondary	Higher	North	South	Central	Fergana Valley	Tashkent
Pill	0.90	0.017	0.002	0.014	0.011	0.028	0.002	0.003	0.006	0.020	0.020	0.037
IUD	0.95	0.458	0.420	0.482	0.453	0.486	0.429	0.593	0.445	0.385	0.529	0.342
Sterilization	1.00	0.007	0.008	0.006	0.004	0.012	0.001	0.003	0.008	0.005	0.007	0.011
Others	0.70	0.074	0.072	0.018	0.062	0.081	0.149	0.041	0.070	0.086	0.022	0.256
Total		0.556	0.502	0.520	0.530	0.607	0.581	0.640	0.529	0.496	0.578	0.646
Average use effectiveness of contraception (e)		0.51	0.46	0.49	0.49	0.56	0.51	0.60	0.48	0.45	0.54	0.55
Cc		0.45	0.50	0.47	0.44	0.40	0.47	0.35	0.48	0.51	0.41	0.41

Table (13) Index of Induced Abortion

	Country	Place of Residence		Level of Education			Regions				
		Urban	Rural	Primary	Secondary	Higher	North	South	Central	Fergana Valley	Tashkent
Total Induced Abortion Rate	0.67	0.97	0.48	0.46	0.95	1.00	0.66	0.67	0.78	0.35	1.32
Index of Abortion	0.88	0.82	0.93	0.92	0.83	0.81	0.88	0.89	0.88	0.94	0.72

Table (14) Index of Postpartum Infecundability

	Country	Place of Residence		Level of Education			Regions				
		Urban	Rural	Primary	Secondary	Higher	North	South	Central	Fergana Valle y	Tashkent
Mean Duration of Postpartm Amenorrhea (in months)	5.3	4.3	6.0	4.8	5.9	5.1	5.0	6.1	3.5	6.5	3.3
Index of Postpartum Infecundability	0.84	0.88	0.82	0.86	0.82	0.85	0.85	0.81	0.91	0.80	0.92

جدول (II-2)
يبين القيم الفعلية والمقدرة لجريمة الرشوة بالطرق التقدير المختلفة

	T	Y	Y(s.w)	Y(p.w)	Y(c.o)
1	1970	150	149.683	149.635	149.140
2	1971	127	126.662	126.643	126.571
3	1972	125	123.916	123.840	123.767
4	1973	137	131.642	131.615	131.574
5	1974	100	104.118	104.163	104.006
6	1975	97	93.12817	93.17439	93.19538
7	1976	81	87.08617	87.14156	87.11912
8	1977	71	78.17331	78.08637	77.91975
9	1978	84	78.83738	78.79267	78.55203
10	1979	71	71.44930	71.48401	71.50102
11	1980	56	56.78538	56.80651	56.87667
12	1981	64	58.94382	58.93343	58.87187
13	1982	78	74.76422	74.75342	74.60114
14	1983	75	69.98843	70.05742	70.14164
15	1984	68	69.58428	69.59291	69.52287
16	1985	108	107.554	107.573	107.545
17	1986	108	106.992	106.981	106.951
18	1987	97	90.04186	89.97488	90.01043
19	1988	67	64.58642	64.74468	64.86401
20	1989	88	98.90917	98.93002	98.94794
21	1990	55	58.76298	58.63402	58.43358
22	1991	49	47.30352	47.26755	47.20746
23	1992	40	38.82502	38.91400	38.97605
24	1993	39	42.44272	42.49344	42.66828
25	1994	60	64.28426	64.25824	6423984
26	1995	61	63.60706	63.63595	63.74758
Total sum	51545	2156	2158.04	2158.13	2158.95

جدول (II-3)
يبين القيم الفعلية والمقدرة لجريمة الاختلاس بالطرق التقدير المختلفة

	T	Y	Y(s.w)	Y(p.w)	Y(c.o)
1	1970	150	122.45	120.59	117.63
2	1971	127	99.744	126.43	127.08
3	1972	125	113.09	113.82	113.74
4	1973	137	118.94	122.91	123.04
5	1974	100	92.570	115.73	115.71
6	1975	97	78.109	88.044	87.728
7	1976	81	88.226	84.236	84.377
8	1977	71	59.048	62.921	63.801
9	1978	84	68.292	78.433	77.489
10	1979	71	56.903	68.916	69.618
11	1980	56	51.695	57.885	58.151
12	1981	64	60.246	57.640	57.356
13	1982	78	65.666	72.081	72.191
14	1983	75	59.591	67.461	67.564
15	1984	68	59.483	73.097	73.403
16	1985	108	100.85	97.118	95.892
17	1986	108	95.482	103.44	103.65
18	1987	97	83.713	87.995	88.882
19	1988	67	59.512	77.694	77.295
20	1989	88	84.505	85.411	85.128
21	1990	55	55.234	63.420	63.590
22	1991	49	45.424	41.293	41.150
23	1992	40	41.426	40.735	40.332
24	1993	39	56,875	44.146	44.092
25	1994	60	66.266	57.499	57.145
26	1995	61	67.379	59.331	58.814
27	1970	304	298.44	311.18	307.48
28	1971	267	259.08	276.16	275.53
29	1972	198	220.64	216.54	216.88
30	1973	167	204.46	177.32	175.54
31	1974	139	151.58	121.60	120.46
32	1975	143	150.63	135.52	134.68
33	1976	162	149.85	146.45	146.05
34	1977	141	164.79	152.84	152.62
35	1978	79	65.319	66.835	69.059
36	1979	108	92.529	98.583	98.171
37	1980	91	96.877	94.801	93.857
38	1981	67	71.926	71.543	72.333
39	1982	60	58.984	56.543	56.690
40	1983	61	70.787	66.877	66.662
41	1984	63	65.953	62.103	61.386
42	1985	81	86.994	77.280	77.171
43	1986	88	92.037	86.519	86.256
44	1987	92	94.933	90.213	90.177
45	1988	100	109.16	98.299	97.725
46	1989	81	92.677	84.696	85.307
47	1990	81	84.711	83.559	82.801
48	1991	116	120.85	105.71	106.21
49	1992	92	78.606	82.889	82.995
50	1993	98	96.013	102.23	102.13
51	1994	79	99.264	97.563	97.301
52	1995	68	66.970	53.574	53.642