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NIGERIA'S POPULATION POLICY AND FUTURE FERTILITY DECLINE

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Abstract

The government of the Federal Republic of Nigeria, Africa's most populous country, promulgated its first explicit population policy in 1988, in response to the soaring population growth rate that impedes developmental efforts. The policy document has stipulated a number of quantitative demographic targets. Paramount among these is the intention to reduce total fertility rate (TFR) to 4, raise the use of family planning methods to 80 per cent, and raise mean age at first marriage to 18 years, by the year 2000. However, a macrosimulation analysis of changes in the proximate determinants of fertility as enshrined in the policy document reveals that Nigeria's TFR will fall from about 6 to 2 instead of 4, which is far beyond the government's expectations. It is, therefore, needful to revisit the demographic targets of the population policy of Nigeria.

Key Words: Nigeria, Population policy, macrosimulation, fertility, proximate determinants.

Introduction

An important distinguishing feature between the developed and developing countries is that fertility (measured by total fertility rate) is low in the former but high in the latter, with a difference of about 2 births for the 1990s (United Nations 1995). The latest United Nations inquiry among governments designed to monitor their perceptions and policies on demographic trends and levels in relation to development shows that 47 percent of the Member States, comprising 59 countries, including Nigeria, view their present fertility levels as unsatisfactorily high (United Nations 1995). This has led to the evolution of population policies in these countries aimed at reaching some demographic goals. Fifty-eight percent of these governments have policies bordering on modification of their fertility levels so as to reduce population growth and improve family well-being. In fact, 36 percent of the national governments have specified quantitative targets for their future fertility levels, with an overwhelming majority stipulating the year 2000 as the target year for attaining their desired fertility levels.

Nigeria, with a population of about 114 million and a population growth rate in the neighbourhood of 3 per cent per annum, is Africa's population giant and the tenth largest country in the world (United Nations 2001a; 1994a).

Consequent upon the recognition of the negative effects of rapid population growth, the government promulgated the 1988 Population Policy of Nigeria (Federal Republic of Nigeria 1988).

One major component of the policy document is the specification of a set of targets, which demonstrates a strong interest of the government to fundamentally change the reproductive behaviour of Nigerians. In particular, the targets of the policy document include:

> For the protection of the health of mother and child, to reduce the proportion of women who get married before the age of 18 years by 50 per cent by 1995 and by 80 per cent by the year 2000; To reduce the proportion of women bearing more than four children by 50 per cent by 1995 and by 80 per cent by the year 2000; To extend the coverage of family planning service to 50 per cent of women of childbearing age by 1995 and 80 per cent by year 2000; To reduce the number of children a

woman is likely to have during her lifetime, now over 6, to 4 per woman by year 2000 and reduce the present rate of population growth from about 3.3 per cent per year to 2.5 per cent by 1995 and 2.0 per cent by the year 2000 (Federal Republic of Nigeria 1988: 13-14).

From the policy document, it is clear that the government expected, *inter alia*, the total fertility rate (TFR) to fall to 4 live births per woman, mean age at first marriage (MAFM) to rise to 18 years, and the percentage of currently married women within the reproductive age category using contraceptive methods to shoot up to 80 per cent, all by the year 2000. Evidently, the 1988 policy document is aimed at improving the quality of life of the average Nigerian, with particular emphasis on reducing fertility through the provision of affordable and high quality family planning services throughout the country. However, it is very doubtful whether Nigeria's TFR will fall from 6 to only 4 if the proximate determinants of fertility, especially, contraception, are altered according to the government's declaration. Moreover, as we have already passed the year 2000, there is nothing to suggest the fact that there is any reproductive or contraceptive revolution in Nigeria at present. The latest nationally representative sample survey in the country, the 1999 Nigeria Demographic and Health Survey (National Population Commission, 2000)reveals that Nigeria's current TFR is 5.2, while use of modern contraceptive technology is only 8.6 percent for currently married women. As a result, Nigeria's population growth rate has remained at an unacceptably high level[1]. This phenomenon acts as a serious impediment to Nigeria's march toward economic self-reliance, sustainable development and the eradication of poverty.

It is, however, conceded that the reasons why Nigeria's fertility has remained high and contraceptive use so low are complex and diverse. Nevertheless, it is imperative that a policy document aimed at decelerating the country's fertility and growth rates should be pragmatic, unambiguous, and realistic. This contention is confirmed by the 1994 International Conference on Population and Development (ICPD), which acknowledged that population factors played a decisive role in all human endeavours, especially in pursuing sustainable development. Thus, it is saying the obvious that population policies and programmes aimed at integrating population into development strategies and meeting the rapidly increasing demand for reproductive health information and services must be attainable and current (Mba 2002; United Nations 1998; Sadik 1991). Unfortunately, as highlighted in the foregoing discussion, some of the quantitative demographic targets of the 1988 Population Policy of Nigeria seem to be unattainable and unrealistic in the light of the country's demographic profile. Therefore, the aim of this paper is to conduct a macrosimulation analysis of the determinants of future fertility decline in Nigeria on the basis of the policy targets, to furnish the empirical basis for arguing the plausibility or otherwise of certain aspects of the demographic targets of the population policy of Nigeria.

Materials and Methods

Generally, the data for the study are from the two nationally representative sample surveys conducted in Nigeria. These are the 1981/82 Nigeria Fertility Survey (NFS) and 1990 Nigeria Demographic and Health Survey (NDHS). It should be noted that the NDHS findings parallel those of the Post Enumeration Survey of 1991 (National Population Commission, 1998). Use will also be made of the information emanating from the population policy document of Nigeria.

In an attempt to unearth the quantitative effects on fertility of changes in its proximate determinants, the REPMOD reproductive macrosimulation model is used (Bongaarts 1977, Bongaarts and Potter, 1983). The changes in the proximate determinants are based upon the demographic targets of the population policy of Nigeria enunciated in order to achieve lower fertility regimes. REPMOD is an acronym for **REP**roductive **MOD**el.

The basic operation of the model is summarized in the reproductive states through which women progress from birth to the end of reproductive career, in the absence of mortality, sterility or marital disruption. When a woman is born, she enters the unmarried state. While at this state, she is at the risk of marrying. The probability of first marriage at each age is derived from a first-marriage distribution which equals zero until about age 15. Subsequent to marriage, the woman is in the fecundable state, that is, she is at the risk of conceiving. This risk is small if contraception is employed and vice versa. After a random interval of time she becomes pregnant. Her pregnancy ends either in a live birth or abortion (spontaneous or induced). If her gestation period ends in an abortion, then she enters a state of temporary non-susceptibility for the duration of the aborted pregnancy plus the associated post-abortion infecundable period before she returns to the fecundable state. If, however, her pregnancy terminates with a live birth, then the nine months full-term pregnancy is followed by a postpartum infecundable period. Finally, at the end of this period of non-susceptibility to conception the return of ovulation signals the commencement of a new fecundable interval.

The foregoing progression through reproductive states is continued until menopause is attained. If marital disruption intervenes, the only way a divorced or widowed woman can return to the reproductive process is through remarriage because childbearing outside marriage is not allowed in the model. If sterility occurs, the approach adopted in the model is to first of all complete the simulation of the entire sequence of reproductive events without sterility and thereafter eliminate those events that would not have occurred if sterility were in fact present[2]. It should be noted further that the probability of spontaneous abortion or intrauterine mortality (including still births) varies with age in a J-shaped distribution. Also, the pregnancy plus postabortion non-susceptible period associated with a foetal loss follows a geometric distribution with a mean of 2.5 months.

The use of REPMOD procedure requires the specification of values for seven basic variables, to wit, (i) fecundability; (ii) spontaneous abortion; (iii) postpartum infecundability; (iv) age at menarche; (v) earliest (first) age at marriage; (vi) mean age at marriage; and (vii) proportion ever married.

There are various methods of estimating fecundability or the monthly probability of conception. The various methods call for various and sometimes stringent data requirements. The use of different techniques of estimation has resulted in different estimates of fecundability (Golden and Millman 1993). Owing to paucity of data, the methodology adopted is an approximation that, it is believed, will capture Nigeria's experience with the available empirical evidence. From the NDHS data set it is estimated that there are 1,742 births occurring twelve months after first union, and there are a total of 5,977 first births subsequent to first union. The ratio of the former to the latter yields 1742/5977 = 0.2915. Applying this ratio to the standard table proposed by Bongaarts (1975, p.654) shows that Nigeria's fecundability plateau mean is about 0.15.

Information bearing on non-induced intrauterine death or miscarriage in Nigeria is rare, fragmentary, and ambiguous. This is because Makinwa-Adebusoye (1991) for example, has reported a pregnancy termination of 14.8 percent in her study of five Nigerian cities. But her investigation was confined to teenagers (boys and girls) between 12 and 19 years of which 80 percent of the girls were still single at the time of her study. Also, the Planned Parenthood Federation of Nigeria (PPFN) has projected a national pregnancy wastage of 20 percent for 1994 - 1996 period (PPFN 1993). Pregnancy wastage is a combination of spontaneous and induced abortions and still births. It is not known whether these three factors were taken into account before arriving at the estimate or that the organization is only referring to one or two of the variables. Since no other empirical evidence with national representativeness is presently available on spontaneous abortion in Nigeria, recourse is hereby made to the PPFN finding on the assumption that it reflects Nigerian women's spontaneous abortion experience. This assumption is within acceptable and conventional limits because the frequency of recognized pregnancies that spontaneously abort, based on different types of studies and data analyses, varies from 10 percent to 25 percent (Kalter 1987). Thus, it is postulated that since induced abortion is still outlawed[3] in Nigeria, the PPFN reported pregnancy wastage of 20 percent is indicative of the spontaneous abortion experience of Nigerian women.

Both postpartum amenorrhoea and postpartum abstinence influence the duration of postpartum infecundability or postpartum nonsusceptibility, which is the time after a live birth during which the woman is not at risk of conceiving. The mean value of the postpartum infecundability as estimated from the NDHS for Nigeria is 21.6 months.

The age at menarche is the age at first menstruation of a woman, which is actually a physiological event that heralds the beginning of her fecund life. The NDHS provides no information on this parameter but the NFS does. All the women interviewed in the NFS programme were asked: 'How old were you when you had your first menstrual period?' The distribution of the responses of the ever-married women is presented in Table 1. The table indicates that at age 12 one out of every five Nigerian women attains menarche. But by age 14 more than half of the women reach menarche, and almost all the women should have had their first menstrual period by age 16. The mean age at menarche is thus 14 years for the nation.

From the NDHS results, some women reported entering into first marital relationship when they were 10 years old. Hence the information establishes the incidence of early child betrothal in Nigeria and further confirms the pronatalist tendencies of that society because by just age 13, a fifth of the women have married.

The mean age at first marriage and proportion ever marrying as required for the running of REPMOD as estimated from the NDHS data set are respectively 16.5 years and 0.998 because about 99.8 per cent of Nigerian women marry before attaining menopause.

Results

Validation of the REPMOD Simulation Programme

Having thus estimated the values of the seven parameters necessary for the execution of REPMOD macrosimulation model, it is important to examine the proximity or otherwise to reality of the results of the technique before further analysis can be attempted. This is because before one can have confidence in the adequacy of a model, the model should, of necessity, be tested. To this end, attempt is made to fit the REPMOD procedure to data from both the NDHS and NFS data sets since a test of the validity of a model is provided by comparing the characteristics estimated by a model with those observed in a population for which the required model input data are available. Moreover, carrying out initial experimentation with the basic unadjusted input data is germane to determining the standard upon which future input variations can be compared.

Using, therefore, the computed values specified above for the operationalization of REPMOD, a simulation experiment is carried out, and the results are presented in Table 2, along with the observed NDHS and NFS distributions. It is both striking and reassuring that the simulated values almost parallel the observed ones, especially, those from the NDHS. This may be because majority of the input values are culled from that data set. Since the NDHS and NFS results reflect the demographic profile of the Nigerian society, it can then be argued that the close agreement between the observed and simulated distributions suggests that the basic REPMOD macrosimulation model adequately represents the family building process in Nigeria.

To test the goodness of fit of the data, the χ^2 (chi-square test) is applied. The χ^2 is a statistic that gives a measure of the discrepancy existing between observed and expected distributions. The step-by-step application of this technique is shown in Table 3.

The results indicate that $\chi^2_a = \sum_{i=1}^{7} \frac{(a_i - s_i)^2}{s_i} = 9.007$,

and $\chi^2_b = \sum_{i=1}^{7} \frac{(b_i - s_i)^2}{s_i} = 11.674$. These represent the computed χ^2

values. Next, we obtain the tabulated χ^2 values at 0.05 and 0.01 levels of significance for 6 degrees of freedom, which respectively yield 12.6 and 16.8.

By comparing the calculated with the tabulated χ^2 values, a lack (or presence) of significance which indicates a close fit (or otherwise) will be found. In the current case, the differences between the simulated model functions and the observed data are not significant at both the 0.05 and 0.01 levels because $\chi^2_{0.95} = 12.6$ is greater than $\chi^2_a = 9.0$ and $\chi^2_b = 11.7$; and $\chi^2_{0.99} = 16.8$ is greater than $\chi^2_a = 9.0$ and $\chi^2_b = 11.7$. Thus, we may conclude that the model provides a good fit to the data.

Consequently, the simulated values presented in Table 3 furnish a good standard against which all future simulations can be compared.

Possible Scenario Options

The population policy of Nigeria has stipulated various quantitative targets congruent with the deceleration of Nigeria's fertility. As far as REPMOD can permit, attention is focused here on investigating the effects on fertility of changes in those variables in a manner consistent with the Government's goals and aspirations.

In conducting the REPMOD macrosimulation analysis, the following possible scenario options, depicted in Table 4 have been considered. It is conceded that a number of simulation options can be postulated for examination. But brevity requirements preclude an exhaustive treatment of all possible scenario options. · Nevertheless, the hypothesized simulation options indicated in the table are the ones the present study deems practical and plausible.

The Nigerian government advocates a mean age at first marriage (MAFM) of 18 years. This informs why the reported MAFM of 16.5 years is raised to 18.0 years in 14 out of the 19 scenario options.

Given the proposed socio-economic and demographic transformations ambitiously envisaged in Nigeria by the government (barring her present socio-economic realities) it can be argued that the age at menarche cannot remain the same in future as its presently constituted value. This is because medical science has established that socio-economic development influences age at menarche, so that improvement and better living conditions (occasioned by better health care, nutrition, etc) depress age at menarche (Derman et al. 1995). This perhaps explains why much of the developed world has lower age at menarche than the developing one. Thus, in anticipation of this development in Nigeria, the age at menarche is varied from 13 to 14 in 6 out of the 19 scenario options.

Since the evidence presented in the preceding discussion signifies that first age at first marriage (FAFM) is lower than both age at menarche (10 versus 14) and MAFM (10 versus 17) in Nigeria, the effect of variation in FAFM is plausibly assumed to be negligible. This reasoning is the basic rationale underlying the unalteration of the FAFM value as shown in Table 4.

It is assumed that the persistence of Nigeria's economic turnaround will ultimately affect the proportion marrying. Hence, a reduction in proportion marrying from 0.998 to 0.907 is postulated in 6 out of the 19 scenario options.

Concerning postpartum infecundability (PPI), two broad options are considered as revealed by Table 4. The first relates to raising PPI from 21.6 to 24.0 since the population policy recommends a spacing pattern of at least 2 years (Federal Republic of Nigeria 1988). The second option is a reduction in PPI from 21.6 to 19.6 by the same percentage point (9.09 percent) used in raising MAFM from 16.5 to 18.0 as desired by the government. This option is necessary because worldwide the duration and intensity of breastfeeding is decreasing in response to modernization and technological breakthrough (Rodriguez and Diaz 1993). This has a direct bearing on amenorrhoea and therefore PPI. Hence, it is assumed that the "development, unity, progress and self-reliance" Nigeria envisions will affect PPI.

Table 4 shows that 3 scenario options are postulated in case of fecundability. The population policy document stipulates 80 percent and 50 percent coverage in respect of contraceptive use. It has already been derived that the fecundability mean for Nigeria is 0.15. The current contraceptive prevalence rate as reported in the NDHS programme is 6 percent. Since 6 per cent use of contraception has yielded a fecundability of 0.15, and since contraceptive use depresses the monthly chance of conception (fecundability), it follows, therefore, that the envisaged massive contraceptive uptake in Nigeria will have a corresponding inverse relationship with fecundability. Also, in attempting to estimate future levels of fecundability from the base natural one, it is important to take into account the use effectiveness of contraceptive methods. In this respect, the United Nations (1986) has suggested some method-specific effectiveness levels, to wit Pill = 90 per cent; IUD = 95 per cent; Injectable = 98 per cent; Condom = 70 per cent; and Traditional = 70 per cent. Since the NDHS findings reveal that Pill, IUD, Injectable, and Withdrawal (Traditional) are the most popular methods, it is assumed that the aggregate effectiveness level for Nigeria is the average of these most popular methods, which is 88 per cent. Consequently, the improvisation adopted for the purposes of this paper is to apply the assumption that the extent of the dampening effect on fecundability by the anticipated contraceptive uptake is the same as the extent to which it is raised at the prevailing level of contraceptive effectiveness, and that contraception is used for the purposes of limiting births only. In this respect, 88 per cent of 80 per cent is 70.4 per cent. Then 70.4 per cent of 0.15 is 0.11. Then by simply taking the difference between 0.15 and 0.11 yields 0.04. Thus the government's proposed 80 percent target level of contraceptive use coverage will plummet fecundability to 0.04. By similar procedure it can be deduced that the proposed 50 percent target level of contraceptive use coverage will depress fecundability to 0.08. The third option is predicated on the assumption that there will be just 100 percent increase from the present observed contraceptive level of 6 percent. In other words, it is assumed that coverage of family planning services will rise from 6 percent to 12 percent. Thus, by applying 12 percent to 0.15 in a similar manner yields a fecundability mean of 0.13.

Because of paucity of empirical information on spontaneous abortion in Nigeria, the changes anticipated in relation to this variable follow a plausible guess. It is posited that owing to improvements in health and related social services, the rate of spontaneous abortion will reduce by about 10 percent in future.

REPMOD Macrosimulation Findings

Having thus postulated a set of 19 plausible scenario options which Nigeria's future fertility experience may follow, the next step is to examine the effects of changes in the intermediate fertility variables. Table 5 gives the quantitative effect on the national fertility (measured by age specific fertility rates and total fertility rates) likely to occur when the relevant proximate determinants are varied in accordance with the government's aspirations. The table shows that when the mean age at first marriage (MAFM) is raised from 17 to 18 years as desired by Nigeria, with the other reproductive parameters remaining constant, then the total fertility rate (TFR) will drop from its present value of 6.01 to 5.57, representing a decrease of 7 percent. The policy implication of this option (Option A-2) is that programmes aimed at increasing the MAFM alone will have a mild dampening effect on Nigeria's future fertility.

However, in real life situations, increases in MAFM are a product of many factors, paramount among which is the quest for higher educational attainments. Increases in educational opportunities in turn lead to greater exposure and enlightenment, as well as greater awareness of technological innovations, including the use of modern contraceptive methods. Hence Options A-3, A-4 and A-5 present results based on simultaneous increases in MAFM and contraceptive use while controlling for other parameters (that is, the third, fourth and fifth rows respectively of Table 5).

The findings suggest that if MAFM rose by one year and contraceptive use was increased to 50 per cent (that is, reducing fecundability from 0.15 to 0.08), 80 per cent, (reducing fecundability from 0.15 to 0.04, and to 12 per cent (reducing fecundability from 0.15 to 0.13), then TFR would have respectively decreased by 22 per cent (from 6.06 to 4.66), 54 per cent (from 6.06 to 2.81), and 9 per cent (from 6.06 to 5.54). This means, as expected, a substantial reduction in Nigeria's fertility, even beyond the government's optimistic aspiration (of TFR of 4), might have been attained by simultaneously raising MAFM from 17 to 18 and contraceptive use to 80 percent.

If Nigeria had experienced a dramatic socioeconomic transformation, it would undoubtedly have affected fecundability and spontaneous abortion for reasons already advanced. Accepting this proposition and hypothesizing that these proximate fertility determinants would change as opined in options A-6 to A-8 (see Table 4), then Nigeria's fertility would also change. The analysis indicates, as depicted in Table 5 (sixth to eighth rows), that when the MAFM was raised to 18 years, menarche was reduced by one year, proportion ever marrying was reduced by 10 percent, PPI was reduced by 9 per cent, and spontaneous abortion was reduced by 10 per cent, then by increasing contraceptive use to 12 per cent, 50 per cent, and 80 per cent respectively yielded TFR of 5.40, 4.45, and 2.26. The results show that Nigeria's fertility target of attaining a TFR of 4 might have been achieved if scenario Option A-7 were adopted.

The next task is to examine how Nigeria's fertility would have fared if the strategy were an exclusive focus on the large-scale adoption of contraceptive technology, on the assumption that all the other intermediate fertility variables remained unaltered. Options A-9 to A-11 provide results of the analysis. As presented in Table 5, fertility would decrease by 8 per cent, 19 per cent, and 51 per cent respectively by contraceptive uptake of 6 per cent, 50 per cent and 80 per cent.

Then, too, if attention was focused on promoting long duration and intensity of breastfeeding alone, then Option A-12 reveals that if PPI was increased by 10 per cent then the nation's fertility would have reduced by 10 per cent only, implying that it might not have been a viable option.

If the MAFM and PPI were both increased in accordance with government's aspirations while other variables remained constant, TFR would have decreased by about 1 birth (Option A-13).

Then, if in addition to altering MAFM and PPI alone, a 6 per cent uptake of contraception was allowed, the results show that the TFR would similarly have decreased by about 1 birth (option A-14). However, when the MAFM and PPI were varied in concert with 50 per cent and 80 per cent uptake of contraception, the TFR would reduce by 2 births (Option A-15) and 3 births (Option A-16) respectively.

Finally, if all the proximate fertility determinants were varied in a manner consistent with those of option A-8, with the exception of increasing the PPI (rather than reducing it), the findings are indicated in the last 3 columns of Table 5. Here the TFR would fall by 1 birth (Option A-17), 2 births (Option A-18), and 4 births (Option A-19), representing the highest fertility reducing scenario option.

Discussion

A notable finding from the analysis is that in all the postulated options, the peak of childbearing must lie in the 20-29 age group in order to make fertility reduction feasible. Additionally, the age specific fertility rates should be expected to be considerably lower for the older women because they will be approaching the end of their childbearing.

Overall, one fundamental inference deriving from the analysis is that the quest for fertility reduction from TFR of 6 to 4 might have been attained in Nigeria by the adoption of Options A-7 or A-15 or A-18. In other words, massive contraceptive uptake is crucial to the achievement of the fertility reduction target of the population policy of Nigeria, and the expected TFR of 4 was likely to have been reached if contraceptive prevalence rate rose to 50 per cent instead of 80 per cent proposed by the government. However, it should be stated that if all the proximate determinants of fertility were changed with a massive rise in contraception (peaking at 80 per cent) as desired by the government, TFR would not have fallen from 6 to 4; rather it would have drastically reduced from 6 to 2 which is the replacement level fertility.

It is a good thing that the government of Nigeria promulgated its population policy in 1988. Some of the basic principles and goals the policy set out to achieve are still valid and relevant. However, time is not on the side of the document. This is because, in the first instance, as the foregoing analysis has shown, there are major inadequacies in the specification of some the quantitative demographic targets. The targets should reflect reality and be devoid of ambiguities. For example, "To extend the coverage of family planning service to 50 per cent of women of childbearing age"as stipulated in the policy document is, strictly speaking, not the same as "to extend the coverage of family planning methods to 50 per cent of women of childbearing age" *because* family planning methods are but a component of family planning service. The final target date of the year 2000 in the existing document has already been reached and passed without any remarkable contraceptive and hence reproductive change in Nigeria.

Nigeria's population policy should be revised to reflect the significant aspects of both the 1994 Cairo International Conference on Population and Development and the 1995 Beijing International Conference on Women and Development (UNFPA 1999). This is because development that is both sustained and sustainable will certainly incude close attention to the social dimension, what is now called human development. Among these, population interventions will be most essential. The experience of many countries shows that population policies and programmes, as well as other interventions in human development, especially investments which make women more equal partners in development, interact in powerful ways (United Nations 1993; Sadik 1991). The results reveal themselves in smaller, healthier and better educated families, and in a generation of women and men who can think for themselves, decide for themselves and take their full part in family, community and national life. In this respect, the policy should stress on reproductive health and rights, reducing maternal death and morbidity, coupled with meeting the unmet needs for contraceptive choices, and access to reproductive health information and services for all groups of the Nigerian population. In particular, innovative strategies should be developed to provide adolescents with reproductive health information to promote gender equality and responsible sexual behaviour. This is because early child-bearing entails much higher health risks since complications in pregnancy and childbirth are much more common before age 18 (World Health Organization 2001; Makinwa-Adebusoye 1991). The Nigerian government should therefore emphasize the fact that early pregnancy is a threat to the health and the life of both the young mother and her infant, and the programme of action should be designed and implemented in a manner appropriate to its culture and conditions.

It should be noted that the empowerment and autonomy of women and the improvement of their political, social, economic, and health status is a highly important end in itself. In addition, it is essential for the achievement of sustainable development. Consequently, Nigeria's new population policy should stress the full participation and partnership of both men and women, which is required in productive and reproductive life, including shared responsibilities for the care and nurturing of children and maintenance of the household.

Meeting the basic human needs of growing populations is dependent on a healthy environment. These human dimensions need to be given attention in developing a comprehensive population policy for sustainable development in the context of population growth in Nigeria.

Additionally, there are certain fundamental phenomena affecting most societies that are conspicuously absent in the present document. In the first instance, population ageing that is rapidly gaining prominence in national population agendas (United Nations 2001b; Mbamaonyeukwu 2001; United Nations Economic Commission for Europe, 1999; United Nations, 1994) is not mentioned at all in the existing document.

Moreover, there is a growing body of literature to support the fact that the human immunodeficiency virus (HIV), the virus that causes the acquired immune deficiency syndrome (AIDS), is rising at alarming proportions in parts of Africa, (World Health Organization 2001; United Nations 2001b; Dorrington et al. 2001; Mbamaonyeukwu 2001b; UNAIDS 2000). In fact, according to the latest UNAIDS Report, 42 million people now carry HIV, while each year 5 million people are newly infected and 3 million die of the disease (UNAIDS 2002). The Sub-Saharan African Region is the worst hit as it contains more than two-thirds of the 42 million people living with the HIV virus throughout the world. But HIV/AIDS is also not reflected in the present population policy of Nigeria. It is important, therefore that a revision of the policy should also focus on tackling the spread of HIV/AIDS, especially among the youth. The new policy should specify the urgent need for the development of more relevant information, education and communication (IEC) programmes to build knowledge, motivation and skills, based on a full understanding of the individual and the broader socio-economic factors that influence individual, institutional and group behaviour. In particular, the IEC programmes should focus on fostering health and responsible behaviour to increase male responsibility in pregnancy and the prevention of HIV and other sexually transmitted infections, as well as to promote informed reproductive health choices, especially for young women.

Furthermore, female genital mutilation (FGM) or female circumcision, which involves the excision of the clitoris and the cutting or removal of other genital parts, is still performed in many parts of Africa, including Nigeria, especially in the rural areas. In most of those settings where FGM is performed, the operation is usually done without anaesthesia on the female infants, young children or adolescents, and involves the use of crude instruments in unsanitary conditions. This often results in lifetime discomfort and makes women unable to function sexually in a normal manner, in addition to making them highly vulnerable to infection (Toubia 1994). About 100 million women in Africa have been circumcised and about 1 million girls undergo this operation every year. For example, the 1995 Eritrea Demographic and Health Survey reported that 95 percent of the female respondents have been circumcised in Eritrea (National Statistics Office and Macro International Inc. 1997). The situation may be the same in some other countries. It should be noted that some muslim countries, including Saudi Arabia, do not practice FGM and some Islamic scholars argue that the practice is not sanctioned by the Koran (Gilbert 1992/1993). Therefore, in the new population policy, the Nigerian government should spell out the adverse consequences of the FGM and launch effective IEC programmes with a view to disabusing people's minds about the FGM. This is because some people, particularly in the rural areas, view the campaign against FGM as an attempt by outsiders to undermine a country's cultural heritage and impose foreign values (French 1997). The new policy should stress the elimination of FGM and removal of other harmful practices against women.

TABLE 1
PERCENT DISTRIBUTION OF EVER-MARRIED ACCORDING TO AGE AT MENARCHE

Current Age	Age at Menarche 10	11	12	13	14	15	16	17	18	19	20	Mean (Months)	Number of Women
15	2.4	7.4	17.7	30.1	33.4	8.9	-	-	-	-	-	13.1	145
16	3.2	8.8	16.6	24.2	26.1	17.2	3.9	-	-	-	-	13.3	124
17	0.7	3.0	15.7	20.6	30.7	23.9	5.3	0.1	-	-	-	13.7	193
18	1.9	6.0	20.7	20.7	21.3	22.1	6.7	0.4	-	-	-	13.5	223
19	4.9	5.5	16.3	14.4	21.2	23.6	11.8	0.7	1.6	-	-	13.7	159
20-24	3.5	3.4	15.1	17.5	22.9	23.0	9.2	3.2	1.6	0.5	0.2	13.9	1,436
25-29	2.8	3.3	15.2	17.7	22.9	26.6	5.9	2.7	1.6	0.6	0.7	13.9	1,706
30-34	1.6	4.0	14.6	15.7	21.3	25.7	8.4	5.2	2.3	0.4	0.7	14.1	1,525
35-39	1.0	1.9	15.4	17.7	22.2	27.7	8.2	2.7	2.2	0.4	0.5	14.1	1,094
40-44	1.2	1.3	12.8	13.9	19.6	29.6	8.6	5.3	4.6	1.6	1.5	14.5	887
45-49	2.0	1.3	12.7	12.4	18.1	31.8	8.6	6.4	3.8	1.0	1.8	14.5	579
All	2.2	3.2	14.9	16.9	22.1	25.9	7.8	3.6	2.2	0.6	0.6	14.0	8,071
Cum %	2.2	5.4	20.3	37.2	59.3	85.2	93.0	96.6	98.8	99.4		100.0	

Source: NFS 1981\1982 Note: Mean Age at Menarche = 14.0 months.

TABLE 2
OBSERVED AND SIMULATED (STANDARD) AGE SPECIFIC AND CUMULATIVE FERTILITY RATES FOR NIGERIA

	NDHS	NFS	SIMULATED
15-19	.146	.173	.155
25-29	.263	.274	.257
30-34	.220	.231	.228
35-39	.159	.147	.166
40-44	.029	.100	.089
45-49	.064	.060	.046
TFR	6.01	6.34	6.06

Age Group	ASFR	ASFR	ASFR
20-24	.258	.284	.271

TABLE 3

TESTS OF GOODNESS OF FIT OF MODEL ESTIMATES WITH OBSERVED FERTILITY FUNCTIONS OF NIGERIA

Age Group	Observed NDHS	Observed NFS	Simulated ASFR	$\frac{(a_i-s_i)^2}{s_i}$	$\frac{(b_i-s_i)^2}{s_i}$	ASFR (a_i)	ASFR (b_i)	(s_i)
15-19	146	173	155	0.523	2.090			
20-24	258	284	271	0.624	0.624			
25-29	263	274	257	0.140	1.125			
30-34	220	231	228	0.281	0.039			
35-39	159	147	166	2.295	2.175			
40-44	92	100	89	0.101	1.360			
45-49	64	60	46	7.043	4.261			
Total				9.007	11.674			

TABLE 4

POSTULATED PLAUSIBLE REPMOD MACROSIMULATION OPTIONS (PROXIMATE FERTILITY DETERMINANTS VALUES)

MAFM	Menarche	FAFM Marrying	Prop.	PPI	Fecund Abort	Spont. Name	Scenario
16.5	14.0	10:0	0.998	21.6	0.15	0.20	Option A-1
18.0	14.0	10.0	0.998	21.6	0.15	0.20	Option A-2
18.0	14.0	10.0	0.998	21.6	0.08	0.20	Option A-3
18.0	14.0	10.0	0.998	21.6	0.03	0.20	Option A-4
18.0	14.0	10.0	0.998	21.6	0.13	0.20	Option A-5
18.0	12.7	10.0	0.907	19.6	0.13	0.18	Option A-6
18.0	12.7	10.0	0.907	19.6	0.08	0.18	Option A-7
18.0	12.7	10.0	0.907	19.6	0.04	0.18	Option A-8
16.5	14.0	10.0	0.998	21.6	0.13	0.20	Option A-9
16.5	14.0	10.0	0.998	21.6	0.08	0.20	Option A-10
16.5	14.0	10.0	0.998	21.6	0.04	0.20	Option A-11
16.5	14.0	10.0	0.998	24:0	0.15	0.20	Option A-12
18.0	14.0	10.0	0.998	24.0	0.15	0.20	Option A-13
18.0	14.0	10.0	0.998	24.0	0.13	0.20	Option A-14
18.0	14.0	10.0	0.998	24.0	0.08	0.20	Option A-15
18.0	14.0	10.0	0.998	24.0	0.04	0.20	Option A-16
18.0	12.7	10.0	0.907	24.0	0.13	0.18	Option A-17
18.0	12.7	10.0	0.907	24.0	0.08	0.18	Option A-18
18.0	12.7	10.0	0.907	24.0	0.04	0.18	Option A-19

Note: 1. MAFM=Mean Age at First Marriage; FAFM=First Age at First Marriage; PPI = Postpartum infecundability.

2. Values in Option A-1 are based on observed demographic profile of Nigeria (dubbed 'Standard').

Values in options A-2 to A-19 are based on the population policy requirements.

TABLE 5

NATIONAL REPMOD MACROSIMULATION RESULTS

Age Specific Fertility Rate				*TFR*				
Scenario	15-19	20-24	25-29	30-34	35-39	40-44	45-49	15-49
Observed	.146	.258	.263	.220	.159	.029	.064	6.01
Option A-1	.168	.237	.257	.229	.180	.093	.015	6.08
Option A-2	.134	.251	.250	.227	.179	.066	.007	5.57
Option A-3	.097	.208	.209	.190	.147	.070	.010	4.66
Option A-4	.049	.127	.132	.121	.090	.038	.005	2.81
Option A-5	.130	.247	.264	.223	.176	.091	.014	5.64
Option A-6	.129	.223	.234	.213	.169	.088	.014	5.40
Option A-7	.097	.195	.198	.181	.141	.068	.010	4.45
Option A-8	.049	.118	.123	.114	.068	.037	.005	2.26
Option A-9	.163	.268	.253	.225	.176	.091	.014	5.95
Option A-10	.122	.226	.215	.192	.147	.070	.010	4.91
Option A-11	.061	.139	.136	.122	.091	.038	.005	2.96
Option A-12	.160	.246	.229	.203	.159	.083	.013	5.47
Option A-13	.129	.228	.224	.201	.159	.083	.013	5.19
Option A-14	.125	.224	.221	.199	.156	.081	.013	5.10
Option A-15	.095	.192	.190	.172	.132	.064	.009	4.27
Option A-16	.048	.122	.124	.113	.084	.036	.004	2.66
Option A-17	.121	.204	.200	.181	.143	.076	.012	4.69
Option A-18	.093	.174	.173	.157	.122	.060	.009	3.94
Option A-19	.048	.111	.113	.104	.078	.034	.004	2.46

References

Bongaarts, J., 1975. A method for the estimation of fecundability. *Demography* 12. 4: 645-660.

____, 1977. A dynamic model of reproductive process. *Population Studies* 31: 59-73.

Bongaarts, J. and R.G., Potter, 1983. *Fertility, Biology, and Behaviour, An Analysis of the Proximate Determinants*. New York: Academic Press Inc. Pp. 132-200.

Derman, R J., et al. 1995. Menopause: quality of life during sequential hormone replacement therapy. *International Journal of Fertility and Menopausal Studies* 40, 2: 73-78.

Dorrigton, R., D. Bourne, D. Bradshaw, R. Laubscher, and I. Timaeus, 2001. *The Impact of HIV/AIDS on Adult Mortality in South Africa.* Technical Report, Burden of Disease Research Unit, Medical Research Council, South Africa.

Federal Office of Statistics (FOS) and Institute for Resource Development/Macro International Inc.(IRD), 1992. *Nigeria Demographic and Health Survey 1990.* Maryland: FOS, Lagos and IRD/Columbia.

Federal Republic of Nigeria, 1988. *National Policy on Population for Development, Unity, Progress and Self-reliance,* Lagos: Federal Ministry of Health.

French, H., 1997. Human Rites: Africa's Culture War: Old Customs, New Values. *New York Times*, Feb. 2, sec. 4:1.

Gilbert D., 1992/1993. Female genital mutilation: for the sake of purity and control. *Links, Health and Development Report* 5: 7-8.

Golden, M.L. and S.R. Millman, 1993. Models of fecundability. In R. Gray (ed.), *Biomedical and Demographic Determinants of Reproduction.* Oxford: Clarendon Press. Pp. 183-208.

Kalter, H., 1987. Diabetes and spontaneous abortion: a historical review. *American Journal of Obstetrics and Gynecology* 56: 1243-1253.

Makinwa-Adebusoye, P.K., 1991. *Adolescent Reproductive Behaviour in Nigeria: A Study of Five Cities.*

Ibadan: Nigerian Institute of Social and Economic Research, Monograph Series 3: 33.
Mba, C.J., 2002. Ghana's reproductive revolution: analysis of the determinants of fertility transition. *African Population Studies* 17.1: 47-67.
Mbamaonyeukwu, J.C., 1992. Demographic scenarios for the achievement of Nigeria's population policy targets. Unpublished M.Phil Thesis. Ghana, Legon: University of Ghana.
____, 1997. Attainment of the fertility target of Nigeria's population policy: a demographic simulation approach. Unpublished Ph.D Thesis. Ghana, Legon: University of Ghana.
____, 2001a. Africa's ageing populations, *BOLD, Quarterly Journal of the International Institute on Ageing* 11. 4: 2-7.
____, 2001b, The Battle Against HIV/AIDS: The Winds are Contrary. *The Spectator*, March 24. Pp. 3.
National Population Bureau (NPB) and World Fertility Survey, 1984. *Nigeria Fertility Survey 1981/82*. Principal Report Vol. 1 Methodology and Findings. Lagos: NPB.
National Population Commission, 2000. *Nigeria Demographic and Health Survey 1999*. Calverton: Maryland, National Population Commission and ORC/Macro.
____, 1998. *1991 Population Census of the Federal Republic of Nigeria: Analytical Report at the National Level*. Abuja: National Population Commission.
National Statistics Office (NSO) and Macro International Inc. (MI), 1997. *Eritrea Demographic and Health Survey, 1995*. Calverton, Maryland: NSO and MI.
Planned Parenthood Federation of Nigeria, 1993. *Executive Director's Annual Report 1992*. Lagos, Nigeria. Pp. 43.
Rodriguez, G. and S. Diaz, 1993. Breastfeeding and the Length of Postpartum Amenorrhoea: A Hazard Model Approach. In Gray, R., (ed.) *Demographic and Bio-medical Aspects of Human Reproduction*. Oxford: Clarendon Press. Pp. 413-427.
Sadik, N. (ed.), 1991. *Population Policies and Progammes: Lessons Learned from Two Decades of Experience*. New York: New York University Press.
Toubia, N., 1994. Female genital mutilation and the responsibility of reproductive health professionals. *International Journal of Gynaecology and Obstetrics* 101. 2: 127-129.
UNAIDS, 2000. *Report on the Global HIV/AIDS Epidemic, June, 2000*. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS.
____, 2002. *Report on the Global HIV/AIDS Epidemic, 2002*. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS.
United Nations, 1986. *The Methodology of Measuring the Impact of Family Planning Programmes on Fertility: Manual IX Addendum*. New York: United Nations.
____, 1994a. *World Population 1994*, New York: Department for Economic and Social Information and Policy Analysis. Pp. 5.
____, 1994b. *Ageing and the Family*. New York: Department for Economic and Social Information and Policy Analysis, ST/ESA/SER.R/124.
____, 1995. *Results of the Seventh United Nations Population Inquiry among Governments*. New York: Department for Economic and Social Information and Policy Analysis, Population Division, Pp. 107.
____, 1998. *National Population Policies*, New York: Department for Economic and Social Affairs, ST/ESA/SER.A/171.
____, 2001a. *World Population Prospects, The 2000 Revision Vol. I: Comprehensive Tables*. New York: Department of Economic and Social Affairs, Population Division, ST/ESA/SER.A/198.
____, 2001b. *World Population Prospects, The 2000 Revision: Highlights*. New York: Population Division, Department of Economic and Social Affairs, ESA/P/WP.165.
United Nations Economic Commission for Europe, 1999. *Socio-Economic Status and Living Arrangements of Older Persons in Finland*. New York and Geneva: Population Activities Unit.
UNFPA, 1999. *ICPD+5*. New York: The Report of the Ad Hoc Committee of the Whole of the 21st Special Session of the General Assembly, adopted on 1 July 1999.
World Health Organization, 2001. *1997-1999 World Health Statistics Annual*. http://www3.who.int/whosis/. Geneva, Switzerland: The WHO.

Notes

[1] Nigeria's high population growth rate of 2.8 percent per annum National Population Commission (1998) is the result of a combination of sustained high birth rates and declining death rates (particularly infant and child mortality rates). Success in reducing death rates is attributable to several factors notably improvements in public health (water and sanitation) and in medical technology (vaccines and antibiotics), coupled with gains in educational attainment.

[2] For instance, if the age-specific fertility rate in the absence of sterility is f (tand the proportion of all women that are sterile by age t (in months) is s(t), then the actual age-specific fertility rate is simply $f(t)x[1-s(t-9)]$. In REPMOD, fecundability is zero until menarche, then rises linearly until age 20, remains at a plateau until age 35, and declines again linearly to zero at age 49.

[3] Although abortion is illegal in Nigeria, however, the current law permits abortion to save a woman's life, and to preserve a woman's physical and mental health.