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Economic factors affecting human fertility in the developing areas of Southern Africa

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ABSTRACT

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South Africa's annual population growth rate, in the traditional sector, is 3.5% (1980–2000), a rate similar to those experienced in the rest of sub-Saharan Africa, and over which the World Bank has expressed concern. For the purposes of this study, economic factors explaining family size choice in the traditional sector were examined and linkages between family size decisions and socio-economic variables analysed. Household utility was maximised subject to resource constraints of time, labour and income, from which a demand curve for children was derived with emphasis on the opportunity cost of wives' time and the quantity–quality trade-off for children. A stratified sampling technique was used to collect data from KwaZulu households in South Africa. Regression analysis was used to estimate the demand function and principal components analysis confirmed the underlying theoretical linkages. Results show that wife's education (expected income or opportunity cost), child help (benefits) and desired family size were important explanatory variables. Three components extracted represented the substitution effect, the income effect and child investment theory. Results show that investment in education, taken as a proxy for expected earnings, is a strong policy option for reducing family size.

INTRODUCTION

High population growth has been a major factor inhibiting economic development in third world countries. Africa has been the focus of world attention in recent years because of high growth rates. Rates exceeded 4% in Kenya and Mozambique between 1970 and 1982 (World Bank, 1984). The traditional sector in South Africa faces a similar growth rate which is estimated as being 3.5% during 1980–2000 (de Graaf, 1987), and 46% of the traditional sector's population of 15 648 000 are younger than fifteen (Dev. Bank South. Africa, 1987).

The major purpose of this study was to define a strategy which would transform the economic conditions of households to ones more conducive to small family size; thus facilitating fertility decline and the raising of living standard potentials. The approach to family size decision-making emphasizes the theory of opportunity costs of time (Mincer, 1963), the quantity–quality trade-off (Becker, 1960, 1965) and child investment theory (Schultz, 1973, 1981). Data were collected from Ubombo (rural) and Mhlabathini (urban) magisterial districts in KwaZulu. One hundred and seventy-five women, classified into three occupational strata which allowed maximum variability in women's education and opportunity cost of time variables, were interviewed. Regression and principal components analyses were used to estimate the demand function for family size and the underlying theoretical linkages, respectively.

THEORETICAL ISSUES

The Chicago school paradigm was adopted because it is rigorous, and has empirical support in regarding tastes as exogenous as opposed to behavioural models where tastes are endogenous. It maximises household utility from "child' services" and "standard of living" subject to resource constraints of time, labour and income from which the demand curve for quantity of children can be derived (Willis, 1973). Major components of the demand curve include the constraining set of resources and the prices of both complementary and substitutionary goods to numbers of children. These relationships form the theoretical basis of the Chicago school approach.

Mincer (1963) introduced the concept of opportunity cost of time for child care as a major constraint to the household; it is linked to women's labour and thus wages. Using wages as a proxy for opportunity cost he showed that as women's wages rise they desire fewer children and substitute to less time intensive goods, explaining the paradox that although children are normal goods fewer are desired as incomes rise. Becker (1960) added that "child services" were composed of two components, numbers of children and child quality, substitutes which vary directly with expenditures of time and money. The income elasticity of child quality is greater than that of numbers of children, indicating that higher-income earners will have fewer but higher-quality children. Mincer's (1963) and Becker's (1960) propositions imply that as opportunity costs of child care rise quality (less time-intensive) is substituted for quantity, and higher average utility per child is derived from higher expenditures per child.

Children are seen as both consumption goods and investment options. Parents may invest in more rather than fewer children in expectation of

future support as their children mature. Schultz (1973) believes benefits derived from children are a motivating factor in fertility behaviour, especially in developing countries where it has become an important economic rationalisation for large family size (Cadwell, 1976).

SURVEY AREAS AND SAMPLING TECHNIQUES

KwaZulu is a self governing territory and is situated in the Natal provincial region of South Africa. Much of KwaZulu is in northern Natal and stretches along the eastern seaboard, with Mozambique as its far northern boundary. Ubombo, the rural area, lies between the latitudes of 27° and 28° South. Two villages Jozini and Ubombo provide most of the community's required services including communication and employment; the Mjindi Cotton Scheme near Jozini and Bethesda Hospital in Ubombo being the principal employers of women. Cotton production, introduced by the Mjindi scheme, and subsistence agriculture are major activities. The area has little infrastructure, is typically rural and representative of a rural KwaZulu community.

Ulundi is situated inland in the Mahlabathini magisterial district and is the administrative capital of KwaZulu. It is typical of an urban area being well serviced by road, rail and air; has shopping complexes, schools, a hospital, and other small enterprise although there is little industrial production. Services here are more easily available than in rural areas; market work rather than subsistence agriculture is the major occupation, and water and electricity facilities are available.

From these areas a stratified sample of 175 women was interviewed. Respondents were grouped into three occupational strata:

(1) Professional workers, eg. nurses, clerks, and teachers, etc.;
(2) semi-skilled industrial workers, including tractor drivers, gardeners, cleaners, kitchen staff and irrigation workers;
(3) respondents not formally employed, such as pensioners, household keepers, subsistence farmers and the self-employed.

In Ubombo a list of all female employees of child-bearing age (15–49 years) from Mjindi and Bethesda was compiled, from which the first two strata were identified. Each employee was numbered in her stratum, and 30 women were randomly chosen from each. The third stratum was difficult to sample as a list of unemployed women was unavailable for Chief Myeni's ward. Therefore the ward was divided geographically into eight identifiable blocks, two of which were selected by proportional probability sampling (PPS). Within these blocks households were approached systematically until women fitting the criteria were found and interviewed.

In Ulundi, the first two strata were selected as in Ubombo, from a list of women employees from all possible employment sources. The third stratum was selected with the aid of town plans. One of Ulundi's four suburbs Unit A was chosen using PPS. Within Unit A, the lots were numbered and 30 randomly selected. If chosen households lacked a suitable respondent, neighbouring households were visited until 30 respondents were found. A post hoc stratification was imposed on stratum 3, reclassifying the group into entrepreneurs and the unemployed. Tables 1 and 2 show t-tests on the group means which were used to test the significant differences between the groups. It is reported that the groups only differed on wife's current income (WINC), the ratio of child to family earnings (CFAM), and child education (EDCD) variables. This suggested that splitting the stratum for futher statistical analysis was unnecessary.

MODEL SPECIFICATION

The major objective was to derive a demand function for the number of children a family would like to have. Practically it is difficult to measure desired family size; in fact these desires seldom reflect reality. Past studies found that desires were neither consistent about numbers of children wanted nor between husband's and wife's expectations. McClelland (1983) suggested that a major problem is defining who makes the decisions, adding that use of wife's desires can be justified as she ultimately bears the children and is likely to incorporate her husband's wishes into her decision. Amongst those surveyed the wife carried the financial burden of children; professional women (stratum 1) contributed 68.7% and industrial workers (stratum 2) contributed 53.4% to family income. The entrepreneurs (group 1) and the unemployed (group 2) of stratum 3 contributed 28.7% and 4.7%, respectively, to family income.

In this study the number of living children was used to reflect demand as the zero order correlation between numbers of living children and stated desires was 0.28. This seemingly low correlation reflects uncertainty associated with fertility choices in the traditional sector. Only 30% of the sample was married at the time of the survey, the percentage increasing to 47% if common law unions and widows are included. A young woman's expectations about marriage, income and employment affects her family size desires; consequently only if her socio-economic status coincides with her expectations, will desires accurately reflect family size. Hence the empirical model can be expressed as:

$$\text{NOC} = f(\text{INCOME}, \text{EDC}, \text{HLP}, \text{TST}; v^{i})$$

where NOC is the number of living children, INCOME an estimate of

TABLE 1

Means of incomes, costs and education associated with different family members by strata in KwaZulu, 1988

Variable description		Stratum 1: Professional	Stratum 2: Industrial	Stratum 3: Combined	Group 1 Self-employed	Group 2 Unemployed	*t*-value $*P < 0.05$ $**P < 0.01$
WINC (R)	Wife's income	8431	2420	1288	2758	198	4.14 **
EDW (year)	Education of wife	11.89	4.73	5.55	5.30	5.61	−0.30
INC (R)	Husband's income	4974	2571	4315	4282	4000	0.21
EDH (year)	Education of husband	3.16	2.20	4.58	5.05	4.17	0.56
OCCH1	Skilled husband	0.37	0.18	0.39	0.50	0.31	0.99
OCCH2	Semi-skilled husband	0.13	0.25	0.43	0.33	0.50	−0.86
TCOST (R)	Total child cost	2985	1875	2381	2642	2187	0.85
CFAM [a]		0.00	0.04	0.15	0.06	0.21	−2.09 *
TCPC [b]		1516	459	662	627	689	−0.43
TYPC [c]		7305	1717	1881	2324	1432	1.09
	n	58	62	54	23	31	

[a] CFAM is a ratio of child to family earnings.
[b] TCPC is total child cost per child.
[c] TYPC is total family earnings per child.
R1.00 = US $0.385 (August 1989).

TABLE 2

Means of numbers of children, tastes, child education and control variables by strata in KwaZulu, 1988

Variable	Description	Stratum 1: Professional	Stratum 2: Industrial	Stratum 3: combined	Group 1 Self-employed	Group 2 Unemployed	*t*-value $*P < 0.05$ $**P < 0.01$
noc	Number of children	1.22	3.36	3.40	4.13	2.94	1.85
tst	Tastes for children	3.19	4.21	4.15	3.82	4.35	−1.21
cu	Contraceptive use	0.67	0.32	0.27	0.30	0.26	0.37
DEDC [a]	Optimal school level	14.21	12.18	12.35	12.30	12.29	0.02
EDCD [b]	Parents pro education	0.91	0.36	0.36	0.61	0.19	3.39 **
AGEW	Age of wife (y)	28.52	33.35	36.02	38.39	34.84	0.93
MSD1 [c]	Fraction of women married	0.24	0.27	0.40	0.65	0.48	1.23
MSD2 [c]	Fraction of women in CL	0.02	0.08	0.13	0.04	0.19	−1.78
	Fraction of women single	0.74	0.65	0.47	0.30	0.32	NA
	n	58	62	54	23	31	

[a] DEDC is the optimal education level parents want their children to receive.

[b] EDCD is a dummy variable representing parents who are for their children being well educated.

[c] MSD1 and MSD2 are dummy variables distinguishing married and common-law (CL) wives from single women respectively.

permanent family income, EDC child's education as a proxy for quality, HLP child's help as an estimate of child benefits, TST parents' taste for children, v^i control variables including wife's age, duration of child-bearing period, marital status etc.

Effects of income on family size

The most important factor in the measure of income is that it must be an estimate of the expected lifetime income stream as perceived by the family. Education levels were used as a measure of these expectations, which appears reasonable considering the high correlations between education and earnings as shown in Table 1. Lyne's (1988) study supports this. Table 1 shows that stratum 1 women earn, on average, three times more, and their education levels are twice as high as those in strata 2 and 3. Although wife's education in both groups in stratum 3 are similar to stratum 2, the unemployed, as expected, have much smaller incomes. Comparing an estimate of husbands' incomes and their education shows that more educated husbands tend to earn better incomes. Husbands' occupational levels and education are also correlated.

The estimation of the proportion of family earnings from children, using CFAM, reveals that less educated women depend more on children's earnings; stratum 3 mothers receiving up to 15% of total earnings from their children. Taking this further reveals that within stratum 3, the unemployed group receive 21% of earnings from children whereas the entrepreneurs receive only 6%. This suggests that women with low incomes do invest in children as a source of financial security. If child earnings (CFAM) is considered together with TCOST (total expenditure on children including education, medical expenses, food and clothing etc.), TCPC (total cost per child) and TYPC (total family earnings per child), it is clear that most families spend similar total amounts on children; but the educated spend more per child while the less educated have larger families. The opportunity cost of time theory is supported where high-income earners replace quantity of children for 'better'-quality ones.

CHILD QUALITY AS AN ESTIMATE OF CHILD COST

Child quality is regarded as a time cost in the Chicago model in the sense that as the cost of time increases (i.e. wages rise), quality becomes less costly than numbers of children and is therefore substituted for quantity. Thus the expected sign for the effect of child quality on family size is negative. Two measures of child quality were tried.

The first was the optimal level of schooling that parents would like their children to receive given their financial constraints. The levels were converted into a continuous variable using the number of years taken to achieve that standard. In most cases, however, respondents overlooked their financial situation; consequently it was not a reliable measure of the cost of children. The second approach was to construct a dummy variable (EDCD), which differentiated between parents favouring education and those against child schooling. The dummy scored one if parents had educated children within the correct time period, held strong opinions on the importance of education, had made some kind of financial provision for schooling, or if under very poor financial circumstances a mother had educated her children to a reasonable level. Otherwise the dummy scored zero.

Both measures were used in regression, but the relationship was positive in all cases and not significant. According to Table 2, the optimal education variable is similar throughout the strata suggesting that it was a better measure of desired education levels irrespective of financial circumstances. The dummy, EDCD, better describes the situation. Ninety-one percent of educated and wealthy parents (stratum 1) favoured investments in child education. Mothers in the other 2 strata were less interested, although, in both, Ulundi's mean for EDCD was higher than Ubombo's. Within stratum 3, however, the entrepreneurs and the 'unemployed' have significantly different mean values for child education. Entrepreneurs favoured child education more than industrial workers and the unemployed women.

Comparing these with numbers of, and tastes for, children illustrates that educated women both desired and had fewer children than their less educated counterparts. This is consistent with the Chicago model where high time costs cause a shift from quantity to quality of children. Professional women desired fewer children and made this choice effective by using contraception; the dummy CU, representing contraceptive use, shows that 67% of stratum 1 as opposed to between 20% and 30% of the other strata used contraception.

CHILD HELP AND FAMILY SIZE

Child help is an estimate of child benefits and is expected to be more important in rural areas where subsistence agriculture is largely dependent upon family labour services. The relationship between benefits and quantity of children was expected to be positive. Child benefits were measured using an index of household chores in which children were involved (HLP). This index was constructed using principal components from a large number of dummy variables which scored one if a child was involved in the

activity and zero otherwise. Chores included cooking, cleaning, agricultural work, shopping errands and informal sector labour. Each activity was split into two dummies by gender so that the index could be weighted appropriately by the most productive children. The urban–rural effect is present since collecting water and firewood, working in the fields and grinding grain are important. These activities are more prevalent in rural areas, implying child labour is a strong motivation for large family size.

Tastes and family size

The variable used to represent tastes was the desired number of children (TST) couples would have had if they could have had their lives over again. Consistency was checked by asking how many more children they desired and why. Their answers suggested that with more information on costs of children, smaller family size desires would prevail. According to Table 2 tastes for children increase from stratum 1 to stratum 3, the former desiring an average of 3.2, with strata 2 and 3 desiring 4.2 and 4.1 children, respectively.

Control variables

The most important control variables were those directly affecting the woman, including her age (AGEW), age squared (AGEWSQ), and marital status (MSD1 and MSD2). It is important to account for these conditions so that like circumstances can be evaluated. Age allows women at similar stages of the lifecycle to be compared. According to Table 2, wife's age and quantity of children follow the expected trend. As age increases numbers of children increase but at a decreasing rate. In regression analysis this should be captured by a negative AGEWSQ.

Three marital status groups were identified: single, married, and women in common-law unions. Two dummy variables (MSD1 and MSD2) identify the groups with single women being used as a base category. The dummy MSD1 distinguishes married from single women by scoring one; similarly MSD2 differentiates common-law wives from single women by scoring one. Both single and common-law women are expected to exert more control on fertility than married women because socially and economically they are less secure.

Table 2 shows that most respondents were single women. As sole supporters of their children, the opportunity cost of child care would be relatively high, therefore they were expected to reduce their family sizes. Evidence is found in Table 2 where the highest percentage of single women and the lowest number of children was in stratum 1. The dummy MSD1,

representing married women, is highest in stratum 3, as is quantity of children, suggesting that there is a positive relationship between the two. This is justified by the fact that their time is 'less valuable' in terms of opportunity cost as husbands are also supporting the household. The common law case is more complicated. Table 2 shows that strata 2 and 3 have the largest proportions of women in these arrangements whose opportunity costs are relatively low; this may induce women to have more children (high values for TST and NOC) as an investment for future support when their situation may become less secure. It is noteworthy that Ubombo has, in all strata, more couples in common law unions than Ulundi, reflecting an urban-rural effect where in rural areas women desire children as a productive labour source as well as an investment option.

RESULTS FROM REGRESSION

The regression analysis results are reported in Table 3. The adjusted coefficient of variation (R^2) is 60.0% with all t-values being significant to the 5% level at least. The improvement in R^2 over other studies (Mincer's and Willis' R^2 range from 35% to 47%) is due to the fact that data were stratified by occupation level, thereby allowing maximum variation in women's education and opportunity costs.

TABLE 3

Demand for family size, Kwazulu, 1988

Dependent variable: NOC		
Variable	Coefficient	t-value
AGEW	0.2907	3.8 **
AGEWSQ	−0.0027	−2.7 **
EDW	−0.1717	−6.0 **
MSD1 × TST	0.2315	3.7 **
MSD2 × AGEW	0.0628	3.6 **
MSD2 × HLP	0.2454	2.3 *
Constant	−2.8142	−2.0 *
F-value	37.5 **	
Adjusted R^2	60.0%	$^{**}P < 0.01$
df	146	$^{*}P < 0.05$

Single women:

NOC = −2.8142 + 0.2907 AGEW − 0.1717 EDW − 0.0027 AGEWSQ

Married women:

NOC = −2.8142 + 0.2907 AGEW − 0.1717 EDW − 0.0027 AGEWSQ + 0.2315 TST

Common-law wives:

NOC = −2.8142 + 0.3535 AGEW − 0.1717 EDW − 0.0027 AGEWSQ + 0.2454 HLP.

The age variables have the expected theoretical signs, both being significant at the 1% level. The positive sign shows that older women have greater parities (number of children already born); but there is a peak in the life cycle; this is captured by the negative AGEWSQ term.

The most significant factor is wife's education. This variable, EDW, a proxy for her future income streams and a measure of her opportunity cost of time, illustrates a significant substitution effect between numbers of children and other commodities as her time price rises. There is no link between wife's education and the marital status variables (i.e. no interaction variable) which implies that all women, in spite of their marital status, respond to opportunity costs, substituting away from the time-intensive 'quantity of children' commodity. This is useful policy-wise because increased expenditure on education is expected to reduce population growth rates significantly with increases in the human capital resource base as an intrinsic result.

The effects of the interaction variables are best illustrated by referring to the equations below Table 3 which describe the different marital status groups. The interaction variables were formed by multiplying MSD1 and MSD2 by other predictor variables so that a slope effect could be included. The first equation reveals the importance of opportunity cost to single women regarding their family size desires. Single women, usually sole supporters of their children, are more sensitive to opportunity cost than other marital status groups because often employment is their only source of income.

The second equation introduces a positive taste interaction variable which reflects that the wife's response probably includes her husband's preferences. Because the association is highly significant, it is evident that women's tastes change as circumstances change. Marriage offers a more secure environment both economically and socially, so tastes become significant.

Table 3 reports that the interaction variable (MSD2 × HLP), was positive and significant at the 5% level, indicating that common law status and child benefits are jointly related to family size. The third equation describing these circumstances shows that children are desired and used as economic agents. As mentioned previously, the rural area of Ubombo has higher proportions of couples in these unions, therefore child help may be expected to be of greater importance here because subsistence agriculture and chores such as collecting water and firewood are more labour-intensive than those in urban areas.

The interaction variable (MSD2 × AGEW) was positive and significant at the 1% level, implying that the positive effect of living together reflects itself through the wife's age variable. By differentiating NOC with respect to

AGEW and setting the equation equal to zero it is possible to compare the peak ages between the three classes. Married and single women both peak at 53.8 years whereas common law wives peak at 65.5 years. Since the latter unions are more common in rural areas it shows that women are using children as productive assets and as investments as their social circumstances become more uncertain. By comparing equations (1) and (3), single mothers with little security depend upon their ability to support the family; whilst women living with boyfriends are more secure in a sense but have no future guarantee of stability, so they invest in children as a safeguard against future economic and social risk.

From this analysis it is obvious that the income effect of women's earnings was outweighed by the substitution effect brought about by opportunity cost of time. Husband's educational levels (income) did not have a significant influence on family size; their influence was felt, however, through the taste interaction variable. Women's education reports the extent to which the substitution effect outweighs the income effect and suggests that investment in good quality formal education would have significant negative effects on population growth rates in traditional areas by inducing a change in tastes as time becomes costly with better job opportunities. Another important issue is the evidence of children being used as productive assets and an investment source, particularly in the less educated strata, and with women in semi-permanent marriage arrangements. Policy makers should consider providing alternative investment options and time saving devices in rural areas, especially providing more support for pensioners and the unemployed.

RESULTS FROM PRINCIPAL COMPONENTS ANALYSIS

Principal components analysis was conducted on all variables presented with results in Table 4. Three factors were extracted accounting for 53.8% of total variance.

Substitution effect

Component 1 confirms the substitution effect. Table 4 reports that variables associated with a high opportunity cost of time are strongly weighted in the first component. It follows that women with higher educational qualifications (EDW), professional status jobs (OCCW1), and with more years of employment experience (EMPW) would have high incomes (WINC), and opportunity costs. Therefore quality would be substituted for quantity shown by the positive weightings for current child costs (TCOST), child education proxies (EDCD and DEDC), a higher standard of living (STAT) (a

TABLE 4

Results of principal component analysis

Variable description	Variable name	Substitution effect	Income effect	Investment in children
Education: wife (year)	EDW	0.835	−0.045	−0.023
Skilled wife [a]	OCCW1	0.810	−0.070	0.212
Wife's income (R)	WINC	0.733	0.378	0.135
Status index [b]	STAT	0.702	0.363	−0.121
Total child cost (R)	TCOST	0.676	0.090	−0.124
Child education [1]	EDCD	0.643	0.058	0.193
Optimal child education (year)	DEDC	0.600	0.031	0.013
Number of children	NOC	−0.612	0.440	0.432
Child help index [b]	HLP	−0.475	0.174	0.334
Husband's income (R)	INC	0.429	0.175	−0.399
Married women [a]	MSD1	−0.032	0.810	−0.069
Education: husband (year)	EDH	0.314	0.705	−0.188
Wife's age (year)	AGEW	−0.371	0.699	0.296
Employment: wife (year)	EMPW	0.462	0.507	0.198
Contraceptive use [a]	CU	0.440	−0.351	0.610
Space children [a]	R14	0.497	−0.247	0.499
Child: Family earnings	CFAM	−0.359	0.272	0.137
Tastes for children	TST	−0.330	0.221	0.039
Eigenvalue		5.527	2.755	1.396
Percent variance		0.7	15.3	7.8
Cumulative percent variance		30.7	46.0	53.8

[a] All these are dummy variables scoring one if the description concerning them is true.
[b] Index functions were formed by principal components.

component distinguishing between low and high-status families), and a high negative coefficient for number of children. The dummies, CU and R14, representing contraceptive use and the desire to space children with modern methods, respectively, indicate that parents are behaving rationally and consistently. Eigen values and percentage of variance accounted for report that statistically this component is the most important rationalisation of family size.

INCOME EFFECT

The second component orthogonal to the first exposes another aspect of theory, the income effect. This component is dominated by MSD1, EDH, AGEW, EMPW, WINC, NOC and STATUS which are all positively related. This implies that with married couples in particular increases in parents' income or their potential earnings are associated with increased expenditure on

normal goods including children and status commodities. The estimate for husband's current income INC, although positive, is not highly weighted because it was computed as a residual of total earnings less woman's and child's earnings and as such is not a true reflection of his income. In many cases husbands were migrant workers, remitting a proportion of their income to their wives, and this, together with any welfare payments from extended family members are included in INC.

Investment in children

Component 3 supports the child investment theory as variables associated with child benefits, eg. HLP and CFAM, are positively associated with quantity of children. The positive link between contraceptive use and these variables may reflect that women are using it to space children to reduce the perceived risk of infant death, and possibly to their own health. The relationship is not a major cause of high fertility. Lack of education and the consequent lack of work opportunity means children are women's best investment for future welfare.

As family planning plays an important role in population reduction policies a discriminant analysis was used to statistically discriminate users from non-users of contraception. The sample was split by a dummy, CU (contraceptive use), into 61 user and 67 non-user cases. A full description of the analysis is given by Fairlamb (1990). The most important discriminating variables included the dummies, R14 (representing women using contraception for child spacing), and NKID (those women not wanting more children), and the variables WINC and EDCD, respectively. Results show that women are using fertility regulation to space their children to improve their chances of survival. Because fertility regulation was more prevalent in the educated strata, family planning efforts could be more effective if benefits of contraception for child spacing were advertised. Other reasons for regulation supported the opportunity cost of time theory where women's current income (WINC) and child's education (EDCD) show the trade off between quantity and quality of children.

DISCUSSION AND CONCLUSIONS

Results, support the underlying assumptions of the Chicago model. Regression and multivariate analyses indicate mothers are responding to economic and social constraints by adjusting fertility to opportunity cost and social benefits (of children). Changing these constraints to ones more conducive to small family size will affect parents' desires for children and

facilitate fertility decline. Results show that numbers of children are substitutes for both quality of children and status goods, which implies that increasing income earning potential provides policy makers a tool for manipulating parents' tastes. Judging from the analyses, education appears to be the most useful and likely option. Increases in both quantity and quality of education in the traditional sector should significantly reduce population growth rates through increasing women's opportunity costs which become expensive if there are better employment options. It is important to train these people to develop marketable skills so they may be employed in the trades and professions where there is increasing demand, and to provide employment for those entering the job market.

However, a shorter-term policy may be to legislate and provide for compulsory schooling for children. This will have two major effects on family economics. The first will be to raise the direct costs of children through fees and equipment, and the second will be to make more demands on women's time, thus further increasing her opportunity costs. In rural areas especially, child's and mother's time are substitutes. The third regression equation showed that mothers tended to invest in children as a labour source so that their time was freed. Compulsory schooling would absorb children's time and therefore reduce the supply of child labour, causing a shift to child labour substitutes. Another way of achieving this effect is to provide time saving services to women in rural areas. Electricity and water facilities would significantly reduce the demand for child labour in rural areas, and better pensions would reduce demand for children as investment options.

Family planning also plays an important role in population reduction policies. Discriminant analysis results showed that information on the benefits of modern contraception for child spacing would be a more acceptable way of extending its use. However reducing demand for children is more appropriate than promoting contraception because the latter's market will only expand if there is a demand for it.

Therefore the policy options are clear. Increases in both quantity and quality of education is a prerequisite for reducing family size desires and population growth rates. The strategy should be combined with investments in job creation, provision of services, improved pension schemes and advertising campaigns on the advantages of modern contraception.

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