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HOUSEHOLD FERTILITY DECISION-MAKING
IN NIGERIA *

by

Ghazi M. Farooq

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1. Introduction*

This study, based on a national household Fertility, Family and Family Planning (FFFP) Survey, 1971-73, is an attempt at providing an understanding of household reproductive behaviour in a traditional black African society which is currently undergoing rapid social and economic transformation. Nigeria shares a typical demographic feature of sub-Saharan Africa (Adegbole 1977) in that both fertility and mortality levels are high. The crude birth rate is estimated to be slightly in excess of 50 per thousand population, one of the highest national fertility rates in the world (Ekanem and Farooq 1977). However, a preliminary bivariate analysis of the present data in an earlier paper showed that the South-Western Nigerian households are not engaged in what one may claim is uncontrolled reproduction behaviour. They do have a conception of desired family size and do desire and practice fertility limitation (Farooq, Ekanem and Ojelade 1977). The present study goes an important step further in that, through an extensive use of multivariate regression analysis, it estimates a model of the socio-economic and cultural determinants of fertility and attempts to delineate the different fertility concepts relevant to a traditional African society.

The postulated relationship as well as the analytical framework used in the present study differ in some respects from a pure utility maximisation approach. Conceptually, an African household fertility behaviour model must be different from a conventional Western model because of the unique socio-cultural and biological factors operating there. In fact the reproduction experience of many households may be more a function of supply factors rather than of demand ones. The changes associated with the social and economic development process may also produce different fertility behaviour from that conventionally expected in the light of experience elsewhere. First of its kind in the growing Nigerian fertility literature, the present study, it is hoped, will contribute to improving the analytical framework for fertility analyses in West Africa.

* The author wishes to acknowledge the assistance of Eric Jensen in the preparation of the paper and the helpful comments and suggestions provided by Richard Anker, Gerry Rodgers, M.T.R. Sarma and George Simmons on an earlier draft.

The rest of the paper is organised as follows: Section II briefly describes the survey and types of information collected. Different fertility indices are discussed, especially as they relate to demand and supply aspects of reproduction in the context of Nigeria. Section III outlines the important theoretical elements and the postulated relationships between fertility and various exogenous variables. Section IV deals with the empirics of the relationships outlined in Section III. The final section presents the major findings of the study and their policy implications, and the likely future trend of fertility.

II. Data and Fertility Concepts

A. The survey

The national FFFP Survey was carried out by the Institute of Population and Manpower Studies, the University of Ife with the aid of a grant from the Population Council during 1971-75 period. The survey was conducted in three phases. The data used in the present study pertain to information collected during July-August 1971 for 3,013 sample households under the Western Phase, which covered the four states of South-Western Nigeria.^{1,2} The estimated fertility behavioural equations for Eastern Nigeria (given for comparison purposes in Appendix A) are based on the data collected under Eastern Phase, 1972-73, for 1,725 sample households in the three Eastern states.

¹ For details of this survey, including the questionnaire, sampling design, errors and biases, see Acsadi, et al. (1972, Chapters 5-9). Among the three surveys phases covering respectively the South-Western, Eastern and Northern regions (field work carried out in this order), the one for South-Western Nigeria generated by far the most reliable information. This was largely due to the geographical proximity of the survey project headquarters (the University of Ife) to the survey area and to the absence of language or ethnic barriers. Control over the field work was also comparatively better. Only South-Western Nigeria was, therefore, selected for the detailed study. Also, among the three regions the Southwest is the most homogenous with respect to ethnic affiliation (Ekanem 1972, Chapter 4).

² Covering the area south west of the river Niger, South-Western Nigeria includes the four former states of Lagos, Western (further sub-divided in April 1976 into Ogun, Ondo and Oyo states), Kwara and Midwest. It contains approximately 30 per cent of the country's population and is the land of the Yorubas - one of the three major tribes. In fact, the Yoruba tribe is among the largest tribes in Africa south of the Sahara.

The purpose of the FFFP Survey was "to obtain reliable information on demographic, social and economic traits of Nigeria's people, and, most especially, upon their fertility behaviour and prospects for its change" (Acsadi et al. 1972, p. 156). This was the first comprehensive demographic survey for the country.¹ Essentially a fertility survey, it concentrated on household fertility behaviour and attitudes. For the purpose of the survey, there had to be at least one eligible woman, defined as currently married and below age 50, and one eligible man, defined as husband of the eligible woman (or women), in a household for it to be included in the enumeration. Three separate types of schedules were administered for each sample household, namely one household questionnaire, a male questionnaire for every eligible male respondent, and a female questionnaire for every eligible female respondent. The female questionnaire provides the main source of information for the present analysis since besides the fertility and pregnancy history of women it contained the crucial questions on desired family size, ideal family size, and family planning; it also provided more details on social and economic variables than did the household or male questionnaires. Unfortunately, the female questionnaire was not completed for about one-quarter of the eligible women. Quite frequently in polygynous households, only one or at most two women provided information. Hence, the detailed analyses of realised fertility-children ever born alive per eligible women (CEB) - and family size preferences are limited to the sample of 3,400 wives from 3,013 sample households who completed the female questionnaire. The number of actual observations for statistical analysis is about 3,000 after exclusion of missing or erroneous data.

For the analysis of realised fertility it was possible to obtain information from the household questionnaire on CEB, number of deceased children, sex of children and a variety of socio-economic variables (the array of exogenous variables though being considerably shorter than that from the female questionnaire). Hence, an analysis of CEB is also carried out for the complete sample of about 4,400 wives, including many of the polygamously

¹ For limitations of the national censuses and of the earlier demographic surveys see Ekanem and Farooq (1977), and references therein.

married women who did not complete the female questionnaire but for whom fertility information was available from the household questionnaire.

Besides the above limitations, some important variables, as pointed out in Section III, were also excluded from the inquiry. The pregnancy history was found to be incomplete for many women and, therefore, was not useable. Despite the extra care taken, there might have been some under-reporting of deceased children and hence CEB, particularly among older illiterate women.¹ Specific data limitations and errors as they affect the present study framework or results are pointed out where appropriate in Sections III and IV. It should, however, be mentioned that by and large the quality of data was found to be quite reasonable and that the survey does afford information for a fairly comprehensive analysis of the more important socio-cultural and economic determinants of household decision-making regarding fertility.

B. Measurement of fertility as the dependent variable

In measuring fertility as the dependent variable, the Nigerian survey allows the use of two concepts, the first relating to actual or realised fertility behaviour, and the second, to family size preferences. Indices of actual fertility behaviour are computed from the reproductive histories of wives - the measure used here is the number of live births or CEB. One possible measure of family size preference is derived from the woman's or couple's response concerning ideal family size. However, eligible women were also asked a question on "additional children wanted". This then provides an alternate measure of family size preference - adding the number of additional children wanted to the number of existing children (i.e. surviving births) gives an index of 'desired family size'. The advantages and disadvantages of CEB, ideal family size or desired family size, as the dependent variable for the present analysis are discussed below.

It can be easily visualised that although a couple, at any given time, may have some idea on the number of children it would

¹ The details of errors and biases in the survey data are contained in earlier publications (Acsadi et al. 1972; Ekanem and Farooq 1977).

like to have, this number itself can change with the actual fertility experience, i.e., the number of pregnancies, birth parity order, relationships of parents with existing siblings and so on. In this sense, as also argued by Namboodiri (1972, pp. 194-9), the concept of ideal family size used in many fertility household surveys may not be providing an accurate measure of the number of children a couple may wish to have.¹ This applies equally to the present study. In the Nigerian survey, the question on ideal family size was put to eligible women as follows:

"I would like to ask more generally:
What do you think is the ideal (generally desirable)
number of children for a woman in this area to have?"

The response to such a question could very well apply to some hypothetical ideal family, which may not necessarily share the respondent family's social, economic, cultural and demographic milieu.

Most economic analyses of fertility behaviour take an index of actual fertility behaviour - number of live births - as the dependent variable.² In the case of Nigeria, it may be argued that the number of live births may be more a measure of supply than demand for children. Given that medical, health and other such social amenities are relatively scarce, the incidences of sterility and sub-fecundity, and pregnancy wastages are claimed to be quite high; also the infant and child mortality level is high (Ekanem and Farooq 1977). Customs such as post-natal sexual abstinence, which may last over long periods of breast feeding (average of two to three years in the Yoruba society), are said still to persist. Hence, if the high-fertility attitude of the society is continuing, many couples would be striving to produce as many children as possible. If true, an appropriate measure of family size preference may better approximate the demand for children and, therefore, may have more meaningful implications for policy consideration.

In any case, preferences concerning family size could be

¹ See also Laing (1970), Hauser (1973) and Simmons et al. (1978, pp. 141-53).

² For references on this see Schultz (1973).

conceived as influencing actual fertility experience and vice versa. Namboodiri, among others, makes a strong case for the determinants of family size preferences to be inter-related with those of the actual fertility behaviour and that "a study of one, therefore, cannot be completely divorced from that of the other" (1972, pp. 195-6).¹ Actual household fertility experience in Nigeria was observed to be consistent with family size preferences (Farooq, Ekanem and Ojelade 1977). In the present study fertility behavioural equations are estimated using two measures, namely CEB and desired family size. The latter, as defined above, appears to be, a priori, a more appropriate family size preference variable than ideal family size.² It takes into account the actual fertility experience which could safely be assumed as influencing the household's preferences regarding additional children; and, above all, this measure reflects the respondent family's social and economic characteristics.

It is important to point out that typically in an African survey, questions on perceptions of family size elicit a large non-numerical response, almost entirely couched as 'up to God'.³ The present survey fared comparatively better in that about three-fifths of the eligible women gave quantitative answers to the question on number of additional children wanted. Desired family size equations are estimated in two different ways: (a) excluding eligible women whose response was up to God, and (b) including these

¹ He reasons that the use of family size preference as a dependent variable in the economic analysis of fertility is consistent with the view that a knowledge of the determinants of individual preference systems is necessary to understand consumer behaviour.

² Rodgers (1976), in a study of Thailand, also found that 'desired additional children' was measured more accurately than ideal family size.

³ In an earlier study, it was suggested that such a response is not necessarily due to the lack of understanding. "A large proportion of non-numerical response is a way of avoiding direct confrontation with an issue that is believed to be beyond the respondent's control. Expressing opinions about the future in terms of number of additional children desired may also be considered premature, especially given the high incidence of miscarriage and infant mortality" (Farooq and Adekun 1976).

women by assigning to additional children wanted a fixed numerical value equal to the average top 10 per cent figure obtained from those with numerical responses in urban and rural areas, separately. The second measure in essence assumes that most of these women prefer large families (that is, as many children as God will provide).

III. Theoretical Considerations for Explanatory Variables and their Specification

As pointed out in the introduction section, the Nigerian society differs sufficiently in various aspects from a typical Western one, so that an application of the usual economic behavioural model for explaining the fertility decision-making phenomenon in Nigeria might very well be misleading. This does not mean that economic factors are not important or that the use of theoretical economic constructs is to be completely ruled out. What seems to be needed is a more integrated economic/sociological framework which would allow for consideration of all relevant factors be they economic, cultural, psychological, biological and so on. This section outlines a model of fertility determination in terms of the exogenous factors expected to be important, their measurement and expected relationships with fertility behaviour and among themselves. These are grouped as socio-economic, cultural, mortality, biological and life cycle, and family planning factors. Variables relevant to only actual fertility behaviour (or family size preference) are so identified. There is also a discussion under appropriate headings of the important missing variables.

A. Socio-economic factors

The choice of variables here largely emanates from the economic theory of fertility decision-making which associates reproductive behaviour with the parent's socio-economic characteristics. This theory is well expounded in the literature.¹ Briefly, children are desired because of their construed benefits - under utility maximisation framework these are referred to as "consumption utility", "income utility", and "status and security utility" of

¹ See supplement to the Journal of Political Economy (1973); Schultz (1974); and Leibenstein (1974).

children - with the choice of actual number of children being dependent, on the one hand, on the resource base the household has for the support of bearing and rearing of children, and, on the other hand, on the costs of children including direct costs and opportunity costs as related to potential income of wife foregone which otherwise would have been realised from her participation (or fuller participation) in economic activity.¹ Below is a discussion of socio-economic factors which are considered to be relevant in the context of the Nigerian society.

1. Income and relative economic status

Holding tastes and all other factors constant, higher-income households are expected to have a larger demand for children than the low-income households (Simon 1974). On the supply side also, ceteris paribus, relatively higher income levels could be expected to contribute positively to the natural fertility level. In the survey, information on current annual income was collected for both husband and wife (but not for other members of the household). Wife's income was, however, found to be highly correlated with her education attainment level and her economic activity status but was less accurately reported.² Therefore, regression equations containing income of wife variable are not reported. Anyway, as discussed below, wife's education level may be a good proxy for wife's income and 'permanent' income. Husband's current income is sometimes assumed to be a proxy for 'permanent income', which is theoretically a more correct variable (children involve relatively long-term expenditure commitments, which then should be related to long-term income prospects). As a more appropriate measure of permanent income, 'quality' of husband's labour activity

¹ Opportunity value of a person's time expended in non-market activities is equal to the market wage that he would earn from his labour-market activities (Becker 1965).

² Income was among the least accurately reported variables in the survey (Acsadi et al. 1972, p. 200). Only in case of urban husbands, was income measurement found to be sufficiently reasonable for it to be included in the present analysis.

is also used (that is whether he was reported to be engaged in a formal economic activity or in an informal economic activity). It can be readily seen that long-term income potentials of a man employed in the formal economic sector could be expected to be larger than if he were employed in the informal economic sector. Husband's education status is also sometimes used as a measure of permanent income. Unfortunately, the coding and data files' construction was such that the survey information on this variable could not be exploited. Hence, relevant income variables used in this study are husband's current income and type of his economic activity.

Also two different questions were asked in the survey on the wife's perception of her household's standard of living. The questions were:

- (i) "Would you say that your present level of living is adequate for the things an average family needs, or worse than that?"

This provides a measure of 'peer comparative economic status'.

- (ii) "Do you think your present standard of living is better or worse than it was in the past or just the same?"

This provides a measure of 'time comparative economic status'.

These subjective measures of the household's relative economic status, like the income variable, are expected to be positively related with fertility behaviour (Freedman 1964). This is true, of course, if the larger resources 'quality' effect on children (i.e. resources spent on improving the quality of children) does not dominate the 'quantity' effect (i.e. resources spent on having additional children).

2. Education

In a developing society like Nigeria, education of wife could be expected to be one of the most important environmental factors shaping the household fertility decision-making and behaviour. Operating as a composite variable,¹ education has negative as well

¹ Education usually emerges as a strong index of socio-economic status, modernisation and development level, and attitudinal changes in fertility differential studies (Farooq and Tuncer 1974; Holsinger and Kasarda 1976; Graff 1979 and references therein).

as positive effects on the fertility level and family size preferences. On balance, the negative effects may be stronger than the positive effects.

Negative effects of education on fertility work largely through the influence of education on tastes and aspirations for material well-being,¹ and on the opportunity cost of children - increasing education could be expected to improve not only the employability of the wife by opening up various alternate avenues of employment, but her income level in her sector of employment as well. Wife's education also may serve as a proxy for children's education (women with higher education likely desire higher education for their children). If true, more education for children means a larger price effect and a lower income utility since their entry into the labour market is inadvertently delayed. In the case of actual fertility experience, the negative effect of woman's education is also likely to be accentuated by the positive correlation between education level and approval of family limitation, knowledge and effective practice of contraception.

Positive effects of education on fertility work through an income effect and, in case of Nigeria, also through the influence educational attainment has in weakening the otherwise widely held practice of lactation taboos, any relaxation of which will help shorten the post partum sexual abstinence period. Education, as in case of the income variable, also contributes to raising the natural fertility level through its influence on nutrition, personal hygiene and health which may help reduce incidences of sterility and pregnancy wastages.

In situations where desired family size exceeds the actual number of children the couples can produce, any increase in natural fertility will result in increasing the actual fertility level. The hypothesis advanced here is that up to a certain level, x , increases in the education attainment level would be related to an increase in fertility, but after that level, the negative effects of education begin to over-compensate for the positive ones.

¹ Traditional cultural values and norms are also likely to change with increasing education. Caldwell associates extent of imported "Westernisation" and imported values with education (1977, p. 9).

This hypothesis, which is referred to as 'threshold hypothesis', for the purpose of this paper, is tested by using four binary education variables (see Table 1 - variable dictionary).

3. Women work participation

Wife's labour force activity is a more direct measure of opportunity cost of children than is education per se. However, in a society like Nigeria, such an opportunity cost of children may largely be compromised on two accounts. First, given the strong familial ties and importance of tribal links, the joint or extended family system is a very common feature of the Nigerian society.¹ Under the extended family system, there is available a ready and relatively cheap provision of baby and child care, which allows for an easy substitution of the woman's role in home and market economic activity. Second, if a woman is engaged in farming or retail trading activity (as is the case for the majority of working wives - 55 per cent in urban areas and 77 per cent in rural), these activities are observed to be not very incompatible with her reproductive (and home) activity. On balance such labour activity, by contributing to family's financial resources, may also have a positive effect on fertility which may overcompensate for the substitution effect of work participation.

Such might not be the case if a woman is engaged in a formal economic activity and is reported to be in occupational categories such as "Professional, administrative and clerical workers", "Other sales workers" or "Craftsmen, production process, transport and service workers". However, there may be a high correlation between education level and reported occupation. As mentioned before, education may serve as a proxy for labour quality and, especially in the urban setting, higher education means more of the labour market being accessible to a woman, particularly job opportunities in the formal sector. As an alternative to the five occupational groupings, the following binary variables are used to measure the wife's work participation effect: (a) not in labour force, (b) labour force participation in formal sector, and (c) labour force

¹ The concept of "nuclear" family may be more or less irrelevant (Caldwell 1977, pp. 10-12).

participation in informal sector. (One of the three categories is treated as excluded depending on the stipulated relationships in a given equation). Relationship of the first and third variables with fertility behaviour is a priori indeterminate but in case of the second, it is expected to be negative.

4. Important variables not available for analysis

Two important micro variables not accounted for in the present analysis are children's education and the household's migration status. Children's schooling is a measure of child quality in the sense that a trade-off 'à la Becker' exists between quantity and quality of child services produced. Child education level may also be a rough measure of school expenses and hence child cost. However, such effects may be picked up by woman's educational level.

Among the various kinds of migration, the rural-urban migration phenomenon may be most important for influencing the fertility behaviour of the migrant households through structural and attitudinal changes, changes in income, opportunity cost of children and the like. Over-all net effects of migration-related factors on fertility behaviour are probably negative in the long run but over the short and medium terms the direction of relationship is not clear (Stark 1978). In any case, the growth of rural-urban migration flows in Nigeria is of a relatively recent origin. At the time of the survey, the quantum of rural-urban migration was probably not very pronounced.

Additionally, the importance of children wages and employment factors as they influence the household fertility decision in developing countries cannot be underestimated. Unfortunately most surveys like the present one do not collect much useable information on these parameters.

Given the lack of secondary data, no information was available on community level variables such as mortality, school enrollment rates, land availability and agricultural productivity, income distribution and the like. Such variables, approximating the community environment for the household, have obvious implications for any demographic decision-making problem of the household. Non-inclusion of the relevant macro variables should, therefore, be taken as a major limitation of the present study.

B. Cultural factors

1. Practice of polygyny

Polygyny is very widely practised in the Nigerian society.¹ The survey reported that about two-fifths of eligible women in urban areas and three-fifths in rural areas were in polygynous marriages (see Table.1). Based on the results of the earlier study (Farooq, Ekanem and Ojelade 1977), the relationship between polygyny and realised fertility (CEB) is expected to be negative partly due to polygynous wives being comparatively more subjected to coitus-fertility restricting customs and practices than monogamous wives and partly because they also tend to have a larger incidence of sub-fecundity.² The relationship between polygyny and family size preference is, however, expected to be positive as more children may be seen by polygynous wives as emotional and status-security safeguards.

It is pertinent to point out that a typical polygynous household set-up is such that the fertility decision-making may be more wife-specific than joint husband-wife. In many instances, the wife may have largely to bear the brunt of the child cost - this factor is perhaps partly responsible for the high female labour force participation observed for this society. However, husbands placed in the upper socio-economic echelons, having either single or multiple wives, are likely to be contributing to the household budget for child bearing and rearing.

2. Religion

South-Western Nigeria is a plural religion society with 32 per cent of respondents being Muslim, 55 per cent Christian, and the rest, Pagan. Caldwell (1968, p. 618) has observed that Muslims in Tropical Africa tend to both desire and attain larger number of children than the other religious groups. This hypothesis is tested in the present study.

3. Sex preferences

Among more traditional societies, a preference for boys over

¹ For marriage practices in Nigeria see Morgan (1975, pp. 199-206). It is interesting to mention that polygyny is prevalent among all religious groups.

² See also Olusanya (1971).

girls is usually observed. The Nigerian survey provides information on the sex distribution of CEB. In order to test the significance of sex preference on fertility behaviour, three binary variables were used, viz. (i) excess of male CEB or female CEB i.e., excess of either sex, (ii) excess of male CEB, and (iii) excess of female CEB. Only the third variable was found to be significant implying that when a couple had more female children than male it attempted to produce more births to have male off-spring.¹ It should be mentioned that theoretically, sex distribution of surviving children and not of children ever born is perhaps a more appropriate variable. Unfortunately, information on sex of deceased children was not available.

Besides the above factors, there are also coitus-related customs, which will be discussed under the biological factors.

C. Mortality factor

In both demographic and economic studies, a positive relationship between infant-child mortality and fertility is emphasised. This is based essentially on the premise that the higher the infant and child mortality, the larger will be the number of live births necessary for obtaining the desired number of surviving children. Hence, from the survey data, if child survival rate is estimated as 1 minus (deceased children/CEB), the number of live births needed to produce x surviving children equals x times the reciprocal of the child survival rate. The reciprocal of the child survival rate is, therefore, included in the CEB function. This is a rough measure of "safety factor" or "replacement factor".^{2,3}

¹ This does not imply, however, that the couple will try to balance the number of sons and daughters.

² For details see Schultz (1969); Harman (1970); and Snyder (1974).

³ Apparently in both Harman and Snyder studies, replacement factor was not defined for cases where no live birth survived. Exclusion of these cases (if true) from the sample, introduced according to Williams (1977), a serious bias in the estimated coefficient. In the present study, for 100 per cent child mortality cases the value of the observation is taken as equivalent of CEB (or deceased children). However, there were very few such cases in the sample.

D. Biological and life cycle factors

It is important to account for biological factors in fertility analyses as they regulate the human reproduction process and determine fecundity, and hence the potential supply of births or the natural fertility level. Factors discussed above are largely behavioural and modify the extent to which natural fertility is realised. Biological factors could also be expected to be affected by behavioural factors.¹

In the Nigerian case, social customs regarding breast feeding and marital sexual abstinence partly determine the biological fertility maxima. Traditionally, the duration of breast feeding is about thirty months. During this period sexual relations are considered to be harmful to the health of the child (Olusanya 1971).² Even if the coitus-controlling tradition were not strictly adhered to, breast feeding, by reducing female fecundity (since the time between a birth and resumption of menstruation depends, at least to some extent, on duration and intensity of breast feeding), influences child spacing and most probably the total number of live births as well.³ The breast feeding effect could largely be composed of two components - the first relating to its effect on amenorrhea (usually referred to as lactation amenorrhea), and the second relating to a continuation of the lactation taboo after menstruation starts. Since a direct question on duration of amenorrhea pertaining to the last birth was included in the survey, it is possible to test for the relevance of the two effects by using (a) duration of amenorrhea, and (b) duration of breast feeding minus duration of amenorrhea variables. Among the Yoruba wives, there is also said to be a high frequency of terminal sexual abstinence, in many cases before the onset of menopause, because "the family system could not stand the emotional stress of her having parallel maternal and grandmaternal responsibilities and obligations" and "for personal reasons such as being too old

¹ For a full exposition on biological factors and their importance see the paradigm-setting studies by Easterlin (1978), and Davis and Blake (1956).

² Traditionally, the period of abstinence is upto three years and exceeds that of amenorrhea and lactation (Orubuloye 1979).

³ For a review article on the fertility reducing effect of prolonged breast feeding see Van Ginneken (1974).

now for the worry of raising more children" (Caldwell 1977, pp. 9 and 14).¹

The post-partum sterility effect is approximated by use of a breast feeding variable. A quadratic age variable is introduced to measure the terminal sexual abstinence effect as well as that portion of sterility and sub-fecundity which may result from increasing age.² It could readily be visualised that actual fertility experience is a convex increasing function of age - CEB increasing with age but the change in the slope of the age co-efficient being negative. Both age and quadratic in age are, therefore, included in CEB equations.³

For the functional specification of CEB, it may be important to account for the household's stage in the life cycle. So, besides the wife's age, her age at first marriage is included as a relevant life cycle variable, though it should be noted that age at marriage, to some extent at least, is a decision variable itself as it might be influenced by such factors as female education and labour force participation. The wife's age minus her age at marriage gives the duration of marriage (in the present case, within the fecund age limit) and if some estimate of average birth interval were to be available, other factors being constant, the approximate number of births could be obtained (i.e., dividing duration of marriage in years by average birth interval). Hence, whereas age of wife has a positive effect on CEB, age at marriage has a negative effect. Age at marriage also may serve as the relevant proxy for the woman's age at first birth.

Age factors are included in the desired family size equations also as age of wife may have an important bearing upon the number of additional children wanted. The number of living children in the index of desired family size would, of course, be partly

¹ For details see Caldwell and Caldwell (1977).

² A direct question was asked concerning sterility but the quality of response was found to be not satisfactory.

³ Age being associated with birth cohort effects also "may capture time variant determinants of fertility" (Schultz 1974, p. 7).

dependent upon the age factor. Also, with increasing age the tendency of rationalising existing number of children as the desired number usually becomes marked.

E. Family planning factors

From the theoretical point of view, if, for a given couple, the biological reproduction maximum is greater than the number of children it wants based on socio-economic environmental factors, then some contraceptive practice has to be adopted by the couple to control the supply of children. In the Nigerian survey, more than one-half of the urban eligible women and more than one-third of the rural ones approved of family limitation practices to 'have just the number of children that they want, and have them when they want them'. Most respondents had a knowledge of traditional methods such as abstinence, breast feeding and rhythm, but only slightly more than one-tenth were aware of modern methods. More than one-half of the respondents had actually practised fertility control, mainly abstinence - less than 5 per cent had ever used a modern method (Adeokun and Ilori 1976).

Three separate family variables planning will be used in the present analysis, namely attitude towards, knowledge of, and practice of family planning. The attitude variable is a proxy for the demand for family planning, with knowledge and practice measuring the extent to which conscious family limitation is practised. It is obvious that the three variables are inter-correlated and hence the estimated parameters need to be interpreted with caution. All three variables usually are expected to be negatively related to actual fertility behaviour. But in situations such as the present one where many households might not be able to realise the desired number of children and where the typical desired family size is large, the question of fertility limitation may arise only when a sufficient number of live births have been obtained and the family planning variables may very well be positively related to CEB. Therefore, a priori, the causality is indeterminate.

IV. Empirical Results

Table 1 provides the dictionary of variables for which information was available from the household questionnaire. Although,

TABLE 1. DICTIONARY OF VARIABLES USED IN ESTIMATION OF ACTUAL FERTILITY BEHAVIOURAL EQUATIONS USING COMPLETE SAMPLE OF ELIGIBLE WOMEN¹ BASED ON INFORMATION FROM HOUSEHOLD QUESTIONNAIRE (Tables 3, 5, A-1 and A-2)

Variables (1)	Definition notes (2)	South-Western Nigeria			
		Urban		Rural	
		Mean (3)	S.D. ² (4)	Mean (5)	S.D. ² (6)
I. <u>Endogenous Dependent</u>					
CEB	Number of children born alive	3.03	2.23	3.45	2.66
II. <u>Exogenous Independent</u>					
EDW1	1 if wife has some formal education (1 to 5 standards), 0 if otherwise	0.13	0.34	0.07	0.25
EDW2	1 if wife has completed primary schooling (6-9 standards), 0 if otherwise	0.18	0.38	0.10	0.30
EDW3	1 if wife has completed secondary schooling (10-12 standards), 0 if otherwise	0.09	0.29	0.02	0.15
EDW4	1 if wife has higher education (13+ standard), 0 if otherwise	0.03	0.18	0.02	0.13
NOACTIVE	1 if wife is not in labour force, 0 if in labour force	0.23	0.42	0.20	0.40
LFORMAL	1 if wife is engaged in a formal activity, 0 if otherwise	0.26	0.44	0.12	0.32
HUSBNDI	Total income of husband during the 12-month period preceding survey (in '00£, 1£=2 Naira)	3.04	2.37	-	-
POLYGMOS	1 if wife reported to be in polygynous marriage, 0 if monogamous	0.40	0.50	0.58	0.49
EXCESSF	1 if female CEB greater than male CEB, 0 if otherwise	0.31	0.46	0.30	0.46
MORT	Inverse of child survival rate	1.14	0.68	1.20	0.89
AGE	Age of wife in years	28.47	6.92	29.84	7.83
AGESQ	Age ²	858.25	431.17	951.42	498.65

¹ Currently married women age 15 to 49 years.

² Standard deviation.

as mentioned in Section II, the scope of this data set is limited in that fewer exogenous variables are covered, the sample size of eligible women obtained is much larger than the one based on the female questionnaire. In the estimation of actual fertility behavioural equations (Tables 3 and 5), this sample probably reflects more truly the population in the sense that the coverage of wives in polygynous marriages is more complete. Table 2 presents a description of the variables calculated from a comparatively smaller sample of eligible women for whom complete information was available from the female questionnaire. This data provides the empirical base for approximating fully specified CEB equations (Tables 4 and 6) and desired family size equations (Tables 7 and 8). The means and standard deviations of each variable used in the urban and rural equations are also shown in Tables 1 and 2.

Fertility equations are calculated separately for urban and rural areas. As shown in Tables 1 and 2, the mean and standard deviation values for various variables are quite different between urban and rural samples. This is especially true for education, wives' and husbands' engagement in formal economic activity, incidence of polygyny, proportion Muslim, breast feeding, approval of family limitation and knowledge of modern contraceptive methods. Also as discussed in the preceding section, some exogenous variables may behave altogether differently in the urban environment than they do in the rural one and the intensity/significance of the effects of others may vary. Urban and rural results are discussed separately.

Before we turn to the discussion of empirical results, it needs to be pointed out that the regressions in Tables 3-8 are estimated by the method of ordinary least squares. Since some exogenous variables (e.g. female work participation, age at marriage and family planning) might themselves be affected by some of the included independent and/or dependent variables, i.e. they being endogenous variables in the real sense, interpretation of the results requires a cautionary note as estimates of the parameters may have a 'simultaneity bias'. However, in dealing with societies such as Nigeria where complex cultural patterns and traditional values may still prevail and for which not much

TABLE 2. DICTIONARY OF VARIABLES USED IN ESTIMATION OF ACTUAL FERTILITY AND DESIRED FAMILY SIZE EQUATIONS USING PARTIAL SAMPLE CONSISTING OF ONLY THE ELIGIBLE WOMEN WHO COMPLETED FEMALE QUESTIONNAIRE (Tables 4, 6-8)

Variables (1)	Definitional Notes (2)	South-Western Nigeria			
		Urban		Rural	
		Mean (3)	S.D. (4)	Mean (5)	S.D. (6)
I. <u>Endogenous Dependent</u>					
CEB		3.21	2.21	4.23	2.45
DFS1 ^a	Surviving children + additional children wanted	7.62	2.70	8.99	3.11
DFS2 ^b	Same as above	6.59	2.66	7.52	3.26
II. <u>Exogenous Independent</u>					
EDW1	-	0.14	0.35	0.06	0.24
EDW2	-	0.20	0.40	0.11	0.31
EDW3	-	0.10	0.30	0.03	0.17
EDW4	-	0.04	0.20	0.02	0.14
NOACTIVE	-	0.22	0.41	0.19	0.39
LINFORML	1 if wife is engaged in an informal labour activity, 0 if otherwise	0.49	0.50	0.68	0.47
LFORMAL	-	0.28	0.45	0.13	0.33
LFORMALH	1 if husband is engaged in a formal economic activity, 0 if otherwise	0.59	0.49	0.30	0.46
HUSBNDI	-	3.20	2.46	-	-
POLYGMOS	-	0.29	0.45	0.51	0.50
EXCESSF	-	0.32	0.47	0.34	0.47
MORT	-	1.26	0.61	1.42	0.88
AGE	-	29.15	6.64	31.08	7.72
AGESQ	-	893.58	424.09	1025.44	508.74
AGEMARGE	Wife's age at first marriage	18.86	3.70	17.62	3.92

Cont'd

Table 2. (cont'd)

Variables (1)	Definitional Notes (2)	South-Western Nigeria			
		Urban		Rural	
		Mean (3)	S.D. (4)	Mean (5)	S.D. (6)
PEERSTD	1 if level of living better from that of an average family, 0 if otherwise	0.18	0.38	0.22	0.42
MUSLIM	1 if wife Muslim, 0 if otherwise	0.37	0.48	0.29	0.47
BRSTFEED	1 if breastfed last child 2 years or more, 0 if less than 2 years	0.23	0.42	0.36	0.48
FPAPROVE	1 if wife approves family limitation, 0 if otherwise	0.46	0.50	0.34	0.47
FPKNOWMD	1 if wife knows one or more modern methods of contraception, 0 if otherwise	0.25	0.43	0.11	0.31
EVERUSE	1 if wife ever practised contraception, including abstinence, 0 if otherwise	0.80	0.40	0.71	0.45

- As defined in Table 1.

^aIncluding women with response 'Up to God' (see Subsection II B).

^bExcluding women with response 'Up to God'.

empirical quantitative evidence is available on how fertility and various other decisions are made by a typical household, and how these decisions interact with each other, it may be reasonable to identify determinants of fertility in a single equation model rather than study fertility as part of an incorrectly specified simultaneous-equation framework. Also, the present survey data does not afford empirical specification of a full model. As may be clear from the discussion in Section III a conscious effort is made to at least minimise the multi-collinearity problem.

A. Actual fertility behaviour

1. Urban results

Results from the regression of CEB on different sets of exogenous variables are given in Table 3. Equation 1 refers to the total sample of eligible women and equations 2 to 4 pertain to three age cohorts of women. One main purpose of the age-specific equations is to pick up the interaction effects related to the wife's stage in the life cycle. By and large, the validity of the theoretical model outlined in Section III appears to be well borne out by the estimated regression coefficients.

Socio-economic factors are quite relevant; particularly husband's income and wife's education level are highly significant. The coefficient of .058 for HUSBNDI signifies that, ceteris paribus, if husband's income is higher by £1700, it has the equivalent effect of adding one extra live birth. Education binary variables appear to support the threshold hypothesis - fertility increases initially with education (although parameter estimates are not statistically significant for EDW1 and EDW2, particularly for EDW2) until the threshold level is obtained with completed primary education and then starts decreasing.¹

¹ A joint F-test for the set of four education binary variables shows it to be not significant at the 5 per cent level but the sub-set EDW3 and EDW4 is found significant at 5 per cent level. The corresponding joint F-statistics for education variables in the rural equations (Table 5) found them to be not very significant. These results, however, are not to be interpreted to mean that education is of a limited relevance to fertility behaviour. The sign/size of individual education parameters are quite consistent across age groups and rural/urban samples. The results obtained (Table 3-6) clearly confirm the non-linearity in the relationship between education and fertility. Statistically, t statistics are more relevant than the joint F-statistics.

TABLE 3. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG URBAN WOMEN IN SOUTH-WESTERN NIGERIA USING COMPLETE SAMPLE OF ELIGIBLE WOMEN^a BASED ON INFORMATION FROM THE HOUSEHOLD QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total (1)	Age groups		
		15-24 (2)	25-34 (3)	35-49 (4)
Constant	-4.917	-1.288	-3.527	-0.852
EDW1	0.195 (0.137)	0.028 (0.117)	0.029 (0.200)	0.959* (0.436)
EDW2	0.034 (0.127)	0.049 (0.103)	-0.083 (0.183)	0.513 (0.463)
EDW3	-0.234 (0.169)	0.048 (0.135)	-0.346 (0.228)	X
EDW4	-0.654* (0.265)	-0.409 ^b (0.274)	-0.925** ^b (0.329)	X
NOACTIVE ¹	0.109 (0.116)	-0.191* (0.098)	0.272 ⁺ (0.165)	0.126 (0.412)
LFORMAL ¹	-0.170 ⁺ (0.105)	-0.198* (0.101)	-0.183 (0.143)	-0.041 (0.326)
HUSBNDI	0.058** (0.019)	0.027 (0.019)	0.073* (0.027)	0.088 ⁺ (0.056)
POLYGMOS	-0.417** (0.095)	-0.063 (0.088)	-0.400** (0.134)	-0.918** (0.285)
EXCESSF	0.371** (0.095)	-0.014 (0.090)	0.366** (0.132)	0.714* (0.292)
MORT	1.117** (0.067)	1.333** (0.075)	1.387** (0.109)	0.842** (0.147)
AGE	0.303** (0.046)	0.076** (0.019)	0.177** (0.023)	0.112** (0.034)
AGESQ	-0.002** (0.001)	-	-	-
$\bar{R}^2$	.47	.51	.29	.17
F	105.08	40.41	26.17	6.82
Average CEB	3.03	1.47	3.14	4.93
No. of observations	1,399	420	676	303

¹ The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant at 5 per cent level in equation 1 and at one per cent level in equations 2 and 4.

The following notes also apply to Tables 4-8, A-1 and A-2:

For explanation of the notations used see Tables 1 and 2.

** Significant at one per cent level; * at 5 per cent; + at 10 per cent (two tail test).

$\bar{R}^2$ is R^2 adjusted for degrees of freedom.

^a Currently married women age 15 to 49 years.

^b Less than 30 cases.

^x Not reported as less than 12 cases.

The range of the education effect is wide indeed compared with the excluded group of uneducated women - the regression coefficients decline in a systematic manner from 0.19 for EDW1 to - 0.65 for EDW4. So women with higher education will have, on the average, two-thirds of a live birth less than uneducated women and almost one less than women with little education.

Over-all, the female work participation does not appear to have much of an effect on CEB except when the wife is engaged in the formal sector (LFORMAL is, however, significant only at 10 per cent level). Although LFORMAL is positively correlated with education, the multi-collinearity problem may not be very serious (the first-order correlation coefficient between LFORMAL and EDW4 is 0.19).¹ The trade-off between participation in formal economic activity and child bearing/rearing is clearly revealed only in the youngest age group (equation 2). Another important observation is that whereas the impact of non-work participation on CEB is, as expected, positive in the 25-34 age sample (equation 3), it is negative and significant in the case of the 15-24 sample. An explanation is not difficult to find. Since NOACTIVE co-efficient can alternatively be interpreted as largely measuring the influence of wife's labour engagement in traditional activities, the hypotheses advanced in Section III of a positive fertility effect of wife's labour engagement operating through an improving of the household budget constraint, and of traditional economic activities not being overtly incompatible with child rearing appear to be relevant for the young-wife households. It is pertinent to note that the joint F-statistics for NOACTIVE and LFORMAL show that, except for the age group 35-49, these labour force participation variables taken together are significant at 5 per cent level for the total sample and at one the per cent level for age groups 15-24 and 25-34.

CEB regression equations including different occupational categories revealed a positive relationship between fertility and the reporting of woman in "Farmers, fishmen, etc." occupation

¹Female education may be collinear to a limited extent with HUSBNDI (first-order correlation coefficients between HUSBNDI and EDW3 and EDW4 are 0.17 and 0.19, respectively). It is interesting to report that regression parameters for EDW3 and EDW4, in absolute size, decrease when LFORMAL and NOACTIVE are introduced to the equation but they increase again closer to their previous levels when HUSBNDI variable is added. EDW1 and EDW2 remain more or less stable.

in both urban and rural areas. The regression coefficient for "Petty traders" occupation was negative in both urban and rural samples, but the coefficients were small and not significant. Woman's labour activity in the "Professional, administrative and clerical workers", "Other sales workers" or "Craftsmen, production process, transport and service workers" occupations had a negative impact on CEB. These results are not reported because as mentioned before, of a high correlation between education level and reported occupation.

Turning to cultural variables, both POLYGMOS and EXCESSF come out with expected signs and are significant at the one per cent level. This shows the relevance of cultural factors in a traditional society and indirectly reflects the inadequacy of applying the usual pure home economics fertility models (which were developed in the context of advanced societies) to developing countries. On the average, a wife in the polygynous union will have more than two-fifths of a live birth less than a monogamous wife. Male sex preference is strong with more than one-third of a live birth extra produced in cases where female children are more numerous than male. Since this variable is a life cycle variable one would expect that the sex imbalance among children produced would display a markedly increasing influence on births with the age of woman. Hence, where as for wives in 15-24 age group, no relationship is observed, the parameter estimate of EXCESSF is 0.37 for 25-34 group and almost doubles to 0.71 for the 35-49 group - this last age group signifies the final reproductive stage in household's life cycle during which a completed family size is being obtained.

After AGE, MORT adds the most to the over-all explanatory power of the equation (in terms of R^2) and it explains about 11 per cent of the total variance in CEB. Caution is advised in interpretation of MORT variable. Since MORT is constructed with CEB, and thus correlated with the error term, the coefficient estimate is a biased one.¹ There appears to be a tendency among

¹ See also Williams (1977).

couples to replace deceased children with additional births. The replacement effect seems strongest for the first two age groups - lower MORT value for 35-49 sample (about 40 per cent lower than that for the 25-34 group) implies that these women are less able to achieve the replacement. Elasticity of CEB with respect to MORT calculated at the sample mean for 15-24, 25-34 and 35-49 age groups is 0.83, 0.65 and 0.25, respectively. Reasons for the elasticity value being below unity are that some replacement might still have to be effected in the future and, more importantly, that MORT includes both infant and child deaths (in case of older age group, adolescent ones also). This elasticity value would be much larger if only infant mortality were considered as it is relatively easier to replace infant deaths (and there may also be a greater motivation for doing so).¹ This would be particularly so in the Nigerian cultural situation as sexual relations normally resume immediately if an infant dies (the time interval for a subsequent birth is generally shortened as compared to the situation of previous birth surviving).

The coefficient estimates for AGE and AGESQ are consistent with the a priori expectations. It may be interesting to mention that for a micro data set, R^2 of 0.47 for equation 1 in Table 3 is on the high side and signifies that the equation is statistically a good fit. However, this is largely due to the inclusion of the non-behavioural variable, age, which largely measures the physiological and the terminal sexual abstinence effects. In this equation, when re-estimated excluding the two age variables, the variance explained by socio-economic factors is increased to 4.5 per cent from 1 per cent, and that explained by cultural factors to 2.3 per cent from 1.1 with the value of $\bar{R}^2$ being 0.28.

A comparison among the three age equations reveals some important variations. Whereas the set of socio-economic variables emerge as quite significant for the younger age cohorts of 15-24 and 25-34 years, such is not the case for the older cohort, 35-49. Only EDW1 and HUSBNDI appear to be somewhat relevant for the latter group. This seems to be consistent with the relatively recent

¹ See also Harman (1970, pp. 33-37).

onset of the socio-economic transition phenomenon in the society. Note also the dominating effect of cultural factors on the CEB of 35-49 age group - an influence absent in the case of the 15-24 cohort. As far as the coefficients of cultural factors are concerned, there is a distinct and clear-cut upward trend with age. All in all, the fertility decision model appears to apply best in the middle age group. This should not be surprising since the early ages reproductive experience may depend, to some extent at least, upon factors such as age at marriage and biological maxima, and the factors that influence child spacing. Fertility equation for older ages, on the other hand, includes certain explanatory variables which may or may not have the same values as held during the actual reproductive experience; also the recall error is likely to be more serious than among younger ages (this may be partly responsible for the large estimated coefficient for EDWL, positive and significant, as the reporting of retrospective fertility by educated women might have been more complete than by uneducated women).¹ Hence, from both sides 25-34 age cohort equations represent a better approximation of the fertility behaviour model except that fertility is incomplete for this age group.

Table 4 presents CEB equations based on the sample of women with completed female questionnaire. If, along with the decrease in sample size (from 1399 to 773 wives), there were also significant sample variations, parameter estimates would be different. Equation 1 including exactly the same variables as equation 1 in Table 3 is designed to test this. Socio-economic variables behave more or less in the same way except that the regression coefficient for NOACTIVE becomes more substantial (though being significant only at 10 per cent level). But there are substantial declines in POLYGMOS, EXCESSF and MORT coefficients. POLYGMOS parameter decrease in absolute size to one-third (from -0.42 to -0.14) which may be a direct result of exclusion of a large number of polygamously married women from the sample. It remains altogether insignificant when other variables are added to equation 1 - see equation 2. This variable, however, remains important for the older age group 35-49 (equation 5). EXCESSF becomes insignificant for the total sample as well for all age groups.

¹ The R^2 and F values obtained are also comparatively very low signifying that the equation is rather weak.

TABLE 4.

ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG URBAN WOMEN IN SOUTH-WESTERN NIGERIA USING PARTIAL SAMPLE CONSISTING OF ONLY THE ELIGIBLE WOMEN^a WHO COMPLETED FEMALE QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total		Age groups		
	(1) ¹	(2)	15-24 (3)	25-34 (4)	35-49 (5)
Constant	-6.568	-5.739	-1.505	-1.279	2.779
EDW1	0.186 (0.153)	0.202 (0.173)	0.257 (0.183)	0.116 (0.230)	0.297 ^b (0.512)
EDW2	0.058 (0.139)	0.073 (0.160)	0.192 (0.156)	0.056 (0.212)	-0.196 ^b (0.531)
EDW3	-0.247 (0.189)	-0.292 (0.215)	-	-	-
EDW4	-0.644* (0.287)	-0.432 ⁺ (0.310)	-	-	-
EDW3+4 ²	-	-	-0.105 (0.211)	-0.299 (0.246)	X
NOACTIVE ³	0.206 ⁺ (0.128)	0.300* (0.142)	0.116 (0.142)	0.264 (0.182)	0.782 (0.512)
LFORMAL ³	-0.155 (0.126)	0.011 (0.134)	-0.026 (0.160)	-0.009 (0.167)	0.185 (0.395)
HUSBNDI	0.072** (0.023)	0.043 ⁺ (0.025)	0.045 (0.032)	0.037 (0.030)	0.073 (0.076)
POLYGMOS	-0.138 (0.115)	-0.151 (0.124)	0.019 (0.151)	0.053 (0.159)	-0.601* (0.344)
EXCESSF	0.243* (0.109)	0.168 (0.114)	-0.099 (0.126)	0.200 (0.145)	0.411 (0.352)
MORT	0.892** (0.081)	0.523** (0.092)	0.832** (0.156)	0.589** (0.139)	0.495** (0.187)
AGE	0.410** (0.054)	0.557** (0.062)	0.201** (0.034)	0.265** (0.027)	0.082* (0.040)
AGESQ	-0.004** (0.001)	-0.006** (0.001)	-	-	-
AGEMARGE	-	-0.150** (0.015)	-0.139** (0.025)	-0.184** (0.020)	-0.078* (0.037)
PEERSTD	-	0.259 ⁺ (0.140)	0.080 (0.153)	0.091 (0.173)	1.029 ⁺ (0.533)

Cont'd

Table 4. (Cont'd)

Explanatory variable	(1)	(2)	(3)	(4)	(5)
MUSLIM	-	-0.160 (0.125)	-0.027 (0.141)	-0.170 (0.161)	-0.210 (0.363)
BRSTFEED	-	-0.237 ⁺ (0.140)	0.216 (0.184)	-0.547** (0.182)	-0.178 (0.366)
FPAPROVE	-	0.235* (0.111)	0.084 (0.123)	0.093 (0.141)	0.669* (0.344)
FPKNOWMD	-	-0.011 (0.130)	0.098 (0.133)	0.022 (0.165)	-0.201 (0.442)
EVERUSE	-	-0.060 (0.149)	0.248 (0.160)	-0.044 (0.196)	-0.344 (0.449)
R ²	.49	.51	.37	.36	.11
F	82.91	43.57	7.27	14.57	2.22
Average CEB	3.21	3.53	1.84	3.45	5.46
No. of observation	1,021	773.	183	414	176

¹ Same specification as equation 1 in Table 3.

² EDW3+4 is equal to EDW3 plus EDW4.

³ The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant only in equations 1 and 2 at 10 per cent level.

For other notes see Table 3.

Equation 2 gives the results for a more fully specified model along the lines of the theoretical framework developed in Section III. A comparison of equation 2 with equation 1 shows that parameters are altered to a varying extent with inclusion of additional variables. This is also true for rural equations (Tables 5 and 6). Addition of relevant variables like age at marriage, comparative economic status and the duration of breast feeding affects the size of coefficients as well as the significance level of high education, female work status, EXCESSF and MORT variables. AGEMARGE, as expected, displays a negative and significant impact on CEB for all age groups. Since AGEMARGE may be approximating the wife's age at first birth, its computed effect emerges as more substantial for the younger age groups than for the 35-49 group. Estimated coefficient of -0.184 means that, ceteris paribus, a delay in marriage of five to six years has the equivalent effect of one less live birth in the 25-34 sample. This effect (especially in the case of 15-24 age group) is less than one might have expected and could be partly due to underestimation of the age at marriage and adolescent sterility. It is important to mention that in the present case, including the age at marriage variable does not seem to cause a serious simultaneity bias referred to earlier. If anything, its exclusion from the regression equations may bias the estimators due to the statistical problem of omitted variables.¹

¹ This was tested by re-estimating equations (2) in Tables 4 and 6 with AGEMARGE omitted. Comparison of the urban equation with the original one in Table 4 shows it to be statistically much weaker with lower R^2 (0.45 versus 0.51) and F values (36.2 versus 43.6), and, perhaps more seriously, it generated larger standard error for every regression parameter. Most coefficients remained stable in size. The only coefficients affected substantially by the exclusion of AGEMARGE were those of EDW3 and EDW4 (coefficients increasing in absolute size to -0.63 and 0.83 from -0.29 and -0.43, respectively), and age variables (AGE and AGESQ coefficients decreased in absolute size to 0.46 and -0.004 from 0.56 and -0.006, respectively); the intercept value is altered to -6.98 from -5.74. Note also that first-order correlation coefficients between AGEMARGE and EDW3, EDW4, AGE and AGESQ (0.15, 0.16, 0.12 and 0.13, respectively) are not very high. The estimated parameters in rural CEB equation 2, Table 6, are effected even less than in the urban case when AGEMARGE is excluded from the regression calculations. Only EDW2, EDW3 and EDW4 coefficients and intercept value changed with all increasing in absolute size. As in the urban case, standard errors for all parameters increased, and R^2 and F values decreased substantially signifying a weaker statistical equation than the original one including the age at marriage variable.

The subjective variable "peer comparative economic status" emerges significant for the total sample, adding further to the relevance of socio-economic factors in the fertility decision problem.¹ Although, positive in all three age groups, PEERSTD is significant only for the 35-49 group, where ceteris paribus a respondent who considers the family's level of living being better than the average level has produced slightly more than one extra live birth.² The causality in case of this age group could also be reverse i.e., wife feels she is better off because she has more children.

An unexpected relationship is observed between the practice of Islam and fertility - the impact of being Muslim is negative though not significant. More discussion of this variable follows in the subsequent sub-section.

The hypothesis about breast feeding is confirmed. This variable appears to be pertinent to the relatively most fecund age group of 25-34 years - a wife breast feeding the last child for two years or more³ would have, on the average, above one-half live birth less than the women not adhering to the social custom of prolonged breast feeding. Splitting of the breast feeding effect into amenorrhea and lactation taboo yielded correct signs for the two co-efficients but did not improve the equation specification. This might be due to data problems as many women

¹ Among other economic status variables, "time comparative economic status" could not be used as almost all the respondents claimed that their present level of living was better than it was in the past, and LFORMALH was observed to be not important (regression results not included here).

² Along with PEERSTD another comparative economic status binary was used to measure the effect of respondent considering the family level of living being same as that of an average family. This variable proved to be redundant as the estimated coefficient size was very small (-0.045) and the standard error value too high (0.121). This was also the case in the rural sample.

³ It is probably safe to assume that a woman with multiple number of children if breastfed her last child for a relatively long period would have done so for her preceding children as well. Hence, the variable used here may be a good proxy for the life-time practice of prolonged breast feeding.

either did not respond to the question on amenorrhea or gave erroneous information in that the duration of amenorrhea reported was too long (or too short) to be biologically possible.

Finally, as regards to the family planning variables only the attitudinal variable is significant. FPAPROVE displays a positive influence, and its impact is substantial (significance level close to 5 per cent) in the older age group. This result is not surprising as in a society characterised by high-fertility norms, consideration for family limitation would arise only when the couple has achieved a sufficient number of children.¹

As a very brief summary of the above results, it can be stated that the urban reproduction experience is not completely determined by biological and cultural factors. It is systematically related to demand specific socio-economic environmental factors. So whereas the practice of polygyny, excess of female over male children, age, age at marriage and prolonged breast feeding customs are important factors influencing CEB, wife's education attainment level and her work status, husband's income and to some extent peer comparative economic status also exert significant effects. Infant-child mortality factor, which measures the total replacement effect consisting of biological and behavioural components, also comes out important though the replacement of children who die is far from complete. Basically similar results were obtained for Eastern Nigeria (see Appendix A).

2. Rural results

Table 5 gives regression equations for the rural sample corresponding to the ones for urban in Table 3. As in the urban case, parameter estimates for education binaries show the non-linear effects of education attainment. In fact, the positive

¹ Family planning variables although do not add much to the fertility explanation but do improve fertility functional specification. Equation 2 in Table 4 (and in Table 6) re-estimated excluding the family planning variables depicts slight decreases in the intercept value and coefficient sizes for EDW3, EXCESSF and POLYGMOS and slight increases in absolute sizes of coefficients for EDW4, BRSTFEED and PEERSTD. On balance, standard errors become worse and $\bar{R}^2$ decreases slightly. More or less the same pattern was observed for the rural sample.

TABLE 5. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG RURAL WOMEN IN SOUTH-WESTERN NIGERIA USING COMPLETE SAMPLE OF ELIGIBLE WOMEN^a BASED ON INFORMATION FROM THE HOUSEHOLD QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total (1)	Age groups		
		15-24 (2)	25-34 (3)	35-49 (4)
Constant	-4.085	-1.125	-4.052	-0.775
EDW1	0.299 ⁺ (0.165)	-0.108 (0.158)	0.516* (0.246)	0.894 ⁺ (0.480)
EDW2	0.067 (0.141)	0.075 (0.125)	0.210 (0.207)	0.128 (0.550)
EDW3	-0.588* (0.270)	-	-	-
EDW4	-0.527 ⁺ (0.316)	-	-	-
EDW3+4	-	-0.280 ^b (0.209)	-0.407 (0.270)	-0.686 ^b (1.304)
NOACTIVE ¹	-0.108 (0.107)	-0.184 ⁺ (0.110)	0.001 (0.153)	-0.171 (0.294)
LFORMAL ¹	-0.010 (0.116)	0.088 (0.126)	-0.209 (0.166)	-0.189 (0.333)
POLYGMOS	-0.226** (0.084)	0.130 (0.098)	-0.192 ⁺ (0.118)	-0.619** (0.210)
EXCESSF	0.404** (0.089)	-0.014 (0.112)	0.307* (0.122)	0.753** (0.217)
MORT	1.151** (0.049)	1.401** (0.079)	1.130** (0.071)	1.042** (0.097)
AGE	0.262** (0.039)	0.067** (0.021)	0.215** (0.022)	0.118** (0.025)
AGESQ	-0.002** (0.001)	-	-	-
$\bar{R}^2$	.47	.43	.30	.22
F	185.20	50.03	49.11	21.87
Average CEB	3.45	1.48	3.43	5.25
No. of observations	2,270	586	1,027	657

¹ The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant only in equation 2 at 10 per cent level.

For other notes see Tables 3 and 4.

impact of some formal education versus none as measured by EDW1 is much more substantial and significant than was observed for urban wives. The effect of EDW1 on the reproductive performance of wives in both 25-34 and 35-49 cohorts is considerable and significant which was not the case for the urban 25-34 age group. Though perhaps influenced by a comparatively better reporting of CEB by educated women than by the uneducated ones, the significance of EDW1 parameter may be at least to some extent real. If true, this education effect probably works largely through its contributing to an improved fecundity level and perhaps also its capturing the land holding effect. Non-statistical significance of high education (as well as LFORMAL) in the age-specific equations could partly be due to fewer observations on these variables - coefficient signs are negative as expected and coefficient sizes, large. Labour activity variable, NOACTIVE, as in the urban case, is relevant for young wives - their work participation (mostly farming) adds sufficiently to the household's resource base to produce, on average, an additional two-fifths of a live birth, other factors being constant. Perhaps women with children are even expected to work. The joint F-test on NOACTIVE and LFORMAL show these labour activity variables to be significant only for the 15-24 age group.

Cultural factors, particularly EXCESSF, show strong influences on reproduction - the impact becoming more pronounced and significant with age, as expected. MORT coefficients for the total sample and age groups 15-24 and 35-49 are larger than the urban ones reflecting the comparatively higher level of infant-child mortality in rural areas. However, the elasticity values of CEB with respect to MORT are not very different from the urban ones. Elasticity values are 0.82, 0.41 and 0.29 for age groups 15-24, 25-34 and 35-49, respectively.

A comparison of equation 1 in Table 6, which provides the estimated equations based on rural wives with completed female questionnaires, with the corresponding equation in Table 5 reveals an interesting result. Impact of education variables comes out to be more pronounced especially EDW1 and EDW3. Otherwise, results are similar to the urban ones in that coefficient estimates for POLYGMOS, EXCESSF and MORT decrease in magnitude and POLYGMOS

TABLE 6. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG RURAL WOMEN IN SOUTH-WESTERN NIGERIA USING PARTIAL SAMPLE CONSISTING OF ONLY THE ELIGIBLE WOMEN^a WHO COMPLETED FEMALE QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total		Age groups		
	(1) ¹	(2)	15-24 (3)	25-34 (4)	35-49 (5)
Constant	-5.448	-3.950	-0.741	-1.801	1.604
EDW1	0.316 ⁺ (0.186)	0.154 (0.228)	-0.087 ^b (0.239)	0.274 ^b (0.316)	0.051 ^b (0.575)
EDW2	-0.002 (0.060)	0.003 (0.020)	0.027 (0.185)	0.088 (0.247)	X
EDW3	-0.766** (0.288)	-0.326 (0.365)	-	-	-
EDW4	-0.627 ⁺ (0.349)	-0.579 ^b (0.393)	-	-	-
EDW3+4	-	-	X	-0.248 (0.323)	X
NOACTIVE ²	-0.021 (0.128)	0.117 (0.149)	-0.159 (0.169)	0.315 ⁺ (0.193)	0.088 (0.355)
LFORMAL ²	-0.103 (0.160)	0.031 (0.185)	0.086 ^b (0.211)	-0.215 (0.236)	0.227 ^b (0.435)
POLYGMOS	-0.134 (0.097)	-0.192 ⁺ (0.112)	0.190 (0.141)	-0.184 (0.142)	-0.429 (0.255)
EXCESSF	0.262* (0.103)	0.132 (0.116)	0.079 (0.145)	-0.107 (0.149)	0.478 ⁺ (0.262)
MORT	0.823** (0.057)	0.617** (0.065)	0.996** (0.116)	0.764** (0.088)	0.419** (0.121)
AGE	0.365** (0.047)	0.420** (0.059)	0.201** (0.038)	0.260** (0.026)	0.125** (0.031)
AGESQ	-0.003** (0.001)	-0.003** (0.001)	-	-	-
AGEMARGE	-	-0.124** (0.015)	-0.164** (0.025)	-0.149** (0.019)	-0.078** (0.030)
PEERSTD	-	-0.192 (0.136)	0.010 (0.174)	0.053 (0.169)	-0.604 ⁺ (0.323)
MUSLIM	-	-0.374** (0.127)	-0.353* (0.174)	-0.451** (0.165)	-0.399 (0.278)

Cont'd

Table 6. (cont'd)

Explanatory variable	(1)	(2)	(3)	(4)	(5)
BRSTFEED	-	0.092 (0.122)	0.061 (0.169)	-0.128 (0.161)	0.358 (0.266)
FPAPROVE	-	0.232* (0.118)	-0.050 (0.150)	0.078 (0.154)	0.618* (0.267)
FPKNOWMD	-	-0.124 (0.177)	0.001 ^b (0.215)	-0.206 (0.222)	-0.070 (0.432)
EVERUSE	-	0.131 (0.128)	0.219 (0.162)	0.065 (0.165)	0.086 (0.283)
R ²	.48	.48	.43	.35	.13
F	146.59	58.59	10.49	17.70	4.27
Average CEB	3.91	4.25	2.10	3.85	6.01
No. of observations	1,603	1,067	204	501	362

¹ Same specification as equation 1 in Table 5.

² The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant only in equations 3 and 4 at 10 per cent level.

For other notes see Tables 3 and 4.

becomes significant. However, in the fully specified CEB function (equation 2) POLYGMOS registers as a significant factor at 10 per cent level. In the age-specific equations, it is not significant, not even for the older age group which is contrary to the case in urban equation 5 (Table 4). On the other hand, male preference attitude remains as a significant factor for the 35-49 age group, which was not the case for urban wives.

AGEMARGE is significantly and negatively associated with CEB, although the effect, unlike in the urban case, is more substantial for the youngest age group than for the 25-34 group. This may partly be because of a comparatively younger average age at marriage in rural areas (17.6 years versus 18.9 - see Table 2). PEERSTD, relevant to only 35-49 age group, enters with an unexpected negative sign but is significant only at 10 per cent level. Over-all, the demand specific socio-economic variables appear to be not as important as in the case of the urban sample.

An important result is the one relating to the unexpected negative impact of MUSLIM on CEB. It is highly significant for the total sample and, unlike in the urban case, is important for 25-34 and 35-49 age groups. Hence, in context of the Nigerian society one can seriously question the otherwise widely held contention that the Muslim traditions are more associated with high fertility than are those of other religious groups. Also, there is no evidence of a conclusive negative or positive relationship between MUSLIM and desired family size (Table 8).

BRSTFEED displays a substantial but positive and significant impact on reproduction experience of the 35-49 age cohort. Given the history of comparatively backward (relative to the present situation) medical, health and social conditions, women in this cohort most probably have had high incidences of sterility, pregnancy wastage and sub-fecundity.¹ So, in fact BRSTFEED might really be measuring the fecundity effect.

Such results may bring out an element of justification for the proposition that actual fertility level for some segments of the

¹ In an earlier paper (Ekanem and Farooq 1977), it was observed that mortality level was higher in rural areas and pregnancy wastage quite high.

rural population may represent more a measure of supply than demand for children - the number of live births obtained being a function, to a large extent, of the natural fertility level as determined by biological or physiological factors and cultural practices. Also note that in terms of both $\bar{R}^2$ and F, the equation for 35-49 age group is weak as compared with the corresponding urban equation.

The family planning variables behave more or less in the same manner as in the case of urban wives - FPAPROVE is the only significant variable and is positively associated with the fertility level.

B. Family size preferences

As discussed in Section II, desired family size (DFS) is used as the relevant measure of family size preferences. Table 7 shows the estimated DFS equations for urban sample and Table 8, for rural. Equations 1 in the two tables pertain only to the sample of women who gave quantitative answers to the question on additional children wanted, whereas in the estimation of equations 2 to 5, women who gave the non-numerical response of 'up to God' are included. Comparisons of equation 1 with equation 2 in both Table 7 and Table 8 do not reveal substantial differences between the two samples and, if anything, explanatory powers of equations 2 are slightly better than those of the equations 1 (note $\bar{R}^2$ and F values). The discussion of results below, therefore, pertain to the sample including women with response 'up to God'.

For both urban and rural samples, female education level emerges among the more pervasive influences on DFS. All the education variables are significantly and negatively associated with DFS in all the ages (only exceptions are the rural 25-34 and 35-49 age equations, where EDW1 is found to be insignificant: in case of 35-49 age equation, however, this might be due to the limited number of observations). In the urban sample, compared to women with no education, women with some formal education prefer, on the average, one less child and women with higher education almost two fewer children - increasing education level has a consistently increasing negative impact on family size preference. The increasing trend is slightly more marked for rural wives with

TABLE 7. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF DESIRED FAMILY SIZE AMONG URBAN WOMEN IN SOUTH-WESTERN NIGERIA USING PARTIAL SAMPLE CONSISTING OF ONLY THE ELIGIBLE WOMEN^a WHO COMPLETED FEMALE QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total		Age groups (including 'up to God')		
	Excluding 'up to God'	Including 'up to God'	15-24	25-34	35-49
	(1)	(2)	(3)	(4)	(5)
Constant	4.404	1.253	6.278	7.728	16.834
EDW1	-1.027** (0.329)	-1.050** (0.264)	-0.669 ⁺ (0.397)	-1.388** (0.394)	-0.720 ^b (0.674)
EDW2	-1.208** (0.307)	-1.034** (0.244)	-0.855* (0.338)	-0.841* (0.372)	-1.862 ^{b**} (0.707)
EDW3	-1.318** (0.371)	-1.746** (0.320)	-	-	-
EDW4	-1.674** (0.546)	-1.939** (0.483)	-	-	-
EDW3+4	-	-	-1.265** (0.433)	-1.894** (0.405)	X
LINFORML	0.229 (0.220)	0.436* (0.174)	0.171 (0.266)	0.688** (0.253)	0.044 (0.461)
HUSBNDI	-0.119* (0.047)	-0.092* (0.038)	-0.146* (0.064)	-0.061 (0.053)	-0.040 (0.098)
LFORMALH	0.160 (0.241)	0.135 (0.189)	0.040 (0.286)	-0.066 (0.281)	0.360 (0.470)
PEERSTD	-0.013 (0.265)	-0.053 (0.219)	-0.027 (0.331)	-0.001 (0.304)	-0.396 ^b (0.693)
POLYGMOS	0.026 (0.250)	-0.051 (0.194)	0.355 (0.319)	-0.029 (0.282)	-0.712 (0.467)
MUSLIM	0.704** (0.248)	0.411* (0.190)	0.332 (0.290)	0.591* (0.280)	0.201 (0.482)
AGE	0.206 ⁺ (0.106)	0.447** (0.090)	0.065 (0.061)	0.012 (0.045)	-0.207** (0.054)
AGESQ	-0.003 ⁺ (0.002)	-0.007** (0.001)	-	-	-

Cont'd

Table 7. (Cont'd)

Explanatory variable	(1)	(2)	(3)	(4)	(5)
Joint F-statistics:					
EDW1 to EDW4	10.59 ^c	5.61 ^c	-	-	-
EDW1 to EDW3+4	-	-	6.85 ^c	12.66 ^c	4.99 ^c
R ²	.12	.14	.09	.14	.09
F	7.54	13.33	3.68	8.43	2.88
Average DFS	6.59	7.62	6.89	7.80	8.28
No. of observations	597	931	286	462	183

^cSignificant at one per cent level.

For other notes see Tables 3 and 4.

absolute size of coefficients increasing from -0.67 for EDW1 to a remarkable level of -2.75 for EDW3 and -2.28 for EDW4. It is pertinent to point out that the evidence of the substantial negative effect of EDW1 (and EDW2) on DFS (in both rural and urban samples) when compared with the evidence of positive association of this variable with actual reproductive experience seems to be confirming the contention that some formal education may lead to, inter alia, an increase in the natural fertility level.

The joint F-statistics for the set of education binary variables in Tables 7 and 8 show that education attainment is highly significant in influencing the attitudes of both urban and rural wives towards the desired number of children. Conceptually, the joint F-test on education variables is relevant here because the influence of education on DFS is associated largely to the changes in relative tastes and preferences that education may generate. Unlike in the case of CEB, the normal substitution effects of education on the number of children wanted are less likely to be impaired by the indirect positive effects of education operating through its influence on some intervening variables.¹

Wives' participation in the formal economic sector, LINFORML, has a significant and positive impact on DFS of urban wives and is relevant to the 25-34 age group.² This may be due to two factors, (a) child rearing activity not hampering female work participation; and perhaps more importantly (b) the children usually from quite young ages help their mothers in the family retail or petty trading concerns.

In the case of the rural sample, the impact of a husband being engaged in formal labour activity on DFS is negative and significant particularly in the 25-34 age group. It is interesting

¹ Education variables in the case of CEB equations were capturing also to a varying degree the associated changes in permanent income, female fecundity, observance of traditional sexual abstinence practices and the like.

² LFORMAL is not included in the equations as it is collinear with education attainment level and, the way it is constructed as a binary variable, it is highly collinear with LINFORML.

TABLE 8. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF DESIRED FAMILY SIZE AMONG RURAL WOMEN IN SOUTH-WESTERN NIGERIA USING PARTIAL SAMPLE CONSISTING OF ONLY THE ELIGIBLE WOMEN^a WHO COMPLETED FEMALE QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total		Age groups (including 'up to God')		
	Excluding "up to God" (1)	Including "up to God" (2)	15-24 (3)	25-34 (4)	35-49 (5)
Constant	4.834	3.185	7.708	6.007	13.762
EDW1	-0.768 ⁺ (0.475)	-0.669* (0.332)	-1.101* (0.450)	-0.248 (0.507)	-0.864 ^b (0.835)
EDW2	-0.756 ⁺ (0.391)	-1.030** (0.285)	-1.234** (0.363)	-0.834* (0.418)	X
EDW3	-2.215** (0.623)	-2.751** (0.502)	-	-	-
EDW4	-2.108** ^b (0.737)	-2.280** (0.566)	-	-	-
EDW3+4	-	-	-1.739** ^b (0.563)	-2.835** (0.529)	X
LINFORML	-0.424 (0.276)	-0.113 (0.187)	0.397 (0.280)	-0.127 (0.280)	-0.762 ⁺ (0.413)
LFORMALH	-0.684* (0.291)	-0.450* (0.201)	-0.271 (0.306)	-0.628* (0.297)	-0.302 (0.454)
PEERSTD	0.615* (0.307)	0.573** (0.206)	0.418 (0.339)	0.642* (0.296)	0.527 (0.458)
POLYGMOS	-0.008 (0.253)	-0.201 (0.168)	0.286 (0.274)	-0.157 (0.247)	-0.611 ⁺ (0.356)
MUSLIM	0.339 (0.283)	0.001 (0.185)	-0.246 (0.312)	0.044 (0.273)	0.021 (0.380)
AGE	0.256* (0.125)	0.392** (0.081)	0.032 (0.059)	0.132** (0.045)	-0.087* (0.043)
AGESQ	-0.005** (0.002)	-0.006** (0.001)	-	-	-
Joint F-statistics:					
EDW1 to EDW4	10.21 ^c	3.25 ^d	-	-	-
EDW1 to EDW3+4	-	-	5.75 ^c	9.76 ^c	0.58
R ²	.06	.08	.07	.09	.03
F	4.82	11.32	3.89	7.67	1.34
Average DFS	7.50	8.98	8.07	9.24	9.34
No. of observations	711	1,353	337	619	397

^c Significant at one per cent level.

^d Significant at 5 per cent level.

For other notes see Tables 3 and 4.

to observe also that rural wives belonging to this age cohort who consider their standard of living to be better than the average level have preference for larger family size, other factors being constant. LFORMALH and PEERSTD do not appear to be important in the urban behaviour.

There is no statistically significant negative or positive relationship between the wife being Muslim and DFS in the rural sample (Table 8). However, in the case of urban sample MUSLIM variable has a negative (though not significant) impact on CEB but a positive association with DFS (Table 7). Note that the relationship between MUSLIM and such factors as female education level, husband's income and female engagement in the formal labour activity is negative.¹ Hence, it can be argued that the positive relationship observed between MUSLIM and DFS is more likely due to the comparatively lower socio-economic status of Muslim households than to the religion per se.

Contrary to a priori expectations POLYGMOS factor does not exert much influence upon family size preferences. It is interesting to note, though, that for the 35-49 age group the relationship is negative for both urban and rural samples (significant only in the latter case). Most probably these women are rationalising their smaller number of children. This rationalisation hypothesis advanced in Section III appears to be verified by the AGE variable - AGE co-efficients for 35-49 age group are negative and significant (see equation 5 in Tables 7 and 8). For the sample as a whole, DFS increases with age but solving for AGE and AGESQ gives the inflection point (that is, where the change in the slope of the age function becomes negative) at age 32 for urban wives and 32.7 for rural.

V. Conclusion and Policy Implications

Based on the Western Phase data from the National Fertility, Family and Family Planning Survey, 1971, urban and rural actual fertility (CEB) and family size preference behavioural equations

¹ For the urban sample, first-order correlation coefficients between MUSLIM and EDW1, EDW2, EDW3, EDW4, HUSBNDI and LFORMAL are -0.18, -0.20, -0.14, -0.13, -0.29 and -0.7, respectively.

have been estimated for South-Western Nigeria. The theoretical framework of socio-economic and cultural determinants of reproductive behaviour outlined in Section III appears to have reasonable empirical validity as discussed in Section IV. Also the CEB regression results obtained for Eastern Nigeria (Appendix A), based on the Eastern Phase data, 1972-73, are found to be largely in conformity with those for the South-Western Region. Socio-economic factors are by and large relevant to household fertility decision-making in Nigeria. Below an attempt is made to bring out the relevance of different policy options to reproductive behaviour in light of the empirical results obtained by the present study.

Among the socio-economic factors, female education attainment level exerts the most pervasive influence on CEB as well as desired family size (DFS). Whereas the effect on DFS is conclusively negative for all the different levels of education attainment, the effect on CEB of some formal schooling (versus no education) is positive and particularly so among the rural women. This means that even a little education helps to reduce the otherwise large incidence of sterility, sub-fecundity, and social practice of marital sexual abstinence; improves permanent income, health, personal hygiene, nutrition, and the like - all of which result in improving the natural fertility level. Hence, in the case of households with DFS greater than living children, an increase in natural fertility level would be translated into a larger number of live births.

As to the likely future trend in fertility, it may be noted that an earlier study (Farooq, Ekanem and Ojelade 1977) showed that whereas most urban couples seem to be able to achieve the desired number of children, such was not the case for many rural couples. If true, with increasing socio-economic advancement the urban fertility could be expected to decline since DFS would be lowered. Conversely, in the short run at least, there is the possibility of rural fertility rising as the combined result of increasing education opportunities for women and concomitant effects on female fecundity, curtailment in the practice of polygyny (which was noted to be negatively associated with CEB) and continuation of male sex preference (which has positive influence upon CEB).

It is pertinent to add here that with the recently instituted free "Universal Primary Education" scheme, at least the lower education level will increase among the female population. However, given the strong negative impact of primary and lower educational attainment level on family size preferences, it is quite conceivable that a decrease in DFS may occur along with the increase in natural fertility. Hence, on balance there might be only a slight or no increase in rural fertility. In the medium and the long run, the rural fertility can be expected to follow the downward urban fertility trend.

Female secondary or higher education attainment level has not only a direct impact on fertility in that it displays a very large negative impact on DFS, but it also may exert important influences on the quality of female work participation (in terms of increasing female engagement in the formal labour market) and age at marriage (i.e., delaying marriage) which in turn have been observed to be influencing actual fertility behaviour. Hence, by all indications it seems that a wider role for female education (formal schooling as well as adult education programmes) has to be included in the complex of 'comprehensive population policies' that the policy makers might be interested in developing.

Female labour involvement in the traditional economic activities of farming and retail/petty trading exerts, if any, a positive influence on family size preference and actual fertility. Particularly during the 70's, there has been an increasing emphasis upon rapid industrial development (so much so that there is a general criticism that the agricultural sector is being ignored). If the national industrialisation and labour policies are designed to contain a well defined objective of improving the role of women in terms of better job opportunities for them in the formal labour market, future fertility behaviour is likely to be subjected to some important structural changes.

In recent years, there have been increasing federal budget allocations for expanding basic social welfare services in order to improve the national health standards. In both urban and rural areas, the emphasis is on providing safe drinking water, and medical and health services. The needs for maternal and child health care seem to be receiving their due recognition. These efforts could be expected to improve female fecundity and reduce pregnancy

wastages on the one hand and reduce the present high infant-child mortality, on the other. In fact, the survey found that three-fourths of the rural respondents and four-fifths of the urban ones already felt that children had better chances of surviving to adulthood "than when they were children". A decline in infant-child mortality level is likely to reduce the perceived extent of excess fertility required to ensure the desired number of children. Hence, along with female education and work status, medical and health services should also be included among the 'comprehensive' population policy variables.

Finally, it was observed that the attitude to family limitation was positive when the couples were able to beget the sufficient number of live births. Hence, as a corollary to improved natural fertility there would be an expanding scope for an active family planning/welfare policy aimed at improving information/knowledge of modern contraceptive methods, and a ready access to modern contraceptions and the necessary follow-up clinical services. Such services will be needed when along with the national socio-economic development process, the coitus-controlling customs are likely to become less stringent.

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Appendix A. Fertility Behavioural Equations, Eastern Nigeria, 1972-73

Table A-1 provides urban fertility equations for Eastern Nigeria based on the complete sample of eligible women (corresponding to the equations for South-Western Nigeria in Table 3). Compared to the results for South-Western Nigeria, the positive influences of EDW1 and EDW2 on CEB in Eastern Nigeria are much stronger and positive. The negative effect of the higher education attainment level appears significant only for the younger age group 15-24. These education coefficients, however, may have been affected by the exclusion of HUSBNDI (income questions were not included in the Eastern Phase Survey). LFORMAL, POLYGMOS and MORT behave the same as in the case of South-Western Nigeria but the parameters are substantially larger. EXCESSF, though having the right sign, is not significant.

However, given that the survey sample size for urban Eastern Nigeria was rather small (344 versus 1,399 for South-Western Nigeria), emphasis should be perhaps upon the general similarity observed between the two regions in fertility relationships rather than upon the differences in the sizes of regression coefficients.

Table A-2 shows rural fertility equations for Eastern Nigeria, based upon the complete rural sample of eligible women. The results are quite similar to the corresponding equations for rural South-Western Nigeria (Table 5) except for the education and labour force variables. Relationship of fertility with EDW1 is indeterminate and that with EDW2 negative and significant. Unlike the results in rural South-Western Nigeria, the effect on CEB of the wife not being in labour force is positive and significant. The joint F-statistics for NOACTIVE and LFORMAL show that taken together these factors are highly significant (at one per cent level), except for the age group 15-24. Note that such was not the case for rural South-Western Nigeria.

An interesting result emanating from Table A-2 is that EXCESSF behaves very much as it did for the South-Western Nigeria sample and, unlike the case of urban Eastern Nigeria, it exerts a positive and significant influence upon CEB.

TABLE A-1. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG URBAN WOMEN IN EASTERN NIGERIA USING COMPLETE SAMPLE OF ELIGIBLE WOMEN^a BASED ON INFORMATION FROM THE HOUSEHOLD QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total	Age groups		
		15-24	25-34	35-49
	(1)	(2)	(3)	(4)
Constant	-7.007	-3.147	-8.596	1.277
EDW1	0.887** (0.310)	-0.015 (0.315)	0.820 ⁺ (0.482)	1.916 ⁺ ^b (1.080)
EDW2	0.493 ⁺ (0.294)	-0.292 (0.295)	0.609 (0.457)	1.394 ^b (1.015)
EDW3	0.432 (0.417)	-	-	-
EDW4	-0.013 (0.519)	-	-	-
EDW3+4	-	-0.902** ^b (0.350)	X	X
NOACTIVE ¹	-0.237 (0.236)	-0.146 (0.232)	-0.440 (0.381)	0.092 ^b (0.844)
LFORMAL ¹	-0.897* (0.368)	0.060 ^b (0.361)	-1.708** (0.524)	-0.966 ^b (1.505)
POLYGMOS	-0.959** (0.290)	-0.089 ^b (0.293)	-0.933* (0.441)	-2.768** ^b (1.020)
EXCESSF	0.354 (0.227)	0.240 (0.222)	0.198 (0.352)	0.764 ^b (0.846)
MORT	1.323** (0.220)	1.119** (0.199)	1.815** (0.336)	2.126 ⁺ (1.265)
AGE	0.420** (0.102)	0.203** (0.043)	0.376** (0.065)	0.052 (0.105)
AGESQ	-0.003 ⁺ (0.002)	-	-	-
R ²	0.50	0.41	0.34	0.16
F	31.91	11.10	9.47	2.26
Average CEB	3.51	1.90	3.85	6.29
No. of observations	344	133	152	59

¹ The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant at 10 per cent level in equation 1 and at one per cent level in equation 3.

For other notes see Tables 3 and 4.

TABLE A-2. ESTIMATED REGRESSION EQUATIONS FOR THE DETERMINANTS OF ACTUAL FERTILITY (CEB) BEHAVIOUR AMONG RURAL WOMEN IN EASTERN NIGERIA USING COMPLETE SAMPLE OF ELIGIBLE WOMEN^a BASED ON INFORMATION FROM THE HOUSEHOLD QUESTIONNAIRE (standard errors in brackets)

Explanatory variable	Total (1)	Age groups		
		15-24 (2)	25-34 (3)	35-49 (4)
Constant	-8.542	-3.998	-4.635	3.192
EDW1	0.001 (0.173)	-0.044 (0.174)	-0.334 (0.268)	0.647 (0.463)
EDW2	-0.393* (0.183)	-0.321 ⁺ (0.179)	-0.208 (0.265)	-0.440 ^b (0.681)
EDW3	-0.564 (0.552)	-	-	-
EDW4	-0.767 (0.558)	-	-	-
EDW3+4		-0.741 ⁺ ^b (0.418)	-0.275 ^b (0.691)	X
NOACTIVE ¹	0.533** (0.125)	-0.008 (0.151)	0.530** (0.190)	0.922** (0.273)
LFORMAL ¹	0.154 (0.411)	-0.477 ^b (0.343)	0.032 (0.644)	X
POLYGMOS	-0.722** (0.117)	-0.234 (0.154)	-0.742** (0.174)	-0.996** (0.246)
EXCESSF	0.399** (0.117)	0.006 (0.153)	0.506** (0.171)	0.552* (0.259)
MORT	1.068** (0.079)	1.362** (0.120)	1.221** (0.129)	0.899** (0.140)
AGE	0.606** (0.051)	0.239** (0.027)	0.269** (0.031)	0.047 (0.030)
AGESQ	-0.007** (0.001)	-	-	-
$\bar{R}^2$	0.42	0.42	0.20	0.12
F	112.57	33.02	23.57	8.50
Average CEB	4.54	2.04	4.64	6.39
No. of observations	1703	406	797	500

¹ The joint F-statistics calculated for NOACTIVE and LFORMAL show them to be significant at one per cent level in equations 1, 3 and 4.

For other notes see Tables 3 and 4.