Socioeconomic Determinants of the Demand for Children in Kebri Dehar District, Eastern Ethiopia

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Abstract- This study attempts to examine Socioeconomic Determinants of the Demand for Children in the Case of Kebri Dehar District. For this purpose, the study used both primary and secondary data. Primary data was collected through interviews and structured questionnaires. The structured questionnaires is posed to a total of 204 randomly sample households and data on socioeconomic variable (income, education, labor market participation, economic value of children, gender composition, age of mothers, ethnicity, Age at marriage, religion and the pro-creation motive) was collected. The data were obtained from 204 sample respondents. A Poisson maximum likelihood estimates technique was used. The results of the study show that measures such as formal expansion of paternal and maternal education, altering the economic value of children, increasing household income, and delaying the marriage age are important. We also find institutional approaches that require "culture based initiatives" relevant. An important policy implication that can be drawn from this result is the need to target such socio-economic variables in designing and implementing population policy measures in Ethiopia and other African nations with similar demographic features.

I. INTRODUCTION

The economic theory of fertility assumes that the household demand for children is determined by family preferences for a certain number of surviving children (i.e., in regions of high mortality, parents may produce more children than they actually desire in the expectation that some will not survive), by the price or "opportunity cost" of rearing these children, and by levels of family income (Todaro & Smith, 2015). Children in poor societies are seen partly as economic investment goods in that there is an expected return in the form of both child labor and the provision of financial support for parents in old age. However, in many developing countries, there is a strong intrinsic psychological and cultural

determinant of family size, so the first two or three children should be viewed as consumer goods for which demand may not be very responsive to relative price changes. The choice mechanism in the economic theory of fertility as applied to developing countries is assumed, therefore, to exist primarily with regard to the additional ("marginal") children who are considered as investments.

The Ethiopian population is characterized by a high fertility rate (Thakoor & Yu, 2014). Continues the highest levels at the end of the twentieth century, and that the rural-urban differentials are also the highest in Africa. The total fertility rate of the country was declined from 6.6 children per woman in 1990 to 5.5 children per woman in 2000 and 5.4 children per woman in 2005 (CSA, 2006). This indicates that in the fifteen-year period, since 1990, the total fertility rate declined by only one child per woman, and stagnated between 2000 and 2005. In particular, there was a slight difference between the 2005 and 2011 total fertility rate 4.8 children per woman (CSA, 2006 & CSA, 2011).Fertility declined in all regions of the country except Afar, Somali, and Benishangul-Gumuz National Regional States during the last decade. It remained constant in Afar National Regional State (4.9 vs. 5.0 children per woman) and Benishangul-Gumuz National Regional State (5.4 vs. 5.2 children per woman) between 2000 and 2011. However, in Somali National Regional State the total fertility rate increased from 5.7 children per woman in 2000 to 7.1 children per woman in 2011 (CSA, 2012).

Furthermore it increased fertility rate in 2016 by 1.5 children per woman. There are number of socio-economic, demographic and cultural factors which may be held responsible for fertility differentials across the regions. The present study tries to investigate some socio economic determinants of fertility.

Ethiopia is often regarded as promising demographic role models since 1970 in reducing the high fertility rates of seven births per woman to below the current average rate for Sub-Saharan Africa, 4.9 (Mesfin et al, 2019). But in 2011, Ethiopia reduces the number of births per woman to 4.8 which is lower than the stands of Sub-Saharan Africa. The Ethiopian Family and Fertility Survey conducted in 1990 by the Central Statistical Authority showed that only 8 percent of all Ethiopian reproductive age group women had ever used any method of contraception (CSA, 1991). The 2012 Inter-Censual Population Survey showed that the national average fertility rate has decreased from 6.2 percent in 2007 to 4.6 percent in 2012 (CSA, 2012). The even though fertility rate of Ethiopia become declined since the starting of contraceptive utilization some of the regions like Afar and Somalia still high. This due to the regions has a lower contraceptive utilization than all regions of Ethiopia. In a country in general and in this region particular where having as many as children is considered as a blessing, achieving such a policy goal seems a difficult task.

The empirical studies elsewhere, following the approaches pioneered by Becker (1960) and Esterlin (1975), find that the macro consequence of population size abstracts much depend on individual household socioeconomic characteristics. Thus, the success of a national population policy will depend, albeit the approach, on identifying those factors that determine the number of children demands, understanding the dynamics of fertility at household levels and designing strategies based on market forces that govern household fertility behavior and choices.

The micro-economic consumer's choice theory based studies on household demographic behavior in Africa, particularly on those factors that affect households' demand for children and fertility pattern in Ethiopia are very few. A few of studies point out that formal paternal and maternal education, economic value of children, household income, and marriage age are significantly determined desired number of children (Bedassa and Sisay 2014). Gorecki and Tesfaye (1993) finds TFR varying from five children in urban areas to about nine children among women in rural areas prevail in the country. Life expectancy is about 53 years. Infant mortality rate is about 103 per 1000. There is limited health service (only 46 % of the population) coverage and literacy rate is only 36% (UNFPA, 1998). Contraceptive prevalence rate is less than 4% (Shigu, 1994).

Although Ethiopia's population policy emphasis expansion of family planning services, it also recognizes the importance of empirical research to identify key complementary policy variables. To this end, it stresses the need for identifying appropriate strategies to tackle the problem by taking into account the dynamics and complexity of the social, economic, cultural and institutional factors across regions, residence settings and household units. With such a goal in perspective, the study examines the socioeconomic determinants of the demand for children for households in Kebri Dehar district. Based on a model in which households endogenously make fertility decision and factors that are commonly over looked by related population policies elsewhere in Africa, we attempt to present some important empirical evidences.

II. OBJECTIVE OF THE STUDY

The primary objective of the study is to examine socioeconomic determinants of the demand for children in Kebri Dehar district. The further study examine

- ➢ To examine whether economic value of children has effects on demand for children
- ➢ To investigate the role of paternal and maternal education in chooses of number children.
- ➢ To assess the socioeconomic characteristics of the household in the study area.

III. RESEARCH METHODOLOGY

Data Collection Techniques

In order to get the required information on socioeconomic and desired number of children in Kebri dehar district, both primary and secondary sources of information is used. Primary data is collected through interviews and structured questionnaires. The structured questionnaires is posed to a total of 204 randomly sample households and data on socioeconomic variable (income, education, labor market participation, economic value of children, gender composition, age of mothers, ethnicity, Age at marriage and the pro-creation motive) is collected. Apart from structured questionnaires, qualitative data was collected from key informants within the town through interview. Secondary sources include unpublished materials and pertinent published documents such as previous reports, and checklists of facts and figures.

Sample Size and Sampling Techniques

There are three criterion usually need to be specified to determine the appropriate sample size, in addition to the purpose of the study and population size,: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Miaoulis & Michener, 1976). The level of precision, sometimes called sampling error, is the range in which the true value of the population is estimated to be. This range is often expressed in percentage points, (e.g., ±5, ±7, and ±10 percent).

The confidence or risk level is based on ideas encompassed under the Central Limit Theorem. The key idea encompassed in the Central Limit Theorem is that when a population is repeatedly sampled, the average value of the attribute obtained by those samples is equal to the true population value. Furthermore, the values obtained by these samples are distributed normally about the true value, with some samples having a higher value and some obtaining a lower score than the true population value.

The third criterion, the degree of variability in the attributes being measured refers to the distribution of attributes in the population. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. The less variable (more homogeneous) a population are, the smaller the sample size have. The population from which the samples will be taken is households of the district. Taking into account that there are tradeoffs between cost and accuracy in every research, the total number of samples was determined by applying a simple formula (Yamane, 1967) although there are many options to do so.

The formula is written as: $n = \dfrac{N}{1+N(e^2)}$

Where n is the sample size, N is the total households (85,000 household heads) within the selected ten Kebeles of the city administration, and e is the level of precision set at 7%.

Sampling size determinations: Even though there are several approaches to determine the sample size, due to their simplicity, cost effectiveness for large populations and lower error committed bias both published tables and simplified formula, which provide the sample size for a given set of criteria, are used. Note two things during using published tables: First, these sample sizes reflect the number of obtained responses, and not necessarily, the number of surveys mailed or interviews planned. Second, the sample sizes presume that the attributes being measured are distributed normally or nearly so. If this assumption cannot be met, then the entire population may need to be surveyed.

SAMPLE SIZE

Size of population	Sample Size (n) for Precision(e) of:			
	±3%	±5%	±7%	±10%
500	A	81	67	51
600	a	96	78	56
700	a	110	86	61
2000	714	333	185	95
…	…	…	…	…
10,000	1000	385	200	99
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100
a = Assumption of normal population is house owner (Yamane, 1967). The entire population should be sampled.				

Therefore, 85,000 total households of the city from 12 Kebeles in the district at 95% of confidence interval with ±7% level of precision (e) the sample size as shown above from the table (3.1) is 204 sample populations.

In the case of formulas, Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes.

The formula is written as $= \frac{N}{1+N(e^2)}$

Where n is the sample size, N is the population size, and e is the level of precision.

According to officials, there are 285,000 total populations in Kebri Dehar district. Among them in the case of this study, 85,000 households from the 12 Kebeles are considered. Using the above-simplified formula at 95% of confidence interval with 85,000 total populations (N) considered under the study. The sample size (n) at 7% level of precision (e) can be calculated as follows:

$$n = \frac{85,000}{1+85,000\,(0.07^2)} = \frac{85,000}{1+416.5} = \frac{85,000}{417.5} = 203.59 \approx 204$$

Therefore, in this study among the total 10 Kebeles of 85,000 households in Kebri Dehar 204 samples is drawn.

Method of Data Analysis

Poisson count model: The Poisson count model assumes that the dependent variable is generated from a poisson process and takes on values that are non-negative integers. Thus, both the censored and integer aspects of children are taken into account. The Poisson model has the additional advantage that it models some heteroscedasticity, since the variance of the dependent variable is a function of x'B. The model is:

$$Pr(yt) = \frac{\exp(-\lambda t)\, \lambda t^{y}}{yt!} \qquad\qquad (1)$$

Where, $\lambda t = \exp(X'B) = E(yt) = \text{variance}(yt)$.

The Poisson model is estimated using maximum likelihood methods. X is a matrix of exogenous variables comprising log transformed household income (level and quadratic form), current age of the wife and her age at marriage. Also included in X' are the maternal and paternal education levels measured in school years, gender composition of children already born, proxy variable for wealth and dummy coded indicator variables on labor market participation of the wife, and expectation of economic support from children. Dummy coded status variable for controlling the differences in the desired number of children between those who already have a child and those who do not is also included.

Using the variables of interest, we derive the maximum likelihood estimates of the parameters. Then, the effect of a unit change in each explanatory variable on the conditional mean of the desired number of children (the marginal effects) is evaluated at the average of the individual responses.

Definition of Variables and Priori Expectations

In this section socioeconomic variables which determine number of children desired, and thus total are define and hypothesize.

Income: Malthus, on the other hand, concluded that an increase in income would lead to a relatively large increase in family size. His argument has two major components. First, an increase in income would cause a decline in child mortality, enabling more children to survive childhood. If a decrease in births did not offset the decrease in child mortality, the number of children in the average family would increase. His second argument is less, mechanical and takes greater account of motivation. An increase in income increases fertility by inducing people to marry earlier and 'abstain less while married.

Age of wife at marriage and current age of wife: if both at marriage and current age of consistence with childbearing age, then increase the probability of demand for children due to existence of large time space.

Education level of the wife: It may improve maternal health, raising the supply of children, or by improving child health (lowering child mortality) it may increase child spacing intervals and reduce the supply of children. If the mother's demand for children is really a demand for surviving children, the lower child mortality associated with mother's schooling may lead her to have fewer pregnancies. Schooling may also affect women's preferences, inducing them to demand fewer children of higher quality (Martha, 1988).

Employment status of the wife: the employed wife may have lower demand for children due to increase their opportunity cost of having children.

House type: children are better housed; lead better child carrying environment and lower expenditure on durable goods like house which already owned, therefore, the demand for children rise

Education level of the husband: is used as a proxy for husband wages, an increase in educational level may induce the demand for children.

Expects support from Children: Children may sometimes provide money income and are then investment good as well (Becker, 1960). The returns of investment based on expectation. As household high expect support or returns of children, the desired more children and the vice versa.

A priori expectations the above variables are based on the theoretical and empirical literature. Based on the household demand and synthesis models, human capital values (education of the couples), women's participation in labor market, and delayed age at marriage are hypothesized to have negative impact on the number of children desired, and thus total fertility.

Empirical studies have developed that for a utility maximizing rational household, children are normal goods. Thus, with a rise in household income levels, it is expected that the demand for children would increase. Beyond certain threshold level, however, income could have a negative impact making its impact non-linear. Similarly, it is expected that wealth and age of the wife would have a positive impact on the demand for children.

In countries like Ethiopia where underdeveloped labor and capital markets are large, family attitudes and values on the number of children, among other things, could depend on the economic values of children to the household, the religious belief of the household, ethnicity and societal values and ranking associated with the gender composition of children (Bedassa and Sisay, 2014).

EXPECTED SIGNS OF EXPLANATORY VARIABLES

No	Variables	Variables definition	Expected Value
1	TNCD	Total number of children desired	
2	INCM	Annual income in Ethiopian Birr	+
3	INCMSQ	Squared annual income in Ethiopian Birr	-
4	AGMGE	Age of wife at marriage in years	-
5	WIFAGE	Current age of wife in years	+
6	WIFEDN	Education level of the wife in school years	-
7	EMPWIF	Employment status of the wife, 1 if employed	-
8	HSTYPE	House type (proxy for wealth), 1 if Villa	+
9	HBNEDN	Education level of the husband in school years	-
10	PRMALE	Proportion of males among alive children	+/-
11	RESID	Household residence, 1 if Urban	-
12	ETNCHD	Ethnicity of the household head, 1 if Somali	+
13	HCHILD	Self-replacement dummy, 1 if at least two children	-
14	ESUPFCD	Expects support from Children, dummy, 1 if Yes	+

IV. RESULTS AND DISCUSSIONS

Income, Labor Market Participation and Education

Based on the evidence from microeconomics fertility studies based on the household demand and synthesis models, the results of the present study shows that children are "normal goods" is inelastic income elasticity of demand. It also reveals the number of children desired is a positive function of household income (INCME) with inelastic (0.876) demand. Because of the net income effect (as postulated by the household demand model) and the increased fecundity or supply of births, the demand initially rises as household income increases. In the long run however, after a higher threshold income level (INCMSQ) is attained, the effect of education and employment starts to offset the income effect making the demand to significantly decline.

POISSON ML ESTIMATES OF THE COEFFICIENTS, MARGINAL EFFECTS AND ELASTICITY OF THE NUMBER OF CHILDREN DESIRED BY HOUSEHOLDS IN KEBRI DEHAR, ETHIOPIA.

Variable	Coefficients (Standard errors)	Marginal Effects		Elasticity
Ln INCM	0.876 (0.2334)***	2.874		0.876
Ln INCMSQ	-0.067 (0.029)***	-0.345		-0.067
Ln AGMGE	-0.013 (0.0035)**	-0.061		0.013
Ln WIFAGE	0.112 (0.226)	0.734		0.112
WIFEDN	-0.017 (0.002)*	-0.054		-0.053
EMPWIF	-0.036 (0.065)	-0.403		-0.013
HSTYPE	0.678 (0.056)***	0.674		0.036
HBNEDN	-0.0203(0.056)***	-0.105		-0.145
PRMALE	-0.043(0.103)	-0.211		-0.021
RESID	0.134(0.085)	0.023		0.026
ETNCHD	0.508(0.045)***	0.784		0.876
HCHILD	0.679 (0.189)***	0.876		0.435
ESUPFCD	0.081(0.053)**	0.3082		0.041
Constant -1.286(1.325)***	Log likelihood	387.36	G-squared	201.23
	Chi-Square	73.53	R- Squared, pseudo	0.301
	Degree of freedom	11.27	N	203

The effect of income on the desired number of children is, thus, non-linear. Among all the variables considered, the absolute marginal (mean) effect of income on the households' desire for children is the largest.

In other way, when we estimate the same model (not reported here) by using per capita income instead of the household income, all the other variables maintained their significance levels and signs. Reflecting the trade-offs between fertility and economic status of the household, the per capita income variable showed a highly significant (p<0.05) negative coefficient of 0.0058. Thus, what is important in effectively achieving the desired policy objective of reducing fertility

at this stage may not be the expansion of family planning programs or contraceptive measures as emphasized in the policy but changing the income position of the households. Therefore, designing public policy intervention programs for creating market driven employment opportunities that would help households to increase their current income position is necessary. One such strategy could be to encourage women's participation in the labor market. In spite of the a priori expected sign, the coefficient of women's employment (EMPWIF) in the present study is not significant enough to support the hypothesis that working women would desire smaller number of children relative to non-working women. This may be because labor markets in the area are generally thin and the opportunity cost of having an additional child may not significantly differ between working and non-working women.

The result also provides strong evidence on the negative impact of the increases in the level of schooling attained by both paternal (HBNEDN) and maternal (WIFEDN) partners on the demand for children. With a mean effect of 0.05 children, the results show that, a 20 percent increase (additional two school years) in the maternal education from the current mean five years of schooling will reduce the expected number of children desired by two.

This could be because even in the absence of attractive labor market opportunities, education can change attitudes, values and beliefs of families towards those that are compatible with a small family norm and demand in which the utility from child "quantity" is discounted more than the utility from child "quality". An interesting inference that can be made from the results on the paternal education (HBNEDN) in the present study is that the desired number of children among women significantly declines as the education level of their husband's increase. Investment provisions designed for raising labor market participation and education levels of both the men and women, and thereby increasing opportunities for improvements in the income level of households are therefore imperative.

If public intervention programs such as family planning are to be followed as is being stressed in the Ethiopia's population policy, the significance of paternal and maternal schooling should be taken as an indicative for designing effective information, education and communication (IEC) components that address both males (husbands) and females. In the absence of either of such provisions the transition from the current high total fertility level of seven children per woman to lower fertility level of four in just 15 years as perceived by the population policy of Ethiopia may be unlikely to be attained.

Consistent with the findings of Kinfu (1996) on poverty and demographic characteristics in Diredawa, the second largest city in Ethiopia, the result from the present study also shows that wealthier households (HSTYPE) desire to have more children. This may be because among wealthier households the tradeoff between child quantity and child quality is minimal. As wealth provides buffer to income shocks, wealthier households not only have the capacity to raise more children even at high costs, but also the ability to pay for better education, health and nutrition.

Economic Value of Children, Gender Composition, Age of Mothers and Ethnicity

In line with the findings of Hilawi (1995) in Northern Ethiopia, this study also finds that households that expect economic support from their children at latter ages, on average desire to have more number of children with a factor of 0.081 than those who expect no economic support from their children. In an environment of least developed labor and capital markets, it is rational for households to consider having more children as a safety net and old-age security. If effective transition to lower fertility is to be sought from the population policy, strategies involving public and private investments in employment and income creating programs are, therefore, important. Such measures help not only to lower the economic value of children, but also to create conducive situation to alter the attitude towards high fertility.

Evidence on the effects of other two variables included in the model on the demand for children are not strong enough to support the a priori expected hypothesizes. These variables include gender composition of children (PRMALE) already born and the residence of the households (RESID).

4.3 Age at Marriage, Ethnicity and the Pro-Creation Motive

The result on the three other socio-economic variables, namely the age at marriage for women, the ethnicity of the household head, and the self-replacement motive are as a priori expected. They clearly establish the importance of postponing the age at marriage, and the need for some kind of faith based. After controlling for the effect of important social and economic variables, higher age at marriage is associated with lower desired number of children. The desired number of children declines by a margin of 0.061 for each additional year the age of girls at marriage is postponed. Households headed by being Somali ethnic desire to have significantly more children (almost five child at the mean) than households from other. For a smooth transition to lower fertility levels stipulated by the population policy of the country, recognizing these differences in the ethnicity and cultural denominations and age at marriage, interventions based on some kind of culture based initiatives may be relevant. Thus emphasis should be given to both social and cultural institutions for bringing the desired behavioral changes favoring lower fertility. Contrary to the a priori expected hypothesis, the study reveals that households at their self replacement fertility level of two children (HCHILD), on average desire significantly larger number of children than those that have already exceeded this level. Given this result, initiative like "the policy of two children per couple" is certainly less attractive. This may be because households are discounting higher fertility levels by the risk of poor health services and the prevalent more than 120 per 1000 infant mortality rates in the country.

Therefore, measures targeting the expansion of community health services such as clinics, health stations, health education services that would help reduce infant mortality should be taken as an integral part of the effort to harmonize the economic and population growth of the country.

V. CONCLUSIONS AND POLICY RECOMMENDATION

Conclusion

This paper has examined some socioeconomic variables that can play key roles in influencing the demand for children among 204 randomly selected households from Kebri Dehar district in eastern Ethiopia. The findings indicate that significant reductions in the number of children desired can be achieved by increasing the educational level of women, increasing the female's age at marriage, and enhancing either the income earning capacity or employment or the income level of households.

After controlling for the effect of some socioeconomic differentials, we find that Somali families prefer to have significantly more children than other ethnicity in the area of the study. In the absence of well-developed labor and capital markets that reflect the true opportunity cost of child bearing and rearing, this result provides strong support for using intervention mechanisms that involve faith based social institutions. However, further studies identifying the specific factors that are endogenous to the religious denomination is important.

Since fertility among married households is a matter of joint decision, we find that education of males (husbands) and females as an important measure for reducing the demand for children and thereby fertility levels among married women. The importance of education lies on its ability to enhance the income earning capacities of households in general, and the leverage in the bargaining power of the female in her attempts to make decisions over her fertility.

Policy Recommendation

The policy implications of our findings are the following:
- ☞ lowering population growth rates through the target of fertility reduction, as a single goal by itself is more likely to be less effective;
- ☞ it would be important to focus on the approaches and incentives that involve the goal of improving the quality of life: raising income levels of households and thereby changing the perceptions on the economic value of children. This can, for example, involve expanding the education of females and males, and the development of labor and capital markets;
- ☞ Household's decision on the number of desired children is based on wide range of important socioeconomic factors such as education, age at marriage, the religion, their income levels, and self-replacement motives. Therefore, increasing access to contraceptive measures by expanding the availability of family planning program services envisaged in the population policy of Ethiopia and other African nations with similar demographic features may not be enough for couples to change their behavior toward having fewer children and to reduce fertility.

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