

## ORIGINAL RESEARCH ARTICLE

# Determinants of fertility in Namibia

Nelago Indongo<sup>\*1</sup> and Lillian Pazvakawambwa<sup>2</sup>

<sup>1,2</sup>Lecturer: Department of Statistics, Faculty of Science, University of Namibia, Namibia

\*For correspondence: Email: nkanime@unam.na Tel +264 61 206 3004

## Abstract

In-depth studies on fertility in Namibia have been lacking so far. This examines the fertility trends in Namibia over the past 2 decades and examines fertility differentials across the various sub-groups of Namibia population, and factors affecting such differentials using NDHS data. Estimates of the amount of variance in the total number of children ever born that could be explained by each of the independent variables were made using multiple regression analysis for the three data sources. Overall, results from descriptive analysis show that fertility levels in Namibia have been decreasing over the past two decades. The decrease could be associated with an increased trend in the prevalence of use of modern contraceptives which doubled since 1992. Age at first birth has remained constant but age at first marriage continues to increase. As a result, postponement of marriage increases the probability that women remain childless or that they have fewer children than desired. Replacement level is projected to be attained much faster than expected and the study recommend for further research that focuses on policy implications of family planning programmes once replacement level has been achieved to maintain it. (*Afr J Reprod Health 2012; 16[4]: 50-57*).

## Résumé

Des études approfondies sur la fécondité en Namibie ont fait défaut jusqu'à présent. En se servant des données recueillies de l'ENDS, cette étude examine les tendances de la fécondité en Namibie au cours des deux dernières décennies et examine les différences concernant la fécondité auprès des divers sous-groupes de la population namibienne ainsi que les facteurs qui affectent ces écarts. Les estimations de la proportion de la variance dans le nombre total d'enfants nés vivants qui pourraient s'expliquer par chacune des variables indépendantes ont été effectuées à l'aide d'une analyse de régression multiple pour les trois sources de données. Dans l'ensemble, les résultats de l'analyse descriptive montrent que les niveaux de fécondité en Namibie ont baissé au cours des deux dernières décennies. Cette baisse pourrait être liée à une tendance accrue à la prévalence de l'usage des contraceptifs modernes qui a doublé depuis 1992. L'âge au premier accouchement est resté constant, mais l'âge au premier mariage continue d'augmenter. En conséquence, le report du mariage augmente la possibilité que les femmes restent sans enfants ou qu'elles aient moins d'enfants que le nombre désiré. Le niveau de remplacement devrait être atteint beaucoup plus rapidement que prévu et l'étude recommande encore de des recherches qui seront concentrées sur les implications politiques des programmes de planification familiale une fois que le niveau de remplacement aura été réalisé pour le maintenir (*Afr J Reprod Health 2012; 16[4]: 50-57*).

---

**Keywords:** fertility, determinants, childbearing age, Namibia

---

## Introduction

Most growth of the world's population happens in the developing world. Countries in Sub-Saharan Africa have been well known for high fertility levels relative to the rest of the world in past decades. In a bid to control fertility, fertility control initiatives were implemented and there has been a lot of impact in some countries which are experiencing fertility decline. Some developed countries have actually overdone it because their fertility levels went below replacement levels and they had to revise their fertility policy in fear of

eventual extinction! The whole idea was for fertility to reach replacement levels. On the other hand, some countries in Southern Africa are feared to have population which will not match the available economic resources. Namibia enjoys a vast land area of 823 700km<sup>2</sup> with a population of about 2 million giving a population density of about 2 people per km<sup>2</sup>. An annual rate of population growth is expected to decline from 3% to 1.5% between 2010 and 2020 both as a result of HIV/AIDS and falling fertility rates. Policy makers have been concerned that fertility has been higher than economic growth rate. There is in need

to understand fertility in Namibia as it not only has a bearing on the population growth rate, but also on socio-economic, political and cultural wellbeing of the country.

The following questions can be asked for Namibia: Has Namibia reached or surpassed its carrying capacity? What is its optimal fertility rate for sustainable economic development? Is Namibia experiencing a consistent and significant fertility decline? Studies on fertility decline in North-Central Namibia for the period 1960 to 2000 based on a parish register system established at the beginning of the 20<sup>th</sup> century revealed that fertility was mainly associated with age at first marriage, use of contraceptives and HIV prevalence<sup>1</sup>. Progress in increasing women's educational attainment and reducing child and infant mortality were identified as key contributors to fertility decline in 24 Sub-Saharan by Shapiro<sup>2</sup>. Bongaarts<sup>3</sup> used data 57 less developed countries and summarized educational differentials in fertility at different stages of fertility transition. The studies showed that educational composition of the population remains a key predictor of overall fertility and that low levels of schooling can cause stalling fertility. Studies on men's influence on fertility issues in Ghana by White<sup>4</sup> indicate that the husband's education exerts a stronger influence on the wife's fertility intentions than does her own education and the magnitude of husband's education increased significantly from 1988 to 1998. A moderate association between the prevalence of premarital fertility and prevalence of HIV infected was observed in studies conducted in sub-Saharan Africa by Garenne<sup>5</sup>. Studies in Cameroon suggest that fertility decline could be driven by economic crisis and structural adjustment programmes<sup>6</sup>. Fertility studies in developing countries by Adsera<sup>7</sup> suggest that young women postpone or abandon childbearing to increase lifetime income through early skills acquisition in order to minimize unemployment risk.

In Rural Zimbabwe, a retrospective survey was conducted by Terceira<sup>8</sup> and a multiple logistic regression model was fitted to potential fertility factors. Fertility reduction was smaller where contraceptive use was small because of the late age at first sexual intercourse, and also since birth

rate at older ages was already low. Mechanisms for HIV-associated sub-fertility in rural Zimbabwe included more frequent widowhood and divorce, reduced coital frequency, increased amenorrhea and possibly pelvic inflammatory disease. In Iran, Jensen<sup>9</sup> established that fertility decline was attributed to successful collaboration of technical experts and religious leaders, involvement of local health workers, women health volunteers and rural mid-wives. The country experienced a 64% decline in fertility in between 1986 and 2000.

In developed countries, social support has been legislated for the elderly and incentives for child bearing have been eroded and parents been motivated to have fewer, higher quality children<sup>10</sup>. It is necessary to establish the factors influencing fertility in Namibia so that these factors can be monitored and controlled. Several factors have been identified as determinants of fertility and classified as intermediate or proximate by Davis<sup>11</sup>. The intermediate variables are the biological and behavioural mechanisms through which socio-economic and cultural conditions can affect fertility indirectly. The proximate variables influence fertility directly. Bongaarts<sup>12</sup> streamlined the variables and came up with four key variables determining fertility as marriage, contraceptive use, induced abortion, and postpartum infecundability. An additional proximate determinant of fertility frequently considered in Sub-Saharan Africa where it is common, is sterility. Although fertility has declined over the last three decades, high fertility levels still persist in sub-Saharan Africa than in any other major region of the world. Nevertheless, disparities between and within countries still exist. The causes of disparities are linked to the development process. Evidence showed that cross country differences in fertility levels diminish as countries become more developed.

Based on the 1992 Namibia Demographic and Health survey, Namibia was classified into the group of countries with steady fertility decline. In 2001 the total fertility rate (TFR) in Namibia was 4.1 and in 2006 the TFR dropped to 3.6. Within Namibia, there were wide regional differences in the level of fertility and the state of fertility transition. Fertility patterns were connected with

the historical context of the regions. At the beginning of independence i.e. in the early 1990s fertility was highest in the northern part of the country, clearly lower in the central regions and lowest in Southern Namibia<sup>13</sup>. However, a decade after independence, fertility in every region but regional differences still remained. Reliable data on demographic variables from colonial period have been lacking, and hence researchers studying fertility in Namibia have concentrated on censuses and demographic surveys collected after Namibia gained her independence in 1990. In-depth studies on fertility decline in Namibia have been lacking so far. Thus, this paper examines the fertility trends in Namibia over the past 2 decades and examines fertility differentials across the various sub-groups of Namibia population, and factors affecting such differentials. The paper tries to explain observed changes in fertility rates across all regions of Namibia with an emphasis on socioeconomic consideration. It aims to extend the understanding of fertility related behaviors in different ways; first by explaining recent developments in fertility rates and their relationships to other social drivers; second by applying statistical models to explain variation in fertility rates due to individual characteristics and third; by exploring which policies though their effects on particular variables have the biggest effect on fertility rates.

## Methods

**Data and Sample:** The analysis is based on secondary data from the 1992, 2000 and 2006 Demographic and Health Surveys (DHS). The DHS is a nationally representative stratified self-weighting proportional sample survey of women 15 to 49 years of age. A total of 5421 women of childbearing age were successfully interviewed in 1992. In 2000, a total of 6755 women were successfully interviewed. In 2006, a total of 9804 women were successfully interviewed. This paper focused on women of child bearing age. Selected variables were chosen to represent the independent variables for the study. The selection was based on relevant literature and on the availability of information in the DHS. These included age of the woman at first marriage, age of the woman at first

intercourse, her marital status, her level of education, her partner's education level, labour force participation, contraceptive use, and breastfeeding pattern among others. The dependent variable was the total number of children born to a woman.

**Statistical Methods:** Descriptive analysis was used to profile the background characteristics of women of child bearing age as well as to compare the average of total number of children ever born across the years. Estimates of the amount of variance in the total number of children ever born that could be explained by each of the independent variables were made using multiple regression analysis for the three data sources. Because categorical predictor variables cannot be entered directly into a regression model and be meaningfully interpreted, dummy variables were created from each categorical variable. The resultant estimated model for each data source was of the form:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_i + \hat{\beta}_2 D_{ij} + \dots + \hat{\beta}_p x_p$$

where  $\hat{\beta}_i$  are the least squares coefficients of the predictors of the multiple regression model;  $y$  is the dependent variable and  $x_i$  are the independent variables. A 5% significance level was used to determine whether an independent variable should be retained in the model or not. Model goodness of fit was assessed using the coefficient of determination, the adjusted multiple  $R^2$ . Residual analysis using residual plots and the Durbin Watson statistic and normality tests were conducted to validate model assumptions. The statistical analysis was conducted on SPSS software.

## Results

**Results of descriptive analysis:** Percentage distribution of women of child bearing age by their background characteristics are presented in Table 1. The results show that the proportion of women using contraceptives has increased consistently from (22.0%) in 1992 to (45.6%) in 2006. This is consistent with the findings by Kirk<sup>14</sup> who reported that the decline of fertility in Namibia is explained by their levels of contraceptive use. Namibia has a relatively young population hence the sample included a higher proportion of women in the

**Table 1:** Percentage distribution of women of child bearing age by their background characteristics, NDHS 1992, 2000 and 2006

Characteristic	Percent		
	1992 N=5421	2000 N = 6755	2006 N = 9804
<b>Age</b>			
15-19	23.8	21.2	22.5
20-24	20.9	19.5	19.1
25-29	16.2	16.4	15.9
30-34	13.3	14.9	14.5
35-39	10.1	11.7	11.0
40-44	9.3	9.7	9.7
45-49	6.4	6.6	7.3
<b>Place of residence</b>			
Urban	34.9	45.9	44.9
Rural	65.1	54.1	55.1
<b>Highest education level</b>			
No education	14.7	11.8	7.9
Primary	49.3	32.2	26.7
Secondary	34.3	53.4	59.7
Higher	1.6	2.7	5.7
<b>Religion</b>			
Roman Catholics	26.9	23.7	22.2
Protestants	71.8	73.5	76.1
No religion	1.3	1.4	1.4
Other religions	0.1	1.4	0.3
<b>Marital Status</b>			
Never married	50.0	50.3	56.6
Married	29.0	23.4	20.4
Living together	13.4	18.4	16.0
Widowed	1.6	1.7	2.7
Divorced	4.0	1.1	1.0
Not living together	2.1	5.1	3.2
<b>Working status</b>			
Not working	68.9	65.7	56.9
Working	31.1	34.3	43.1
<b>Current Contraceptive use</b>			
Currently not using	78.0	58.4	54.4
Currently using	22.0	41.6	45.6

younger age group. With respect to highest educational level, there is a clear indication that the percentage of women attaining higher education has been increasing in Namibia since its independence. This is reflected by the results that the proportion of women with secondary education increased from (34.3%) in 1992 to (59.7%) in 2006. A similar pattern is also observed among women with higher levels of education. This has contributed significantly to the increase in the percentage of women employed. In all the years, the proportion of women who belong to the protestant religion is above 70 percent. Generally, at independence, Namibian population was perceived to be mainly rural. However, with the increasing development whereby new areas are proclaimed to become urban, the proportion of the population in urban areas continues to increase which is also reflected in the DHS. In all the years, the sample included a high proportion of never married women. It is also of interest to observe that the proportion of married women has decreased from 29 percent in 1992 to 20.4 percent in 2006.

**Trend analysis:** Overall, on average, the total children ever-born increased by age of women. The pattern in figure 1 shows a decline in fertility. This pattern is consistent with the reported total fertility rate (TFR) in the three DHSs. Total fertility rates declined dramatically over the past few decades, falling from an average of 6.2 children per women of childbearing age in 1992 to 3.6 in 2006. The timing and pace of decline however varies from region to region.

The results in figure 2 show that the mean age at first birth has remained relatively constant over the years, while the mean age at first marriage has considerably increased from 21 years to almost 23 years. This is an indication of high premarital childbearing among women in Namibia, which is also reported by Gage<sup>15</sup>. A change in the mean age at first marriage is deemed as the contributing factor to declining fertility. In most African countries, married women have a higher fertility rate than unmarried women. As the share of women that are unmarried has decreased over time, this may be expected to have depressed total fertility rates.

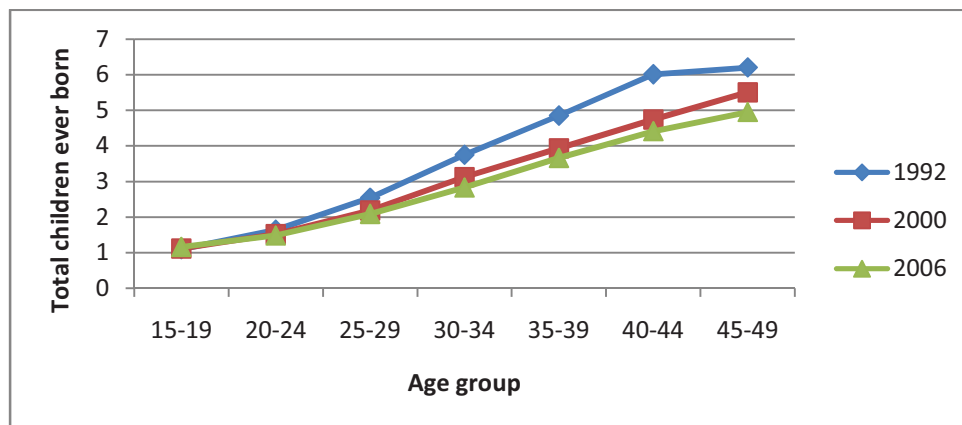


Figure 1: Mean number of children ever born by women of childbearing age by year

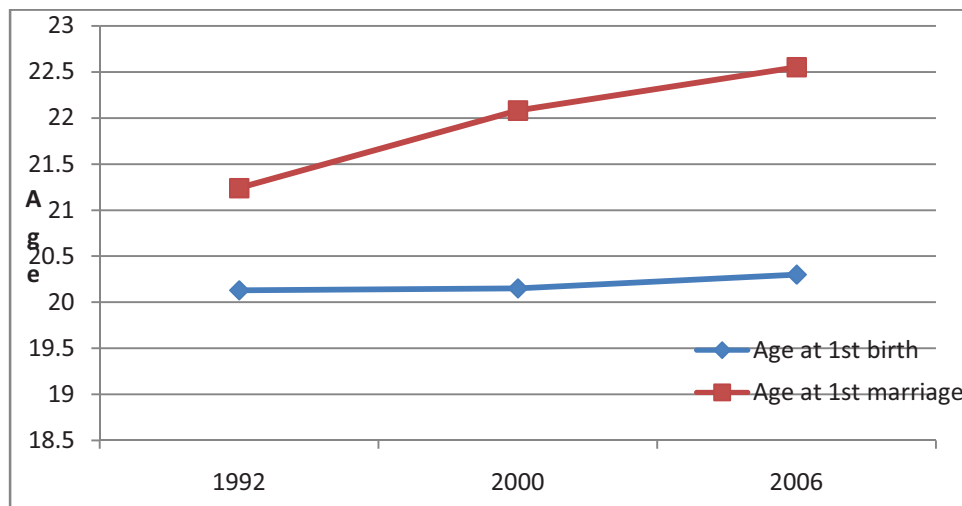


Figure 2: Average age at first marriage and first birth of women of childbearing age by year, Namibia

**Results of Multiple Regression Analyses:** Results of multiple regression analyses are shown in Table 3. Multivariate analysis was performed to estimate the effects of a set of independent variables on the dependent variable included in the study. The results indicated that the age of the respondent, her place of residence, her level of education, her working status, fertility preferences, desire for more children and three proximate variables (ever use of contraceptive method, age at first marriage and age at 1<sup>st</sup> birth) are the significant predictors of fertility in Namibia.

With respect to age at first birth, the estimated coefficients are negative in all the years. This could be interpreted as, an increase in the age at first birth results in a decrease in fertility. These findings are consistent with Westhoff<sup>16</sup> who reported that in Namibia a high prevalence exists of sexual unions that do not imply regular cohabitation of partners, and as a consequence, formal marriages occur relatively late in life but child bearing starts at an early age. However, the magnitude of the effect decreases over the years. A similar pattern is observed for age at first marriage



**Table 2:** Estimated coefficients of socioeconomic variables and proximate factors on fertility among females 15-49, Namibia, 1991, 2000, and 2006 DHS

Characteristic	1992	2000	2006
Constant	4.597	4.252	4.277
<b>Place of Residence</b>			
Urban	reference	reference	reference
Rural	0.892**	0.663**	0.445**
<b>Age group</b>			
15-19	reference	reference	reference
20-24	1.316**	1.023**	1.034**
25-29	2.542**	2.178**	2.018**
30-34	3.919**	3.15**	2.98**
35-39	4.952**	3.946**	3.747**
40-44	6.283**	4.683**	4.404**
45-49	6.571**	5.467**	4.692**
<b>Education level</b>			
Never been to school	reference	reference	reference
Primary	0.001	-0.074	-0.243*
Secondary	-0.486	-0.686**	-0.933**
higher	0.899*	-0.871**	-1.125**
<b>Ever used a contraceptive method</b>			
never used	reference	reference	reference
used Folkloric	-1.045	-0.057	-1.166
used traditional	0.091	0.543*	0.844*
used modern	-0.024	0.01	0.007
<b>Desire for more children</b>			
desire no more within 2 years	reference	reference	reference
after 2 years	-0.794**	-0.93**	-0.71**
unsure timing	-0.205	-0.223*	-0.274**
declared infecund	-0.324	-0.756**	-0.66**
	-0.511**	-0.353**	0.037
<b>Fertility preference</b>			
no more	reference	reference	reference
have another	0.139	0.696*	0.394*
declared infecund			
<b>Respondent working status</b>			
not working	reference	reference	reference
employed	0.0001**	-0.188*	-0.21**
<b>Age at 1st birth</b>	-0.211**	-0.178**	-0.151**
<b>age at 1st marriage</b>	-0.019*	-0.008	-0.018**
<b>age at 1st intercourse</b>	-0.004**	0.001	0.003
<b>R<sup>2</sup></b>			
<b>F-ratio</b>	0.557	0.520	0.518
<b>Durbin Watson</b>	119.759**	152.993**	194.085**
<b>Number of cases</b>	1.805	1.892	1.873

Significant at \*p &lt; . 05, \*\* p &lt; .01

but with a very small effect. Overall, fertility increases by the age of a woman. As expected, women in the age group 15-19 have fewer children than women in all of the other age groups. This pattern is consistent for all the years. However the results show an indication of a decrease in the number of children born over the years. For instance, in 1992, women in the age group 45-49 had 6.57 more children on the average as compared to those in the 15-19 age group. This figure reduced to 5.46 children in 2000 and to 4.69 children in 2006 for the women aged 45-49. The effect of education level is significant among those women with at least secondary level education. In 2006, women with at least secondary education had fewer children on the average than those who have never been to school. The magnitude of the effect is higher in 2006 where women with higher levels of education had on average one child less than those who had never been to school. The effect of the woman's education on fertility has been reported by several researchers<sup>17</sup>. Most educated women have either spent more years in school, thereby increasing their age at first birth and at first marriage, hence resulting in fewer number of children compared to those who have never been to school. A similar scenario is also observed among women who are working. Compared to women who are not working, working women have on average fewer children. This could be because working women have limited flexibility in terms of maternity leave conditions, work commitments and this could negatively contribute to their fertility levels. Over the years under consideration, it is apparent from the results that women who live in rural areas have more children than those in urban areas. The effect of place of residence on the total number of children ever born indicates a decrease from 1992 to 2006. In the long run it is anticipated that fertility will decrease among women in the rural areas. With respect to contraceptive use, the results show that women who have ever used traditional methods have on average more children than those who have never used. This could be an indication of the ineffectiveness of traditional contraceptive methods. Overall contraceptive use in Namibia has a small effect on fertility. Overall, with regard to the desire for more children, those women who

desire more children within two years or after and those unsure of the timing, have on average fewer children than those who desire no more children.

## Discussion

Overall, results from analyses show that fertility levels in Namibia have been decreasing over the past two decades. The decrease could be associated with an increased trend in the prevalence of use of modern contraceptives which doubled since 1992. Age at first birth has remained constant over the past two decades but age at first marriage has slightly increased to 22 years. Researchers<sup>18-19</sup> noted that postponement of marriage increases the probability that women remain childless or that they have fewer children than desired. As a result, postponement of first marriage leads to postponement of first child birth in most cases. It is also observed and reported by researchers<sup>18</sup> that women are today much more educated than those in previous generations. Longer periods in education have increased the mean age of women at first childbirth and reduced the number of years in which they can have additional children. In addition, higher educational achievement has contributed to higher female labor force participation, changed their desire for children as compared to other goals and provided them with greater autonomy in many series of life. Better educated women are also more aware of health problems and contraceptive technologies and thereby more capable of avoiding undesired pregnancies and births. In Namibia, the trend of educated women has increased since independence. Official statistics in Namibia have also recorded higher rates of women's enrollment in tertiary education. A similar pattern is observed with respect to female labour force participation. Relating these to fertility pattern, married women with at least secondary education in Namibia have on average two children as compared to five children for those with no education.

The Namibian government has been more active in the area of family planning programs and had succeeded in ensuring health care assistance, in widespread contraceptive and general sexual and reproductive health services. These services are provided free in various hospitals and clinics in

both rural and urban areas. On the other hand, Namibia introduced a policy of Education for All after independence resulting in an influx of women enrolling in educational programs in both rural and urban areas. Similar to findings of this study, education was also shown to affect a wide range of behaviors in several countries, most of which have a depressing impact on fertility.

Results from multiple linear regression analysis using the stepwise model selection procedure show that fertility levels among women in Namibia are associated with age, age at first intercourse, desire for more children and fertility preference, after controlling for her education level, place of residence. Although Bongaart's earlier included it as a proximate determinant of fertility, marriage does not seem to be a significant predictor of fertility in Namibia. This could be due to the fact that child-bearing has also increased rapidly among non-married women, leading to sharp rises in the share of births outside of marriage. These changes in child-bearing behaviour are partly explained by shifts in values of individuals regarding family and gender roles<sup>18</sup>.

Namibia is sparsely populated with a population density of two people per square kilometer. The national vision on fertility is to reach the replacement level by 2030. However, from the current demographic statistics, the replacement level is projected to be attained much earlier than 2030 if current trends persist. This becomes a policy concern as Namibia may fall in the fertility dilemma as experienced by some developed countries and timely control measures have to be put in place. Further research could focus on policy implications of family planning programmes once replacement level has been achieved to maintain it.

## Contribution of Authors

Authors, Nelago Indongo and Lillian Pazvakawambwa contributed extensively to the work presented in this paper. They both participated in data organization and management, data analysis and contributed to the writing of the manuscript. Both authors reviewed and edited the manuscript and approved the final version of the manuscript.

## Acknowledgements

The authors wish to thank the Ministry of Health and Social Services in Namibia and its staff in the Directorate of Policy Planning and Human Resource Development for access to these data and experts at Population Association for Southern Africa (PASA) for their valuable comments and inputs. This paper was also made possible with funding support from the University of Namibia.

## References

1. Shemeikka R, Notkola V. and Siiskonen H. Fertility Decline in North-Central Namibia: An assessment in the period 1960-2000 based on parish registers. *Demographic Research* 2005; 13(4):83-116.
2. Shapiro D and Gebreselassie T. Fertility Transition in Sub-Saharan Africa: Falling or Stalling. *African Population Studies* 2008; 22(2):4-21.
3. Bongaarts J. Completing the fertility transition in the developing world: The role of educational Differences and fertility preferences. *Population Studies* 2003; 57 (3): 321-335.
4. White MJ, Tagoe E, Stiff C, Adazu K and Smith DJ. Urbanisation and the Fertility Transition in Ghana. *Population Research and Policy Review* 2005; 25(1):59-83.
5. Garenne M. and Zwang J. Premarital fertility and HIV/AIDS in Sub-Saharan Africa. *African Journal of Reproductive Health* 2008; 12(2):64-74.
6. Eloundou-Enyenge PM, Stokes CS and Cornwell GT. Are there crisis-led fertility declines? Evidence from Central Cameroon. *Population Research and Policy Review* 2000; 19(1):47-72.
7. Adsera A. Changing fertility rates in Developed countries: The impact of labour market institutions. *Journal of Population Economics* 2004; 17(1):17-43.
8. Terceira N, Gregson S, Zaba B and Mason PR. The contribution of HIV to fertility decline in rural Zimbabwe 1985 – 2000. *Population Studies* 2003; 57(2):149-64.
9. Jensen E.R. and Ahlburg, DA. Fertility Decline in Iran. *Population Studies* 2004; 58(2):219-231.
10. Shults PT. The Fertility Transition: Economic Explanations. Economic Growth Center 2001, Yale University, Discussion paper No. 88:1-23.
11. Davis K, and Blake J. Social Structure and Fertility: An Analytic Framework. *Economic Development and Cultural Change* 1956; 4: 211–235.
12. Bongaarts J, Potter RG. Fertility, biology and behaviour; an analysis of the proximate determinants. New York: Academic Press 1983.
13. Ministry of Health and Social Services (MoHSS). Namibia Demographic and Health Survey 1992. Ministry of Health and Social Services 1993, Windhoek, Namibia.
14. Kirk D and Pillet B. Fertility Levels, Trends, and Differentials in Sub-Saharan Africa in the 1980s and 1990s. *Studies in Family Planning* 1998; 29 (1): 1-22.
15. Gage AJ. Sexual activity and contraceptive use: the components of the decision making process. *Studies in Family Planning* 1998; 29(2):154-166.
16. West off CF, Blanc A and Nyblad L. Marriage and entry into parenthood. Health Surveys Comparative Studies 1994(10). Calverton: Macro International.
17. Martin TS. Women's Education and Fertility: Results from 26 Demographic and Health Surveys. *Studies in Family Planning* 1995; 26(4): 187-202.
18. D'Addio A.C. and d'Ercole M.M. Trends and Determinants of fertility rates in OECD Countries: The role of policies, OECD Social, Employment and Migration Working Papers (2005) DELSA/ELSA/WD/SEM 6.
19. Varea C. Marriage, age at first birth and fertility in traditional Moroccan Population. *Journal of Bio-Social Science* 1993; 25 (1): 1-15.