Bangladesh e-Journal of Sociology. Volume 14, Number 2. July 2017

Determinants of Fertility Decline in Namibia: An analysis of the Proximate Determinants

Martin E. Palamuleni*

Abstract: *The paper examines trends in the proximate determinants of fertility in Namibia during the period 1992-2013, with a view to explaining the factors responsible for fertility decline in the country. The study uses the 1992, 2000, 2006 and 2013 Namibia Demographic and Health Surveys and Bongaarts' model of proximate determinants. The study shows that marriage has a far more dominant inhibiting effect on fertility than the other proximate fertility determinants. Specifically, the fertility suppressing effects of marriage are more important than the effects of contraception and postpartum infecundability in explaining fertility levels and trends in the context of Namibia; the indices of marriage and contraception and an increase in the index of postpartum infecundability. The change is greatest in contraceptive, moderate in marriage and least in breastfeeding. The study recommends that strategies aimed at improving reproductive health services such as empowerment of women should be promoted in Namibia.*

Keywords: nuptiality, contraception, post-partum infecundability, fertility decline, proximate determinants, Namibia.

Introduction

The subject of demographic transition has been one of the principal preoccupations of scholars and policy makers in the last few decades. Some researchers have observed that the ever-present differentials in the levels, trends and determinants of fertility warrant separate and detailed studies in various regions and countries in order to obtain a better understanding of the issues (Mirzaie, 1998). In this paper an attempt is made to examine the recent trends in fertility and its proximate determinants in Namibia. The need for research on the subject of fertility in Namibia cannot be overemphasized. Fertility is one of the most important determinants of population growth, which aspect has implications for the state of various social, economic and cultural factors in any given country. This is particularly true in the context of sub-Saharan Africa (SSA) which region has, until very recently, been characterized by high population growth rates and high levels of fertility. Fortunately, new evidence suggests that fertility levels have begun to decline in the region. However, the pace and intensity of such change among the countries of the region, has by no means been uniform. Moreover, in some cases fertility decline has stagnated or reversed altogether (Garenne

* Population Training and Research Unit, North West University, Mafikeng Campus. E-mail: martin.palamuleni@nwu.ac.za

2007, 2008; Shapiro, Gebreselassie 2007). This paper therefore examines the nature and determinants of fertility decline in the case of Namibia.

Country background

Namibia has a population of about 2.1 million and it is one of sparsely populated country in the world (Namibia Statistical Agency 2012). However, the population is unequal distributed in the country. More than half of the country's population are at the northern part of the country, in rural areas and mostly engage in subsistence farming. The country is considered as one of the richest countries in terms of natural resources in the continent but one third of the population is living in poverty (UNAIDS, 2009). According to the United Nations (UN) the poorest 20% of the country's population receives only 1.4% of the national income while the 78.7% of the national income is concentrated in the hands of the few richest 20% of the population (UNAIDS, 2009). The majority of the population suffer from food insecurity, have limited access to services and there is a problem of high unemployment in the country, which counts for about 37% (UNAIDS, 2009).

Namibia is a middle income country which is ranked 127 out of 187 countries and has a Human Development Index of 0.624 in 2013 (UNDP 2014). Although compared to other countries in the region the demographic indicators in Namibia are much better but they are worse with other middle income countries.

Available demographic statistics indicate that the Infant Mortality Rate (IMR) has declined from 56.6 per 1000 in 1992 to 38.1 in 2000 and increased to 46 in 2006 (MoHSS and ICF International, 1993, 2003, 2007). The estimate of IMR for 2013 is 39 per 1000 (MoHSS and ICF International, 2014). Moreover, the risk of Namibia women dying due to pregnancy and related complications is high and probably increasing. Maternal Mortality Ratio (MMR) was estimated to be 225/100000 in 1992, increasing to 271/100000 in 2000 and 449/100000 in 2006 before declining to 385/100000 in 2013 (MoHSS and ICF International (1993, 2003, 2007, 2014).

Similarly, expectation of life at birth for males was 59 years in 1991 and declined to 48 years in 2001 and increased to 53 years in 2011 (Central Bureau of Statistics, 2010.). Similar estimates for females were 63, 50 and 61 years respectively (Central Bureau of Statistics, 2010.). The decline in expectation of life at birth between 1991 and 2001 and increase in maternal and child mortality rates over the same period are largely attributed to the HIV and AIDS epidemic. It is estimated that the 20% of all pregnant women in Namibia are infected and adult HIV prevalence rate is 14.3% [11.8% - 17.3%] (Central Bureau of Statistics, 2010).

Furthermore, studies have shown that major factors contributing towards poor health status among the majority of the people in the country are: poverty, high illiteracy rates, especially among women, too early, too many, too frequent and too late pregnancies and high fertility (Central Bureau of Statistics, 2010).

Total Fertility Rate (TFR) in Namibia has declined over the past few decades. TFR declined from 5.4 children per woman in 1992 to 4.2 children per woman in 2000 and further down to 3.6 children per woman in 2006 (MoHSS and ICF International, 1993, 2003, 2006, 2014). Thereafter TFR appears to have remained constant (MoHSS and ICF International, 2014). The decline in fertility could be attributed essentially to an increase in contraceptive prevalence rate. Contraceptive prevalence rate for all the methods for currently married women rose from 28.9% in 1992 to 43.7% in 2000, 55.1% in 2006 and to 56.1% in 2013 (MoHSS and ICF International, 1993, 2003, 2006, 2014).

In recognition of the important role demographic variables play in social and economic development, the Government of Namibia prepared and implemented a national population policy whose objective was "to contribute to the improvement of the standard of living and quality of life of the people of Namibia .... through the harmonization of the dynamics of Namibia's population ... with the country's resource potentials in order to accomplish development objectives" (Arowolo 2000b). Given that the Government of Namibia has embarked the process of reviewing the population policy it is important to understand the nature and patterns of fertility in Namibia so as to come up with achievable targets for the future.

In addition, the desired demographic goals have been set within the broader national development objectives that place poverty alleviation as top priority (GRN/NPC 1997). As such various policy documents including the national population policy have been prepared whose overall objective is to achieve sustainable population growth rates which are compatible with the attainment of the country's social and economic development objectives (Arowolo 2000b; GRN/NPC 1997).

Objectives

While various studies have documented fertility decline in Namibia (Shemeikka, Notkola and Siiskonen 2005; Indongo and Pazvakawambwa 2012)), no systematic attempt has been made to identify the factors responsible for this trend.

In view of the foregoing, this paper endeavours to examine the factors that have been responsible for the recent fertility decline in Namibia. Specifically the paper aims at analysing the levels of and trends in fertility in Namibia, with particular focus on the role of each of the proximate determinants in the fertility decline and unpacking reasons for the change in TFR between 1992 and 2000, 2000-2006 as well as between 2006 and 2013.

Data and methods

The study is based on an analysis of data obtained from the 1992, 2000, 2006 and 2013 Namibia Demographic and Health Surveys (MoHSS and ICF International (1993, 2003, 2007, 2014). All the surveys are nationally representative and have been implemented to allow analysis for the country of Namibia as a whole and separately by rural-urban areas. The last two surveys allow the analysis to

be conducted for selected districts. Both household and individual files have been used to obtain the necessary data.

Bongaarts' model

To meet the study objectives, the proximate determinants framework as developed by Bongaarts was been applied (Bongaarts, 1978, 1982, 1987). Bongaarts' formulae for estimating TFR and the corresponding indices are easy to use and sensitive enough to determine the nature and pace of fertility change and its determinants. Also, the relative importance of each of these determinants in influencing fertility levels can be assessed from this model.

Factors influencing fertility can be classified into two groups, namely intermediate fertility variables (or proximate determinants) and socioeconomic variables. The former, of interest because of its direct impact on fertility, consists of a set of biological and behavioural factors through which social, economic and cultural conditions can affect fertility. Stated otherwise, in the absence of these determinants, human fertility may reach a theoretical maximum of total fecundity (TF), accounting for an average of 15.3 births per woman. Thus, fertility differentials between regions and across time within the same region can always be traced to changes in one or more of the proximate determinants.

While Davis and Blake (1956) were the first to identify a set of eleven proximate determinants known as "Intermediate Fertility Variables", their classification did not get wide acceptance because it could not be easily incorporated in fertility analysis. Consequently, Bongaarts (1978) reclassified this list of determinants into seven variables, namely, marriage pattern, contraceptive use, induced abortion, lactation infecundability, spontaneous abortion, frequency of coitus and sterility. However, after various studies, Bongaarts (1982, 1987) realized that some of these factors are more relevant than others in determining the magnitude of fertility change. In fact, only four of them (proportion married, contraceptive use and effectiveness, induced abortion and postpartum infecundability) are the most important in explaining fertility variation, accounting for up to 96% of fertility change in some populations (Bongaarts, 1978; 1982; Bongaarts and Potter, 1983). In addition, it has been empirically shown that changes in these proximate determinants of fertility account for much of the variations in fertility among populations (Chuks, 2003; Casterline, 1994; Letamo & Letamo, 2001; Horne, 1992; Jolly & Gribble, 1993).

The fertility-inhibiting effects of the most important determinants are quantified in Bongaarts' model by four indices, each assuming a value between 0 and 1. When the index is close to 1, the proximate determinant will have a negligible inhibiting effect on fertility, whereas when it takes a value of 0, it will have a large fertility-inhibiting effect. It is important to note that since abortion is frowned upon in Namibia because of religious considerations, the index of abortion has been taken as 1, and, therefore, its contribution to fertility decline is virtually nil.

Bongaarts (1982) symbolized these four indices as follows: C_m being the index of proportion married; C_c as the index of contraception; C_a is the index of induced abortion; while C_i is the index of postpartum infecundability. The main equation of the model is thus:

$TFR= C_m*C_c*C_a*C_i*TF$

Where TFR is the Total Fertility Rate and TF is the Total Fecundity.
Regarding the estimation of the four indices, Bongaarts proposed the following treatments:

Index of Marriage:

$C_m= \sum\{m(a)*g(a)\}/ \sum g(a)$

Where, m(a) is the age specific proportions currently married and g(a) is the age specific marital fertility rate. In other words,

$C_m= TFR/ TM$

Where TM is the total marital fertility rate.

Index of Contraceptive Use:

The index of contraceptive use (C_c) is calculates as follows:

$C_c= 1 - 1.08* u*e$

Where, u is the proportion currently using contraception among married women of reproductive age; e is the average use effectiveness of contraception and 1.08 is the sterility correction factor. The method specific use-effectiveness level (e_i) is adopted from Bongaarts and Potter (1983). The weights are, in effect, equal to the proportion of women using a given method (u_i). Table 1 presents use-effectiveness of different contraceptive methods.

Table 1: Use-effectiveness of Different Contraceptive Methods

Contraceptive Method	Use-effectiveness
Pill	0.90
IUD	0.95
Injection	0.99
Sterilisation	1.00
Others	0.70

Source: Bongaarts and Potter (1983)

Index of Postpartum Infecundability:

The index of postpartum infecundability (C_i) can be estimated indirectly using the following equation:

$C_i= 20/ 18.5 + i$

Where i is the average duration (in months) of postpartum infecundability caused by breastfeeding or postpartum abstinence and is estimated using the following equation

$i = 1.753 * e^{0.1396 * B – 0.001872* B* B}$

Where B = mean or median duration of breastfeeding in months.

According to Bongaarts, 20 is the average birth interval (in months in absence of breastfeeding and postpartum abstinence, while 18.5 is the sum of 7.5 months of waiting time to conception, 2 months of time added by spontaneous intrauterine mortality and 9 months of full term gestation. In absence of breastfeeding, the average duration of postpartum infecundability is assumed to be 1.5 months.

Index of abortion:

$C_a = TFR/(TFR+(b*TA))$

Where TA is the total abortion rate equal to the average number of induced abortions per woman at the end of the reproductive period if induced abortion rates remain at prevailing levels throughout the reproductive period. B is the number of births averted per induced abortion which may be approximated by the equation b = 0.4 (1+u). Owing to unavailability of requisite information on induced abortion in Namibia, we assume that the overall total induced abortion rate is zero. However, the effect of this variable will be automatically subsumed in the estimation of the total fecundity.

Having obtained the indices, it is possible to calculate the various levels of fertility by means of multiplication with the corresponding indices. The model relating fertility to the intermediate variables takes the following form:

Total Fecundity Rate (TF) = 15.3
Total Natural Marital Fertility Rate (TN) = $TF*C_i$
Total Marital Fertility Rate (TM) = $TN* C_c*C_a$
Total Fertility Rate (TFR) = $TM* C_m$

These are the four different types of fertility levels identified from which the impact of the proximate determinants can be obtained. With the inhibiting effects of all proximate determinants present, a population's actual fertility level is measured by TFR. If the fertility-inhibiting effect of delayed marriage and marital disruption is removed without other changes in fertility behaviour, fertility will increase to a level of TM. If all practices of contraception and induced abortion are also eliminated, fertility will increase to a level of TN. Removing lactation and postpartum abstinence will, in turn, increase fertility to TF (Bongaarts, 1982).

Results

Levels and differentials in fertility

Table 2 presents various fertility indicators for Namibia calculated from the 1992, 2000, 2006 and 2013 NDHSs.

Table 2: Age Specific Fertility Rates and Other Measures of Fertility for Namibia 1992, 2000, 2006 and 2013

	1992	2000	2006	2013	1992-00	2000-06	2006-13
15-19	0.109	0.088	0.078	0.082	-19.3	-11.4	5.1
20-24	0.207	0.166	0.169	0.168	-19.8	1.8	-0.6
25-29	0.241	0.176	0.159	0.168	-27.0	-9.7	5.7
30-34	0.208	0.160	0.145	0.149	-23.1	-9.4	2.8
35-39	0.166	0.137	0.110	0.110	-17.5	-19.7	0.0
40-44	0.105	0.071	0.044	0.042	-32.4	-38.0	-4.5
45-49	0.037	0.038	0.008	0.010	2.7	-78.9	25.0
CBR	42.0	30.5	29.2	29.5	-27.4	-4.3	1.0
GFR	165	129	113	115	-21.6	-12.4	1.5
TFR	5.4	4.2	3.6	3.6	-22.1	-14.7	2.2
M	29.7	29.7	28.4	28.4	0.1	-4.6	-0.1
Direct	44.9	35.0	30.9	31.6	-22.2	-11.6	2.3
Indirect	44.2	34.7	30.8	31.6	-21.5	-11.2	2.6

Source: ASFR were obtained from appropriate survey reports whereas all the other fertility measures were calculated by the author.

* The standardised birth rates were calculated using the 1996 South African age-sex structure and age specific fertility rates as the standards for the direct and indirect methods respectively.

The Crude Birth Rate (CBR) in Namibia declined from 42.0 in 1992 to 30.5 in 2000 and to 29.2 in 2006 (MoHSS and ICF International (1993, 2003, 2007). The estimate for crude birth rate for 2013 increased slightly to 29.5 (MoHSS and ICF International (2014). The General Fertility Rate (GFR), a measure of the number of children per 1 000 women aged 15-49 show a similar trend to crude birth rate in that it declined from 165 in 1992 to 129 in 2000 and 113 in 2006 before increasing slightly to 115 in 2013. As for the total fertility rate (TFR), Table 2 shows that it has gone down from 5.4 in 1992 to 4.2 in 2000 and to 3.6 in both 2006 and 2013. The stagnation of TFR and the slight increase in CBR and GFR is not atypical in Namibia but is a phenomena that has been observed in other African countries passing through the various stages of the demographic transition (Moultrie, Sayi, Timæus, 2012). This phenomenon has been described in literature as “fertility stall” which has been attributed to, among

other things, the stagnation of socio and economic development (Garenne, 2007, 2008; Sayi 2014). The possibility that fertility has stalled in Namibia is an area requiring further investigation and discussion among population researchers.

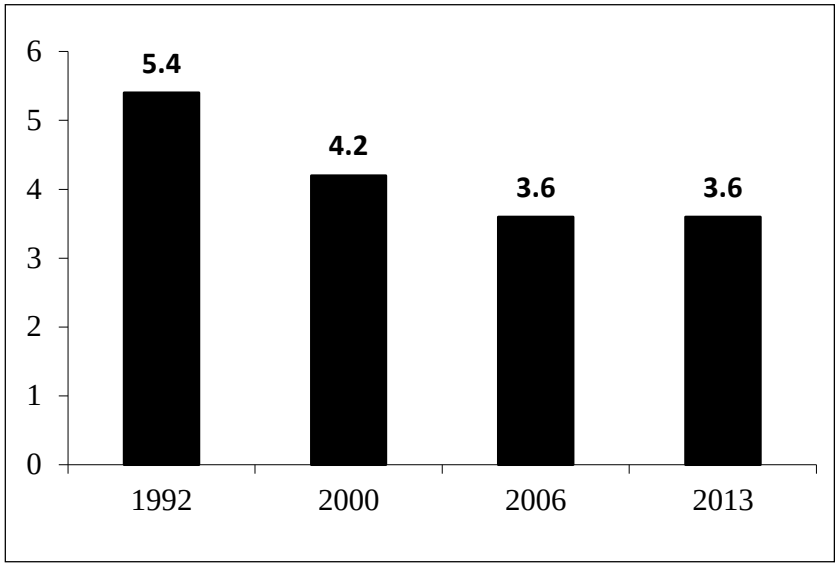

Figure 1: Total Fertility Rates for Namibia 1992-2013

Given that CBR is not a good measure of fertility, as it is affected by the age-sex structure of the population, standardised birth rates were calculated. Standardised birth rates have the advantage that they remove the negative impact of the age-sex structure. Standardised birth rates are also presented in Table 2. In general, like other fertility measures, standardised birth rates indicate a decline in fertility between 1992 and 2006 and suggest a slight increase in fertility between 2006 and 2013**.**

The Age Specific Fertility Rates (ASFRs) start from a low value in age group 15-19 rising to a maximum in age group 20-24 before declining to lowest value in age group 45-49. This pattern is observed in all data sets. Table 2 and figure 2 also suggest that the decrease in fertility in Namibia is primarily due to declines in the older age groups (say age groups above 30 years). ASFR at younger age groups (age groups below 30 years) appears to have risen. The shift in the timing of fertility is also indicated by the decline in the mean age of childbearing (m) from 29.7 years in 1992 and 2000 to 28.4 in 2006 and 2013. This observation is consistent with a finding by other researchers who noted that fertility patterns tend to concentrate and shift to younger years as fertility declines (Stover and Kirmeyer, 1999). On the other hand, this contradicts the assertion by Caldwell et. al. (1992) that " … the African fertility transition … will be characterised by fertility decline at all ages …". Probably this claim is true at advanced stages of fertility transition and not at early stages as is the case with Namibia.

The age pattern of fertility indicates that Namibian women have children early in the childbearing period. For example, women under 30 years of age accounted for 57.3 per cent of the total fertility rate (TFR); women under 20 years of age accounted for only 29.5 per cent of the TFR. The corresponding figures obtained in the 1992 NDHS were 59.1 and 29.5 per cent, respectively. This indicates that fertility is shifting towards earlier ages. The shifting is also evident from a fall in the mean age at childbearing from 29.7 years in 1992 to 27.4 years in 2013. This suggests that

childbearing is taking place relatively earlier now than it was previously, presumably because of greater fertility regulation at older ages in recent years

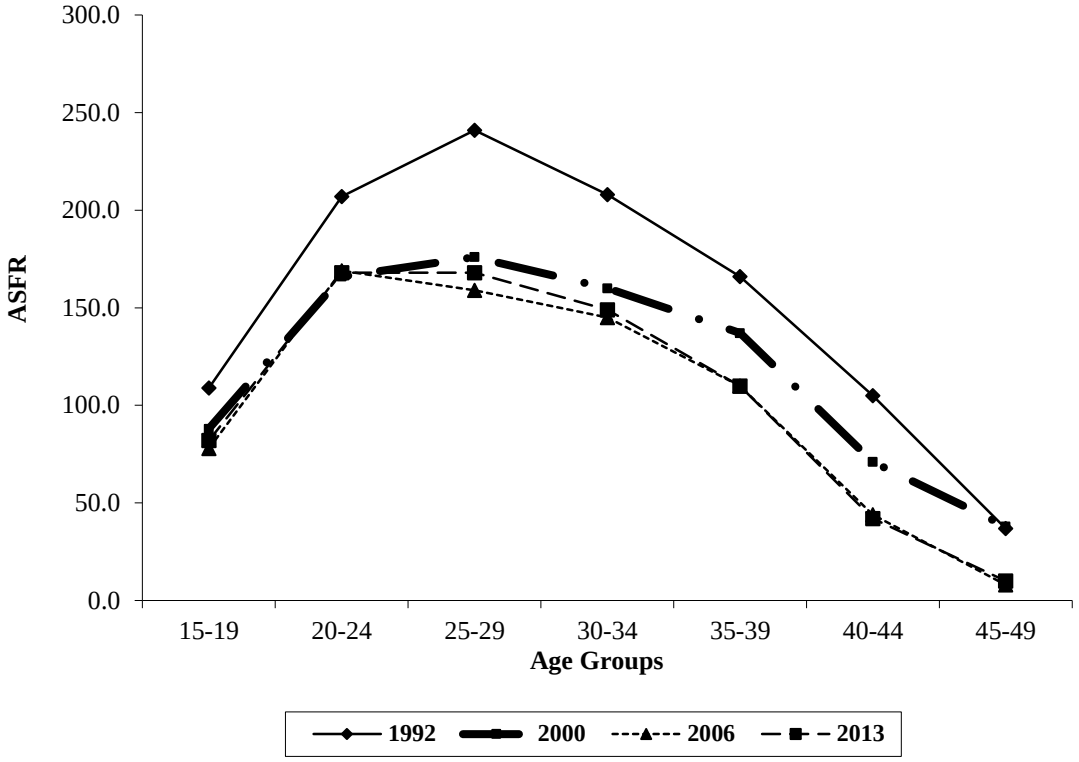

Figure 2: Age Specific Fertility Rates for Namibia 1992, 2000, 2006 and 2013

Fertility change can also be traced by examining cohort parity progression ratios (PPRs). The PPR is defined for parity i as the proportion of women who proceed to the next birth, i+1, among those who have had an ith birth. PPRs show the proportion of women who proceed from one event in the childbearing sequence to the next (Feeny, 1991). Older women (40-49) are chosen so that their PPR will be closer to their final PPR. Table 3 and figure 2 present PPRs for Namibia for the data sets under review. Cohort Fertility Rate (CFR) has declined from declined from 5.9 in 1992 to 4.9 in 2000 and 4.4 in 2006 and 3.9 in 2013 (see figure 3). Unlike the fertility measures presented in the previous paragraphs CFR suggest a continuation of fertility decline during the period under review.

Overall, other things being equal, the fertility measures utilised in this section have shown that during the twelve-year period under consideration (1992 to 2004), fertility in Namibia has been declining.

Table 3 PPR for Namibia 1992, 2000, 2006 and 2013

CEB	1992	2000	2006	2013

0	0.967	0.975	0.960	0.944
1	0.953	0.938	0.930	0.923
2	0.916	0.868	0.862	0.817
3	0.889	0.822	0.805	0.705
4	0.854	0.790	0.724	0.685
5	0.847	0.792	0.705	0.655
6	0.810	0.706	0.641	0.602
7	0.726	0.612	0.582	0.583
8	0.681	0.593	0.577	0.388
9	0.591	0.557	0.451	0.500
10	0.527	0.469	0.294	0.385
11	0.483	0.300	0.200	0.200
Cohort Fertility Rate (CFR)	5.9	4.9	4.4	3.9

Source: Calculated by the author.

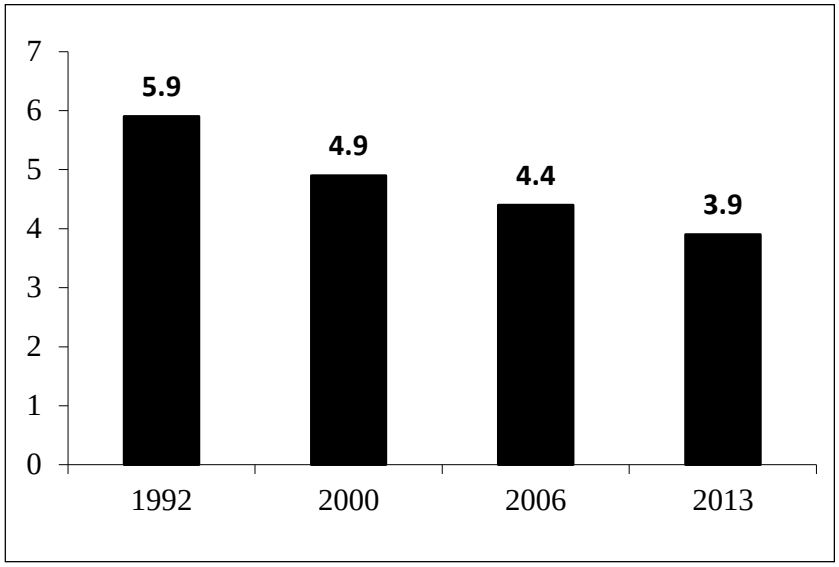

Figure 3: Cohort Fertility Rate for Namibia 1992, 2000, 2006 and 2013

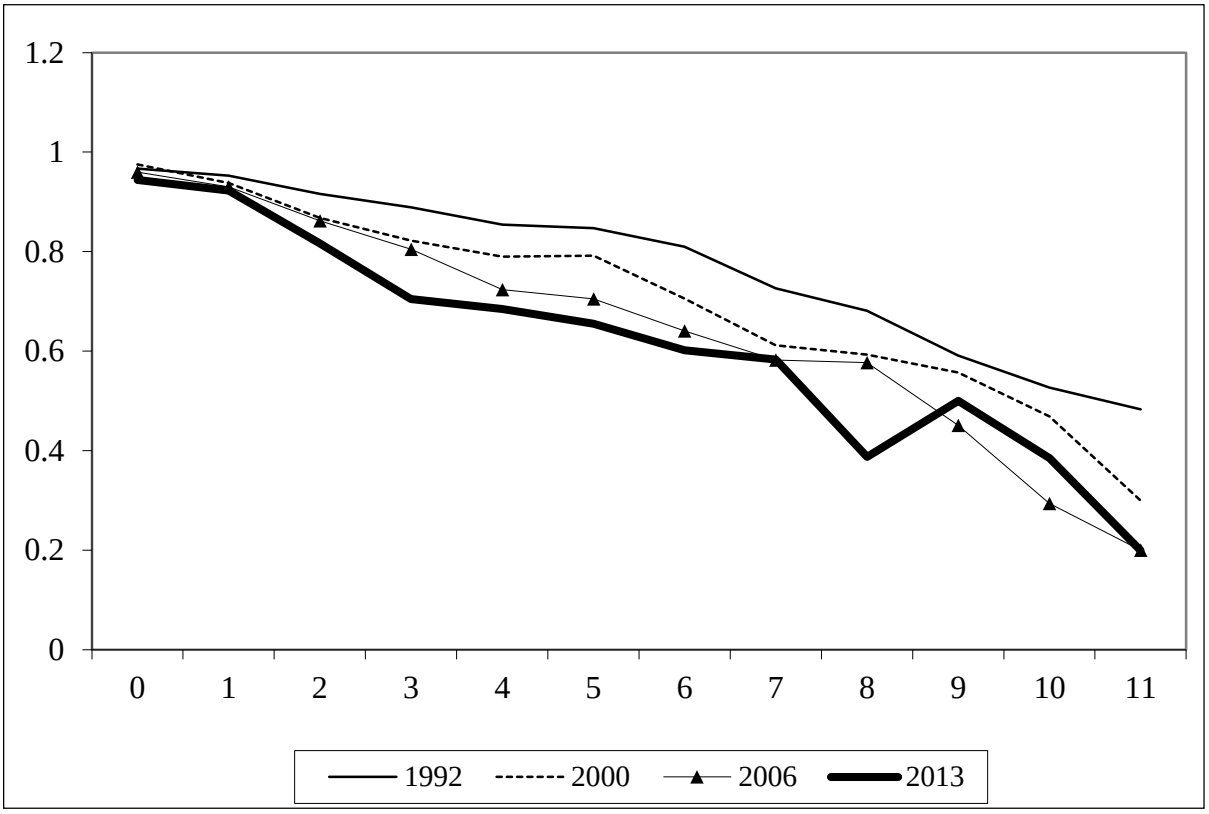

Figure 4: Parity Progression Ratios for Namibia 1992-2013

Proximate determinants of fertility

To improve an understanding of the causes of fertility decline in Namibia it is necessary to analyse the mechanisms through which socio-economic variables influence fertility. Davis and Blake (1956) referred to these mechanisms as the "intermediate fertility variables". Later, Bongaarts developed a model which quantifies the impact of the intermediate variables (Boongaarts, 1978; Bongaarts and Potter, 1983). Furthermore Bongaarts (1978) has proposed that the principal proximate determinants are marriage, breastfeeding, contraceptive use and abortion. Recent review of the model has revealed that the original model is still relevant and robust (Bongaarts, 2015). The myriad social, economic and cultural factors that influence fertility act through one or more of the proximate determinants.

Age at first marriage and proportion married

Age at first marriage refers to the ages reported by the respondents as those at which they began their first marital relationships. Age at first marriage identifies the onset of exposure to continuous and socially sanctioned childbearing. Implicitly therefore, the earlier a woman marries, the longer her reproductive life span, and *ceteris paribus,* the higher the number of children she is expected to have at the end of her childbearing period. Conversely, an increase in the average age at first marriage in a population is associated with the transition to lower fertility, as the length of time the woman spends exposed to the risk of childbearing is reduced and consequently the number of children she will bear over her reproductive span declines.

In Namibia information on age at first marriage was collected by asking each ever married woman for the date (month and year) when she began living with her first husband. Respondents were also asked how old they were when hey first married. The results indicate that the singulate mean age at first marriage for females has increased from 26.4 years in 1992 to 28.3 years in 2000 and 2006 and declined to 27.9 years in 2013 (see Table 4). The findings seem to suggest that in Namibia, the mean age at first marriage is increasing. In 2000 the mean age at first marriage varied from 18.2 years in 15-19 to 17.9 years in 45-49. The same pattern is observed in the 2004 MDHS. Overall the values of mean age at first marriage suggest an increase in age at first marriage.

The increase in the age at first marriage could also be inferred from the decline in the proportion married in age 15-19. Table 3 indicates that 7.7% of the women aged 15-19 reported that they were ever married in 1992. This proportion declined to 5.5%% in 2000 and 2006 and increased slightly to 5.9% in 2013. Similar percentages for the age group 20-24 were 31.1%, 24.1%, 24.1% and 22.1% respectively. However, although the mean age at first marriage appears to be increasing in Namibia, the results show that the increase is small and many women are remaining single.

Whereas slightly over half of the women were married before their thirtieth birth day in 1992 and nearly 40% of the women are married by age group 30-34.

Another way of looking at age at first marriage is to examine the singulate mean age at marriage (SMAM). The SMAM is the mean age at first marriage among those who ever marry (United Nations, 1983). Available information indicates that SMAM has for females has increased from 26.4 years in 1992 to 28.3 years in 2000 and 2006 and declined to 27.9 years in 2013 (see Table 4). Although the available statistics in Namibia point to a rising trend in age at first marriage, the increase is still so small as to lead to drastic changes in fertility.

Table 4: Proportion Ever Married by Age and singulate Mean Age at marriage, 1992-2013

	1992	2000	2006	2013
15-19	92.3	94.5	94.5	94.1
20-24	68.9	75.9	75.9	77.9
25-29	46.9	55.4	55.4	57.8
30-34	25.8	39.7	39.7	44.2
35-39	19.2	30.7	30.7	36.5
40-44	18.9	26.1	26.1	30.6
45-49	11.9	17.1	17.1	24.1
SMAM	26.4	28.3	28.3	27.9

Source: Calculated by the author.

Contraception

Contraception has a direct negative impact on fertility. Available statistics indicate that the government of Namibia, with the help of the NGOs in the field, has made remarkable progress in the area of family planning. Results of the 2013 NDHS show that, among currently married women aged 15-49, knowledge about at least one family planning method is almost universal. Moreover, the use of contraceptive methods has significantly risen in Namibia during the period under review. Table 5 indicates that contraceptive prevalence rate for all the methods for currently married women rose from 28.9% in 1992 to 43.7% in 2000, 55.1% in 2006 and to 56.1% in 2013. These statistics suggest that contraceptive use in Namibia almost doubled within two decades after independence.

Table 5 also indicates the declining importance of the traditional methods. CPR by traditional methods has declined from 2.9% in 1992 to 1.1% in 2000 and 0.8% in 2013. At the same time, the CPR for modern methods has increased from 26.0% in 1992 to 42.6% in 2000 and to 53.4% in 2006 and 55.3% in 2013. This means that the increase in the overall CPR is due to the increase in modern contraceptives. This could be related to the national family planning programme and related campaigns that promote use of modern contraceptives.

Table 5: Contraceptive Use by age by Method: Namibia 1992, 2000, 2006 and 2013

	Any methods				Modern methods				Traditional methods			
	1992	2000	2006	2013	1992	2000	2006	2013	1992	2000	2006	2013
15-19	20.5	45.2	40.9	37.2	16.5	40.4	39.1	32.2	4.0	4.8	1.8	5.0
20-24	30.6	45.4	54.4	53.7	25.7	45.0	51.5	53.2	4.9	0.4	2.9	0.5
25-29	32.3	46.2	56.6	58.5	28.3	45.5	56.4	58.0	4.0	0.7	0.2	0.5
30-34	29.3	44.0	57.6	58.4	27.0	42.6	55.8	57.6	2.3	1.4	1.8	0.8
35-39	32.6	47.7	56.6	57.3	29.8	46.0	55.4	56.9	2.8	1.7	1.2	0.4
40-44	23.7	39.6	56.0	57.5	22.5	38.9	54.0	56.9	1.2	0.7	2.0	0.6
45-49	36.6	36.7	49.4	52.6	23.1	36.1	47.6	50.9	13.5	0.6	1.8	1.7
	28.9	43.7	55.1	56.1	26	42.6	53.4	55.3	2.9	1.1	1.7	0.8

Source: Calculated by the author.

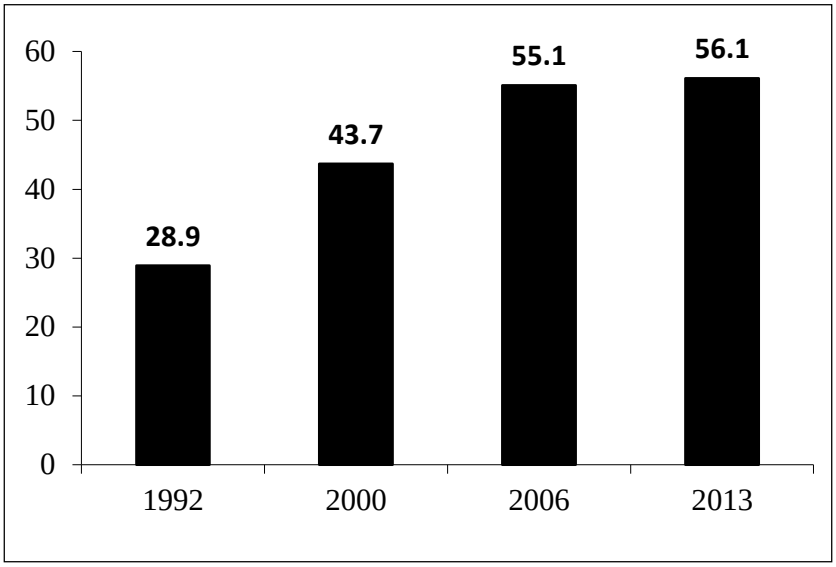

Figure 5: Contraceptive Prevalence Rate for Namibia 1992-2013

The specific methods used by Namibian women are indicated in Table 6 and illustrated in Figure 3. Apart from the increase in contraceptive prevalence, a marked change has also occurred in the mix of methods used for contraception. In 1992, the most commonly used methods were pills (8.3%), injections (7.7%), female sterilisation (7.0%) and IUD (2.1%). By 2000, the use of injections more than doubled whereas the use of pills remained unchanged. In 2000 the most commonly used methods were injections (18.7%), female sterilisation (8.5%), pill (8.2%) and condom (5.3%) and IUD dropped to the fifth position at 1.2%. The 2006 NDHS reveal further changes in the contraceptive mix in that the most commonly used methods were injections (21.8%), condom (10.7%), female sterilisation (10.3%), pill (8.6%) and IUD (1.4%). In 2013 the most commonly used methods are injections, condom, pill, female sterilisation and IUD. It is interesting to note that the use of pills and female sterilisation swapped positions.

Table 6: Contraceptive Method Mix for Namibia 1992, 2000, 2006 and 2013

	1992	2000	2006	2013
None	71.1	56.3	44.9	43.9
Pill	8.3	8.2	8.6	7.0
IUD	2.1	1.2	1.4	1.2
Injections	7.7	18.7	21.8	26.8
Condom	0.3	5.3	10.7	12.3
Female Sterilisation	7.0	8.5	10.3	6.4
Male Sterilisation	0.3	0.8	0.4	0.3
abstinence	0.3	0.2	0.4	0.2
withdrawal	0.3	0.1	0.3	0.3
Herbs	1.8	0.9	0.9	0.4

Breastfeeding, postpartum amenorrhoea, abstinence, and infecundability

Lactation (breastfeeding) and postpartum practices (amenorrhoea and abstinence) are associated with fertility. Postpartum amenorrhoea refers to the temporary disappearance of menstruation after childbirth at which period a woman becomes non-susceptible to conception. Various studies have established a direct relationship between the length and intensity of breastfeeding and the duration of postpartum amenorrhoea (Bongaarts & Potter, 1983; Gutmann & Fliess, 1993; Mbamaonyeukwu, 2000, Chuks, 2003; Letamo & Letamo, 2001). Postpartum abstinence refers to the period of voluntary sexual inactivity following childbirth. Thus, women are considered infecundable if they are not exposed to the risk of conception either because they are amenorrhoeic or are abstaining from sexual intercourse after childbirth. Stemming from its defining characteristic, postpartum infecundability is one of the four proximate factors through which economic, social and other factors operate to influence fertility.

Table 7 shows the mean duration (in months) of breastfeeding, postpartum amenorrhoea, abstinence and infecundability for 1992, 2000, 2006 and 2013. The table reveals that Namibia women breastfeed their infants for about two years. This is quite encouraging, especially when viewed against the background of the nutritional benefits of breast milk. The table further shows that this scenario has not changed much over the years. The results indicate that the older women consistently breastfeed for longer periods than the younger ones.

The finding seems to suggest that fertility decline in Namibia is partly attributed to the sluggish changes in breastfeeding behaviour. Breastfeeding is universal in Namibia with 98% of children born in the last five years having been breastfeed.

Furthermore, Table 7 shows that the mean duration of postpartum amenorrhoea among Namibia women increased from 8.3 months in 1992 to 9.7 months in 2000 and declined to 5.5 months and 5.7

months in 2006 and 2013 respectively. These estimates imply that other things being equal, in the absence of contraception, Namibian women are likely to become pregnant sooner rather than later. A similar picture emerges when postpartum abstinence and postpartum infecundability (PPI) are considered. In fact, while PPI was 16 months in 1992, it declined to about 15 months in 2000 and 13 months in 2000. The mean duration of postpartum abstinence among Namibiaan women increased from 6.0 months in 1992 to 7.9 months in 2000 and declined to 6.8 months in 2006 and 6.3 months in 2013.

Table 7: Mean duration of breastfeeding, amenorrhea, abstinence and insusceptibility for Namibia, 1992, 2000, 2006 and 2013

	Breastfeeding	Amenorrhoea	Abstinence	Insusceptibility
1992	16.9	8.3	6.0	12.8
2000	18.3	9.7	7.9	18.3
2006	15.4	5.5	6.8	13.1
2013	14.8	5.7	6.3	11.3

Source: Calculated by the author.

The role of the four proximate determinants on the decline of fertility in Namibia

The indices of marriage, contraceptive use, induced abortion, and postpartum infecundability and the TFR and TF, as obtained from using Bongaarts' model for the years 1992, 2000, 2006 and 2013 are presented in Table 8 and illustrated in figure 4. In analysing these findings, it should be kept in mind that the lower the value of an index, the higher the percentage reduction in the TFR due to that index. It is also important to point out that the data for the computing the index of abortion are not available hence was excluded from this study.

As it can be seen from Table 6, TFR has declined by 1.2 births from 5.4 in 1992 to 4.2 in 2000 and it declined by a further 0.6 births from 4.2 to 3.6 between 2000 and 2006.

In all the four surveys the most important proximate determinant explaining the level of fertility in Namibia is that of index of marriage (C_m). In both 1992 and 2000 the index of marriage is followed by postpartum infecundability and then index of contraception. In 2006 the index of contraception and index of postpartum infecundability have swapped their positions. As such in both 2006 and 2013 the indices are ranked as follows: index of marriage, followed by index of contraception and then postpartum infecundability.

Another aspect worth pointing out is that in calculating the index of marriage, ever-married women were considered instead of currently married women, because when currently married were used to calculate C_m, the

Table 8: Estimates of Selected Fertility Measures, Proximate Determinants and Indexes of Proximate Determinants for Namibia 1992, 2000, 2006 and 2013

	1992	2000	2006	2014
TFR	5.4	4.2	3.6	3.6
TMFR	16.0	16.4	14.7	15.3
U	0.281	0.439	0.548	0.549
E	0.263	0.409	0.500	0.499
Breastfeeding	16.9	18.3	15.4	14.8
I	10.9	12.1	9.7	9.2
Cm	0.336	0.254	0.242	0.238
Cc	0.920	0.806	0.704	0.704
Ca	1.000	1.000	1.000	1.000
Ci	0.681	0.655	0.710	0.722
C_m C_c C_a C_i	0.211	0.134	0.121	0.121
TF	15.3	15.3	15.3	15.3
TNFR	10.4	10.0	10.9	11.1
TMFR	9.6	8.1	7.7	7.8
Fitted TFR	3.2	2.1	1.9	1.9
TF	22.0	22.0	22.0	22.0
TNFR	15.0	14.4	15.6	15.9
TMFR	13.8	11.6	11.0	11.2
Fitted TFR	4.6	3.0	2.7	2.7
TFR	5.4	4.2	3.6	3.6
TMFR	16.0	16.4	14.7	15.3
TNFR	17.3	20.4	20.9	21.7
TF	25.5	31.2	29.4	30.1

Source: Calculated by the author.
+ not calculated due to unavailability of data.
** Proportion childless could not be estimated for 1992, probably due to small sample size.

implied TFRs were very low. It should also be noted that the implied TFR in all cases is lower than the observed TFR. This may be due to the fact that the estimated value of TF of 15.3 as used in the model is lower than that found in Namibia.

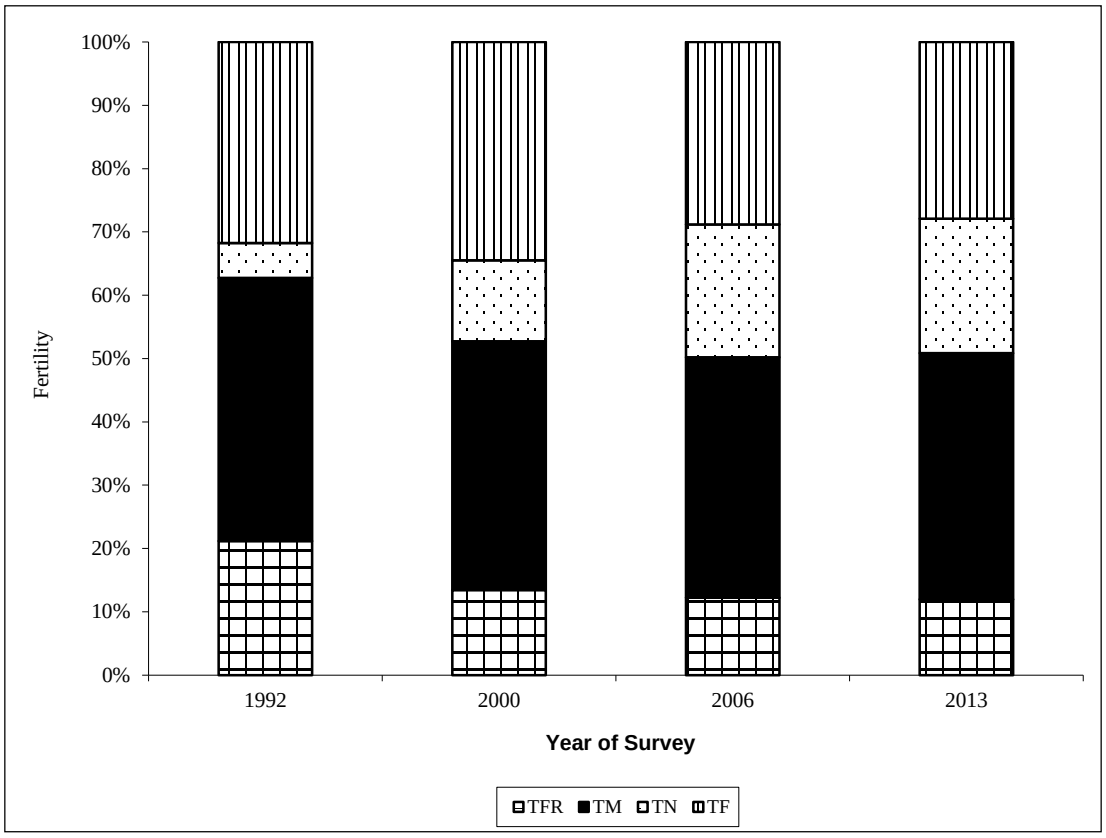

Figure 6: Proximate Determinants of Fertility for Namibia 1992-2013

The index of marriage declined from 0.336 in 1992 to 0.254 in 2000 and 0.242 in 2006. The recent NDHS of 2013 reveal a further decline of 0.238. The decline suggests that the changing patterns of marriage in Namibia played a significant role in fertility decline in the country. Another proximate determinant that played a role in fertility decline in contraceptive use. The index of contraception declined from 0.920 in 1992 to 0.806 in 2000 and to 0.704 in 2006. Between 2006 and 2013 the index of contraception remained the same probably indicating that contraceptive use had a minor effect in reducing fertility during this period. It may be noted as well that contraceptive use effectiveness has improved during the period under review, increasing from 26.3% in 1992 to 40.9% in 2000 and 50.0% in 2006. After 2006 contraceptive effectives has remained unchanged. The factors responsible for the stagnation of contraceptive use and effectives are beyond the scope of this study and require further scrutiny.

The index of postpartum infecundability declined from 0.681 in 1922 to 0.655 in 2000, increased to 0.710 in 2006 and increased further to 0.722 in 2013. These figures indicate that whereas Ci contributed to the decline in fertility between 1992 and 2000 the impact of this index was such that it increased fertility during the period 2000-2013.

Decomposition of the role of the four major determinants on fertility decline between 1992 and 2014

Table 9 indicates the magnitude of the total inhibiting effect being accounted for each proximate determinant at different time points starting from 1992 to 2013. The difference between the total fecundity and the estimated TFR demonstrates the resultant inhibitory effect of each determinant. The total inhibiting effect is prorated by the proportion of the logarithm of each index to the sum of logarithm of all indices.

Table 9: Decomposition of the Change in the Proximate Determinants in Namibia 1992, 2000, 2006 and 2014

Proximate Determinant	Births per woman				Percentage			
	1992	2000	2006	2014	1992	2000	2006	2014
Marriage	8.5	9.0	9.0	9.1	70.0	68.2	67.2	68.0
Contraception	0.6	1.4	2.2	2.2	5.4	10.7	16.6	16.6
Infecundability	3.0	2.8	2.2	2.1	24.7	21.1	16.2	15.4
Total	12.1	13.2	13.4	13.4	100.0	100.0	100.0	100.0

The results indicate that out of the 12.1 births that were inhibited in 1992, 8.5 births (or 70.0%) were due to the effect of marriage, 3.0 births (or 24.7%) were due to post partum infecundability and only 0.6 births (or 5.4%) were due to contraception. Similarly, in 2000, the three proximate determinants (marriage, contraception and postpartum infecundability) inhibited 13.4 births, and these are distributed as 9.0 births (68.2%), 2.8 births (21.1%) and 1.4 births (10.7%), respectively. In 2006, 67.2% of the births averted were due to marriage, 16.6% of the births averted were due to contraception and 16.2% of the births averted were due to postpartum infecundability. Lastly, in 2013, 68.0% of the births averted were due to marriage, 16.6% of the births averted were due to contraception and 15.4% of the births averted were due to postpartum infecundability.

The analyses in the preceding paragraph indicate that the single most important proximate determinant of fertility in Namibia is Marriage. During the period under review marriage alone contributes to more than two thirds of the country's fertility level. Over the same period the impact of contraception has increased. The impact of breastfeeding on fertility is on the decline as a result of reduced intensity of breastfeeding. The decline in breastfeeding is likely to increase in future as the status of women improves.

Discussion and concluding remarks

The study examined fertility trends in Namibia during the period 1992 to 2013. The findings of the study indicate that fertility continued to decline during the period under review with the exception of 2006-2013 period. The study also assessed the role and relative importance over time of three proximate determinants of fertility in Namibia using the four DHS surveys conducted in the country over time. In this regard the study show that the fertility-inhibiting impact of marriage is more significant than the effects of contraception and postpartum infecundability. The effect of

contraception is next in importance in inhibiting fertility whereas postpartum infecundability remains the least. However, the results reveal that there has been an erosion of postpartum practices over time. The percentage reduction attributable to PPI declined from 24.7% in 1992 to 16.2% in 2006 and 15.4% in 2013. The percentage reduction attributable to marriage has declined from 70% in 1992 to 68% in 2013. The contribution of marriage appears to have remained unchanged between 2000 and 2013. At the same time the results indicate that the importance of contraception has increased during the period under review. The percentage reduction attributable to contraception has increased from a meagre 5.4% in 1992 to 10.7% in 2000 and 16.6% in 2006. Furthermore the study indicates that the percentage reduction attributable to contraception remained unchanged at 16.6% in both 2006 and 2014. This finding could have given rise to the stall in fertility observed in Namibia between 2006 and 2014.

The role played by HIV/AIDS in fertility transition in Namibia remains to be quantified. It has been debated that HIV and AIDS would affect demographic parameters in Africa (Ntozi, 2002). HIV and AIDS have been observed to affect fertility and its proximate determinants in a number of ways (Guy, 1999; Ntozi, 2002). First, there can be a change in attitude and behaviour in people such that they decide to refrain from premarital sex and multiple sexual partners and postpone marriage indefinitely. The continued increase in age at first marriage in Namibia could be attributed to this phenomenon. Second, in contrast to most infectious diseases, which take their heaviest toll among the elderly and the very young, HIV takes its greatest toll among young adults such that many women die from AIDS before completing their reproductive years (Guy, 1999; Ntozi, 2002). Third, contraceptive use might increase due to the recommendations put forward in regard to the usage of the condom because of its HIV preventive qualities. Fourth, infected mothers might decide to terminate their pregnancies in order to avoid infecting their babies with HIV. All these four mentioned changes have a suppressing effect on fertility. Fifth, mothers in fear of transmitting HIV to their babies might decide not to breastfeed and take short periods of postpartum abstinence so that their partners do not engage in extramarital affairs, thus attracting early pregnancies and as a result enhancing fertility (Ntozi, 2002). Lastly, women infected with HIV might have lower fertility because of secondary sterility and foetal loss brought about by the disease and its associated infections. The last two factors have the effect of increasing fertility levels. However, to gain a full understanding of the impact of HIV and AIDS and fertility in Namibia would require a separate study being conducted on these aspects.

As noted earlier, the period between 1992 and 2006 witnessed the largest increase in the percentage contribution attributed to contraception. This is a reflection of the commitment made by the Namibian government to increase both the availability and utilization of contraception services in the country. The importance of contraceptive use however appears to have been surpassed by the changing patterns of marriage during the period 2000-2004.

This is an interesting finding and should be seen in light of the prevailing social, economic and political context.

The results of this analysis have important implications for policy planning and programme development in Namibia. The observed stagnation in contraceptive use should be a course for concern among those promoting the idea of family planning in Namibia. If the family planning programme is expected to play a leading role in reducing the rate of population growth in the country, as advocated in the national population policy, then the current family planning programme efforts at both governmental and nongovernmental levels should be vigorously pursued so as to raise the prevalence rate of contraception and hence further reduce levels of fertility.

Rising levels of mean age at first marriage for women is clear evidence of rising levels of educational opportunities. The current emphasis on the education of the girl child should be intensified so as to further reduce marriage at an early age. Moreover, sufficient female education acts as a catalyst in changing pronatalist tendencies, empowers the woman, and prepares her for gainful employment outside the home, all of which have a negative influence on the propensity for high levels of fertility.

Overall, the findings of this study show that the fertility-inhibiting effects of postpartum infecundability are more important than the effects of contraception and marriage patterns. Consequently, the promotion of the notion of prolonged breast-feeding duration should continue to receive the attention of the Government and other stakeholders because prolonged durations of lactation inhibit fertility. Moreover, the nutritional benefits of breast milk to children have been well documented.

In conclusion, there is need to manipulate the proximate determinants of fertility in order to realise further and faster fertility drop in Namibia. Three of the four proximate determinants considered in this study can be manipulated to influence future fertility trends in Namibia. However, not much can be done to increase the contribution of induced abortion to fertility decline in the country. This is due to the fact that abortion is illegal in Namibia largely as a consequence of religious beliefs and cultural prescriptions that forbid this practice. Government policies should concentrate on a) strengthening the national family planning programme with a view to increasing contraceptive utilization and effectiveness, b) encouraging breastfeeding and c) raising the age of marriage.

References

Arowolo O.O. 2000a. Fertility in Namibia. In *Fuller B and Prommer I (Editors) (2000)* Population-Development-Environment in Namibia Background Readings, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria, pp. 252-272.

Arowolo O.O. 2000b. Namibia's Population Policy. In *Fuller B and Prommer I (Editors) (2000)* Population-Development-Environment in Namibia Background Readings, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria, pp. 231-252.

Bongaarts, J. 1978. A Framework for Analyzing the Proximate Determinants of Fertility. *Population and Development Review*, 4(1), 105-132.

Bongaarts, J. 1982. The Fertility-Inhibiting Effects of the Intermediate Fertility Variables. *Studies in Family Planning*. 13(6/7), pp.179-188.

Bongaarts, J. 1987. The Proximate Determinants of Exceptionally High Fertility. *Population and Development Review* 13(1), 133-139.

Bongaarts, J. 2015. Modeling the fertility impact of the proximate determinants: Time for a tune-up. ***Demographic Research*** Volume 33, Article 99, pp. 535-560.

Bongaarts, J. and Potter, R. G. 1983. ***Fertility, Biology, and Behaviour: An Analysis of the Proximate Determinants***, Academic Press, Inc.

Central Bureau of Statistics, 2010. ***An atlas of Namibia's population: monitoring and understanding its characteristics.*** Central Bureau of Statistics, Windhoek.

Chuks, J. 2003. Ghana's Reproductive Revolution: Analysis of the Determinants of Fertility Transition. *African Population Studies* 17(1):47-67.

Caldwell, J. C., et. al. Fertility Decline in Africa: A New Type of Transition. *Population and Development Review*, vol. 18, pp. 211-242.

Casterline, J. B. 1994. Fertility Transition in Asia. in Locoh, T & Hertrich, V. eds. *The Onset of Fertility Transition in sub-Saharan Africa*, Derouaux, Ordina, Liege, pp.69-86.

Cohen, B. 1993. Fertility Levels, Differentials and Trend. in Forte, K. A. et, al. eds. *Demographic Change in Sub-Saharan Africa*. New York: National Academy of Science.

Davis, K. & Blake, J. 1956. Social Structure and Fertility: An Analytical Framework. *Economic Development and Cultural Change*, 4(4), 211-235.

Garenne M (2007) "Situations of fertility stall in sub-Saharan Africa" paper presented at the 5th African Population Conference in Arusha, Tanzania, x-x December 2007.

Garenne M (2008) *Fertility Changes in Sub-Saharan Africa*. DHS Comparative Reports nr. 18. Calverton MD: Macro International Inc.

GRN/NPC. 1995. *First National Development Plan (NDP1)*. Volume 1. Windhoek: Government of the Republic of Namibia, National Planning Commission.

GRN/NPC. 1997. *National Population Policy for Sustainable Human Development*. Windhoek: Government of the Republic of Namibia, National Planning Commission.

Gutmann, M. P. and Fliess, K. H. 1993. "The Determinants of Early Fertility Decline in Texas" *Demography* 30(3):443-457.

Guy, S. 1999. Family Planning in the Era of HIV/AIDS. *American Journal of Public Health.* 89(5) p. 780.

Hinde, A. 1998. *Demographic Methods*. New York: Oxford University Press Inc.

Horne, A. 1992. Fertility-Inhibiting Indices in the Arab World. *Population Bulletin- ESCW*A, 40, 5-35.

Indongo N, Pazvakawambwa L. 2012. Determinants of fertility in Namibia African Journal of Reproductive Health 16[4]: 50-57.

Jolly. C. & Gribble, J. 1993. The Proximate Determinants of Fertility. in Foote K.A., et al. .eds. *Demographic change in Sub-Saharan Africa*, Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, D.C., National Academy Press, 68-116.

Kirk, D. & Pillet, B. 1998. Fertility In Sub-Saharan Africa in the 1980s and 1990s. *Studies in Family Planning* 29 (1):1-22.

Letamo, G. & Letamo, H.N. 2001. The Role of Proximate Determinants in fertility Transition: A comparative study of Botswana, Zambia and Zimbabwe. *South African Journal of Demography* 8(1):29-35.

Mbamaonyeukwu, C.J. 2000. Signs of Fertility Transition in Nigeria. *African Population Studies* 15(1):23-42.

Mirzaie, M.1998. Swings in Fertility Limitations in Iran. *Working Papers in Demography No. 72* Demography and Sociology Programme, Australian National University.

Moultrie TA, Sayi TS, Timæus IM. 2012. “Stopping, spacing and postponing: The future of the African fertility decline”

Namibia Statistical Agency. 2012. Namibia 2011 Population and Housing Census Main Report, Windhoek.

Namibia Ministry of Health and Social Services (MoHSS) and ICF International. 2014. *The Namibia Demographic and Health Survey 2013.* Windhoek, Namibia, and Rockville, Maryland, USA: MoHSS and ICF International.

Namibia Ministry of Health and Social Services (MoHSS) and ICF International. 2000. *The Namibia Demographic and Health Survey 2006/07.* Windhoek, Namibia, and Rockville, Maryland, USA: MoHSS and ICF International.

Namibia Ministry of Health and Social Services (MoHSS) and ICF International. 2003. *The Namibia Demographic and Health Survey 2000.* Windhoek, Namibia, and Rockville, Maryland, USA: MoHSS and ICF International.

Namibia Ministry of Health and Social Services (MoHSS) and ICF International. 1993. *The Namibia Demographic and Health Survey 1992.* Windhoek, Namibia, and Rockville, Maryland, USA: MoHSS and ICF International.

Ntozi, J. 2002. The Impact of HIV/AIDS on Fertility in Sub-Saharan Africa.
African Population Studies, 17(1): 103-124.

Reinis, I. 1992. The Impact of The Proximate Determinants of Fertility: Evaluating Bongaart’s & Hobcraft and Little’s Methods of Estimation. *Population Studies*, 46(2). pp. 309-326.

Sayi TS. 2014. Relationships between marriage and fertility transitions in sub-Saharan Africa” poster presented at Population Association of America (PAA) Annual Meeting, Boston, USA, 1-3 May 2014.

Shapiro D, Gebreselassie T. 2007. “Fertility transition in Sub-Saharan Africa – Falling and stalling.” *Paper presented at the 2007 Annual conference of the Population Association of America,* New York.

Shemeikka R, Notkola V, Siiskonen H. 2005. Fertility decline in North-Central Namibia: an assessment of fertility in the period 1960-2000 based on parish registers ***Demographic Research*** 13(4):83-116.

Stover, J. & Kirmeyer, S. 1999. *Demproj Version 4: A Computer Program for Making Population Projections*, Policy Project.

UNDP 2014. ***Human Development Report 2010****.* Oxford University Press, New York and Oxford.

United Nations. 1983. *Indirect Techniques for Demographic Estimation*, Manual X, Population Studies No. 81, New York.