

**The Impact of Women's Education on Fertility in KwaZulu-  
Natal: 1993-1998**

by

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## **Abstract**


This article examines the relationship between women's education and fertility in KwaZulu Natal based on data from the 1993 Project for Statistics on Living Standards and Development survey (PSLSD) and the 1998 KwaZulu Natal Income Dynamics Study (KIDS). This study shows that fertility has declined between 1993 and 1998. Additionally, fertility declines as the level of education increases. However, women with lower levels of education have higher fertility than those with no schooling and women with tertiary education have higher fertility than those with secondary education. Moreover, education has a stronger effect on fertility in 1998.

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## Preface

This article is the original work by the author. It has not been submitted to another university. I have acknowledged usage of other people's work where necessary.

Signed  Date: 17/04/2000  
Ntsiki Manzini

## **Intention to submit**

This dissertation was designed for the submission as an article for the Southern African Journal of Demography. The requirements of this journal are attached. The article consists of *10 989* words.

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## 1. Introduction

Recent research has shown that fertility rates in sub-Saharan Africa (SSA) have been steadily declining during the past two decades, even though they still remain amongst the highest in the world. Demographic and Health Surveys undertaken prior to mid-1995 indicate that as many as two thirds of the countries in this region have experienced such fertility declines (Kirk and Pillet, 1998). The most remarkable declines have occurred in East and Southern Africa, notably South Africa, Zimbabwe, Botswana, Lesotho and Kenya.<sup>1</sup> In many instances, the achievement of mass education has been suggested as a critical explanatory factor behind this fertility trend. This assertion is based on two observations. Firstly, that in the past 20 years, SSA countries have *not* undergone the period of sustained economic growth and industrialisation that is associated with fertility decline in developed countries. Secondly, fertility decline seems to have taken place concurrently with large increases in educational attainment. Supporting evidence for this fertility-education relationship comes from Demographic and Health Survey (DHS) and World Fertility Survey (WFS) data, which have consistently shown that education has had the most profound impact on fertility decline.

As for the direction of this relationship, most country studies have revealed that education has a strong negative effect on fertility,<sup>2</sup> but this association is not universal. Increased education appears to have a strong negative effect on the fertility of couples and their desired family size. Education may lead directly to exposure to new ideas and belief systems that are consistent with small family size. Moreover, education may bring new economic opportunities for women, allowing for greater upward mobility and thus raising the opportunity costs of their time (Weinberger, 1987; Martin, 1995). Conversely, education also increases earning potential, which might lead to couples wanting more children (Weinberger, 1987). Education is also more likely to have a positive effect on women's status in society through enhanced control over their fertility. Sathar et al (1988) argued that women who work outside the home are more likely to have enhanced control over household decisions, increased awareness of the world outside the home and, as a result, more control over childbearing.

Several studies have shown that women's education has a more beneficial effect on fertility than men's education. Singh and Casterline (1985), in their review of the WFS, showed that women with secondary education had lower fertility than men in the same educational category. Moreover, they point out that the relationship may be positive. Levels of fertility may in fact increase with an increase in male education.

In South Africa, most studies have shown large differences in the fertility rates between the various subgroups of the population, with Africans having the highest levels of fertility and whites the lowest. This can be largely attributed to differences in the levels of economic development, as well as the cultural value attached to children (Dept of Welfare and Population Development 1998). Past policies of the apartheid government prevented African women from taking advantage of educational and employment opportunities in the modern sector of the economy, which in turn influenced their fertility choices and behaviour. Mostert and Hofmeyr (1988: 2) show that African females were the least literate in comparison to the other race groups. For example, in 1985 only 57% of African females aged 20-54 were literate, compared to 85% of Indians, 78% of coloureds and 99% of white women. Furthermore, only 14% of black women aged 20-64 had achieved 10 years or more of schooling, while coloureds had attained 19%, Indians 30% and whites 84%. With regard to fertility levels, Mostert (1990: 63), using the 1987/89 DHS data, found that fertility during the first half of the 1980s was 2.5 for Indians, 2.9 for coloureds, 1.9 for whites, and 4.6 for Africans. This is consistent with the findings from other studies. Using the South African Living Standards Survey and 1995 October Health Survey, Chimere-Dan (1997) found that Africans had the highest levels of fertility, with fertility levels at 4.1 and 3.3 children per woman.

Despite this, there is evidence of a fertility decline among Africans. The 1998 South Africa DHS found that the total fertility rate (TFR) for African women was 3.1 in 1998. This contrasts sharply with the results of the level of 6.3 for 1970-1975, 5.6 in 1980-1985, 4.6 in 1989 and 4.1 in 1993. The fertility level of Africans in South Africa is relatively low compared to other African countries. The low levels of fertility can be attributed partly to the high levels of contraceptive use in South Africa. The 1998 DHS estimates that as many as 58% of all African women aged between 15-49 use contraceptives in South Africa. This shows a slight increase from the 54% recorded in 1993. This estimate exceeds that of other Southern and Eastern African countries.<sup>3</sup>

Since fertility decisions differ within various groups at different educational levels, the relationship between education and fertility is an important topic and of direct relevance to planners and policymakers attempting to integrate population variables into development planning. Therefore, this study examines the effect of mother's education on fertility levels among Africans. Accordingly, two questions are asked. Firstly, to what extent does the level of education of mother's influence fertility? Secondly, does education continue to have an influence on fertility when controlling for age, rural-urban residence, head of the household and economic status?<sup>4</sup>

Although individuals should have the ultimate responsibility for making reproductive decisions, the environment, which they live in has an impact on their reproductive behaviour. The study examined the interrelations between education and the fertility patterns of African women in KwaZulu-Natal during the 1993-1998 period. This is done by exploring whether years of schooling attained have made any significant change to fertility levels between 1993 and 1998. The net effects of education, after adjusting for age, rural-urban residence, head of the household and wealth, are also analysed. In order to meet the objectives detailed above, the underlying hypothesis is that education has a negative effect on fertility, at least in the long run.

## **2. Literature Review**

### **2.1 Theoretical Background**

During the late 1980's the debate about levels of fertility in South Africa emphasised the proximate determinants of fertility, for instance, the age at first marriage, patterns of sexual activity and use of contraception. Understanding changes in fertility levels in the 1990's involves the interplay of the old and the new dynamics. These new dynamics include larger numbers of female headed households, more women having children without being married, the age of marriage being delayed, more women achieving higher levels of education and more women entering the formal labour market. So far, the existing literature has given this interplay rather cursory attention.

The most common explanation for the onset of fertility decline is the Demographic Transition Theory (DTT hereafter), formulated by Frank Notestein in 1945 and reviewed recently by Kirk in 1996. According to the Demographic Transition Theory, as a nation goes through the processes of industrialisation, urbanisation and modernisation, its mortality rate declines first, while the birth rate follows later. The DTT assumes that with development there come improvements in health technology and social factors that hasten fertility control. Thus, with regard to fertility change, the theory suggests that development is one of the driving forces behind the fertility transition. This suggests that fertility decline occurs simultaneously with socio-economic advancement. The key explanatory variables in fertility decline have been ascribed to reductions in mortality, especially among infants and children, increasing urbanisation, reductions in the economic value of children and the emergence of new educational and employment opportunities especially among women. Bongaarts and Watkins (in Population Council, 1998: 2) indicate that despite the inappropriateness of the classical demographic

theory, development is recognised as one of the driving forces of fertility transition. However, analysts debate the precise variables and processes.

In terms of the Demographic Transition of Africans in KwaZulu-Natal, there should be a decline in mortality levels while fertility continues to be high. However, this is not the case as KwaZulu-Natal is characterised by the mid-transitional stage of declining fertility rates and a steady decline in mortality rates (disregarding for the moment the impact of HIV/AIDS). Hence, this suggests that the fertility transition KwaZulu-Natal is ahead of its level of development. This assertion can be explained by several factors. Firstly, by noting Lotter's (1988: 9) argument that while "development in the form of industrialisation and urbanisation have affected fertility", this has not been the case with the African population since it remains predominantly rural. Furthermore, he notes that "large families have remained the norm in the poorer rural areas and children are still seen as economic assets (Ibid: 9)." Another factor explaining this position is that the education of Africans in Natal has been inadequate compared not only to other races but also Africans elsewhere in the Republic of Southern Africa (Krige, 1989). Basically this region has been characterised by a higher percentage of Africans with no education and lower percentage of those with Standard 10. Krige further argued that "the lack of secondary school qualifications of African adults are imperative for an increase in literacy rates and for lowering the mortality and birth rate"(Krige, 1989: 182). Notably this contradicts with the Demographic Transition Theory, which asserts that development is one of the driving forces of fertility transition thus this reinforces the enigma surrounding the on going fertility transition in KwaZulu-Natal. It is for this reason that education is considered as a measure of development and the relationship between fertility and years of schooling is analysed.

## **2.2 Empirical Evidence**

Studies that show the relationship between education and fertility are well documented. These studies have concentrated on the effect of parent's schooling on fertility. Most studies have found a strong negative association between mother's education and fertility in both developed and developing countries.<sup>5</sup> Formal education has been found to lead to increased contraceptive use and improved dialogue between partners (Diamond et. al, 1999). Thus, the risk of unwanted fertility has been found to decrease consistently and sharply with increased formal education (Lam and Duryea, 1999; Weinberger, 1987). In their study of Brazil, Lam and Duryea (1999) found that fertility decline was consistent with increases in education. Furthermore, they note that fertility falls rapidly with the first few years of schooling (four

years), and that by the time women have more than 10 years of schooling, fertility has declined substantially. These women report about three births fewer than those with no schooling.

Other researchers support this consistent relationship between women's education and fertility. Martin (1995: 189), using results from 26 DHS studies, makes a similar observation in her analysis of fertility and education. The author found that in all the countries studied, women that were highly educated have considerably lower fertility than those with no schooling. Furthermore, she observed that women with no schooling have an average of about six to seven children, while those with higher levels have about two to three children (1995: 190). Despite this negative association between fertility and education, the author points out that the association was weakest in sub Saharan Africa and more pronounced in Latin America. Zathar et al. (1988) also found an association between higher levels of education and lower fertility among mothers in Pakistan. Weinberger (1987) also did an analysis of countries that participated in the WFS, and found that women with 4 to 6 and 7 or more years of schooling have substantially lower fertility than do women with less education (Ibid: 38). However, she hastens to add that Latin America shows a more steadily decline in fertility from lower to higher education groups compared to the other regions. Women with secondary and higher education levels have lower fertility compared to women with primary education and those without education. Thus, the evidence suggests that those women with 7 years or more of schooling have been found to have lower fertility.

Cochrane (1979) explored three ways through which fertility is determined by education, namely whether education has an effect on the biological supply of children, demand for children or the regulation of fertility. The author concludes that the data used in her review showed patterns of non-linearity and that the inverse relationship was determined by the subgroups under investigation. For instance in the least developed countries, higher fertility was associated with smaller levels of education, and lower fertility with higher levels of education.

Notwithstanding these negative trends, other studies show that that education is not always consistent with fertility decline. These include observations by Population Council (1998), Martin (1990) and Weinberger (1987). These observations were mostly in sub Saharan Africa. Results show that in the least developed countries, education has a positive effect on fertility at the lower end of the education spectrum and then declines beyond the primary education stage. For instance, Martin's (1995) analysis demonstrates that in most of the sub Saharan countries, women with four to six years of schooling did not show any significant differences when compared to women with no formal schooling. In other instances, fertility was higher among women with few years of education compared with women with no formal schooling.

Countries exhibiting this curvilinear pattern were Kenya, Burundi and Liberia. The findings from Kenya are similar to those observed by the Population Council in 1998. For instance, between 1978 and 1989 women with primary schooling exhibited slightly higher TFR's than women with no education. In 1978 women with primary schooling had total fertility of 8.49 compared to 8.06 among women with no schooling. Again, a similar trend is observed in 1989 where women with primary schooling have a TFR of 7.12 compared to 6.83 for women with no education (Population Council: 1998: 19). Lotter (1988) also mentions that Kenya and Indonesia experienced increases in fertility with higher education thus depicting a positive relationship between education and fertility. Another pattern that has been found in the relationship between education and fertility is the inverted U-shaped relationship. Martin (1990) suggests that this pattern has been documented in several developing countries. However Lotter (1988) alludes that the inverted U-shaped relationship is also common in developed countries and has occurred in Finland, France, Italy and Holland.

In South Africa, the fertility transition has also been partly attributed to education. According to Caldwell and Caldwell (1993: 243), education has increased the demand for fertility control, and higher levels of education have created a greater demand for contraceptives, especially among Africans. They argue that, in societies where there is almost universal primary education for girls and where at least 30 percent of all girls have completed some secondary, school fertility levels usually decline.

The negative relationship between education and fertility has also been observed in South Africa. Empirical evidence from Chimere-Dan's analysis (1999: 13) of the 10% sample of the 1996 Census shows a negative relationship between fertility and levels of education. For instance, the total fertility rate among African women was 3.4 for those with no formal education, 3.3 those with lower primary education, 2.9 those with upper secondary and 2.6 for women with secondary schooling and above. These findings are replicated in the 1987 and 1998 DHS, where the total fertility rate among women aged 15-49 falls with increasing levels of education. This suggests that fertility and education in South Africa are negatively correlated. In addition, the 1998 study shows that contraceptive use increases with the level of formal education attained. Consequently, one may draw a positive connection between contraceptive use and women's education and can maintain that there is a negative relationship between fertility and level of education. Thus, as Lotter (1988: 9) asserts, "as more blacks are exposed to urban living, modernisation, and development in the form of better education... more can be expected to limit their family size with the result that the TFR should continue to decline." While education may seem to have a negative effect on education, studies have shown that this may not always be the case. For instance, among African women, low levels of education have a positive effect on fertility but then decline as education increases.

This trend takes the pattern of a seven-shaped curve. Such trends have been observed by Chimere-Dan (1997); Mostert and Hofmeyer (1988). On the other hand, Thomas (1999) observed a continuous decline in fertility with increases in education, although he did observe an increase in fertility at higher levels of education.

When looking at education and controlling for other variables, some studies have shown that maternal schooling continues to influence fertility. Studies looking at the relationship between education, rural-urban residence and fertility have found that fertility is lower in metropolitan and urban than in rural areas. Some scholars suggest that the low fertility in metropolitan and urban areas may be attributed to the larger proportion of the educated people that live in these areas, as these people are more likely to use contraceptives and undergo induced abortion. Other studies have found that the level of urbanisation, together with government family planning initiatives, determine the relationship between education and fertility (Cleland and Rodriguez, 1988; van de Walle and Foster, 1990). Thus in urban societies, increased education lowers fertility and in rural societies increased education tends to raise fertility. In a study of Kenya by Kalule-Sabiti (1992), the author shows that cumulative fertility among women with 5 to 8 years or higher levels of schooling decreases drastically from rural areas to metropolitan centres. He compared education levels between rural and urban areas and found that those residing in rural areas have higher fertility than those residing in urban and metropolitan areas. Moreover, the differences are larger between rural and metropolitan areas than between urban and rural areas. Furthermore, the gap between cumulative fertility is larger between rural versus urban areas and rural versus metropolitan areas, but narrows between urban and metropolitan areas. Similar findings are observed for women with no education and those with little education. Singh and Casterline (1985: 206) also found that although the negative relationship between education and fertility still exists, it is much weaker in rural areas than in urban areas. They suggest that fertility may be higher in rural areas partly because of “fewer employment opportunities, lower cost of children, and lower aspirations to social mobility resulting from increased education in rural areas”. In addition, Singh and Casterline found several cases that show that women with no schooling have higher fertility in urban areas than in rural areas. This, they suggest, is largely due to the relaxation of traditional family planning strategies among the urban women (Ibid; 1992: 206).

In South Africa, studies showing the relationship between fertility and education by rural-urban residence are not well documented. However, it is expected that the levels of fertility by education will be lower for metropolitan and urban women with higher levels of education. This is largely explained by the fact that in South Africa literacy levels and contraceptive use are higher in urban areas and metropolitan areas. For instance, Mostert and Hofmeyr (1988: 2) show that for females aged 20-64, there were 78% literate

African females in urban areas, compared to 41% in rural areas. Similarly, when looking at the contraceptive prevalence by education and place of residence, urban areas exhibit higher levels of contraceptive use, that is, 66% compared to 52.7% in 1998 (1998 South Africa DHS). When analysing race by place of residence, Du Plessis (1999:73) shows that 57% of Africans residing in urban areas are currently using family planning compared to 43% of Africans in rural areas. Furthermore, contraceptive use increases with levels of education. Thus, those with more than a standard 10 education have the highest use of family planning. The study shows that 78% of those with a post-secondary education use contraception, as opposed to the 73% among those with a standard 10, 65% with standard 6 to 9, 54% with standard 4 to 5, 44% among those with a standard 3 or less and 33% among those with no education. Thus, given the greater contraceptive use among educated women living in urban or metropolitan areas, one may propose that fertility will be lower for them than it would be for rural non-educated women.

With regard to age, education has been found to prolong the timing of first births or subsequent births. Evidence from a comparative study of fertility in Togo and Uganda, revealed that women's education only had an important effect on age at first birth among women with seven or more years of schooling (Ahn and Shariff, 1994). Furthermore, they found that the chances of having a first birth were reduced as the amount of schooling increased. Thus, women with 7 to 9 years of schooling had a 20-30% lower risk than women with less than seven years of schooling. In addition, those with 10 or more years of schooling had about 50% lower risk of having a first child. This is supported by research conducted by Preston-Whyte (1988), who observed that most women cite finishing or achieving higher education as a major factor in delaying childbearing. These findings are common to both the younger and older women.

Finally, with regard to the fertility-education relationship controlling for economic status, research has shown that increases in the level of education may result to higher economic status. This has been largely attributed to the fact that education increases the propensity to work, which in turn increases one's earning capacity. Consequently, this may lead to the ownership of valuable material assets.

In South Africa, Thomas (1999: 165) found that the better educated earn higher wages, which in turn explains part of the negative relationship between fertility and education. In addition, the author notes that household income explains relatively a small part of the association between female education and family size among African women (Ibid;1999: 169).

### 3. A Brief Overview of KwaZulu-Natal

In this section, some contextual information on KwaZulu-Natal is presented. KwaZulu-Natal is a predominantly Zulu speaking region. In traditional Zulu society, much emphasis is placed on children and the ability to demonstrate fertility (Preston-Whyte, 1988). The status of a man is measured by the size of his household and that of a woman by the number of children she has borne (Schapera, 1946 and Preston-Whyte, 1988). Thus, the birth of a child is hailed with great joy as an event of importance in the community. Furthermore, Zulu culture is predominantly patriarchal, which tends to enforce the decision making powers of men, even with regard to issues such as family planning where women should be involved in decision making.

Despite this, fertility in KwaZulu-Natal has, by African standards, declined to moderate if not low levels. In 1994, the total fertility rate among Africans was 4.2 children per woman and this declined to 3.1 children per woman in 1996 (Chimere-Dan, 1997; 1999). Fertility has continued to decline and is currently at 3.3 in 1998 (DHS, 1998). Notably, this fertility decline among Africans occurred at a time where there was widespread resistance to family planning programmes, which were perceived as a political ploy of the apartheid government to eliminate the African population (Chimere-Dan, 1997; Klugman, 1991).

With regard to the demographic and development profile, about 82% of the population is African in KwaZulu-Natal and there is a larger proportion of females than males (Stats SA, 1996). According to the 1996 census, 57% of the population lives in non-urban areas. Moreover, the 1996 census estimates indicate that 23% of the population aged 20 years and over have received no formal education, of these 61.3% were females. The 1996 census also reports an unemployment level of 22% for KwaZulu-Natal. According to 1994 estimates, unemployment is higher in the rural areas than in the urban areas for both males and females. However, females constitute a larger proportion of the unemployed, that is, 47% compared to 29.2% for males in rural areas.

In terms of poverty, Roberts (2000) reports that in 1998 about 42% of the population of KwaZulu-Natal is poor, compared to 34% in 1993. He suggests that poverty levels in the region have increased. Moreover, the depth of poverty in KwaZulu-Natal has been found to be 14%.<sup>6</sup> With regard to human development, the Development Bank of Southern Africa (DBSA, 1998) suggests that the Human Development Index (HDI hereafter)<sup>7</sup> for KwaZulu-Natal was 0.602 in 1991 (May, 1998). While this portrays an above average level compared to the North West and Eastern Cape provinces, this changes when one considers

the HDI's for the different race groups. For instance, the HDI for Africans ranges from 0.25 to 0.55, suggesting that Africans in KwaZulu-Natal fall in the low development category. Furthermore, KwaZulu-Natal is experiencing one of the most rapidly progressing HIV epidemics in the world. The province's HIV/AIDS prevalence has risen from 18.2% in 1995 to 27% in 1997 to 32.5% in 1998 (UNDP, 1998), with Africans experiencing higher levels of infection. By 1993, Africans in KwaZulu-Natal were showing higher rates of infection than the rest of South Africa. Although, the HIV/AIDS scourge is prevalent among women in the childbearing ages, there is not enough data (evidence) to suggest that the decline in fertility levels in KwaZulu-Natal has been a consequence of the HIV/AIDS epidemic.

In KwaZulu-Natal, addressing the subject of fertility decline remains a challenge given that the majority of the population have low levels of economic development and places a strong emphasis on traditional values on children.

#### **4. Data and Methodology**

##### **4.1 Data Sources**

The data used for the analysis of the fertility-education relationship is the 1993 South African Living Standards Survey (SALSS), conducted by the South African Labour and Development Unit (SALDRU) of the University of Cape Town, and the 1998 KwaZulu-Natal Income Dynamics Study (KIDS), conducted by Data Research Africa on behalf of the University of Natal-Durban. The SALDRU study is a national household survey of almost 9000 households. The 1998 KIDS survey was a follow-up to the SALDRU survey. It involved a re-survey of the households surveyed in 1993 in KwaZulu-Natal. The 1998 sample consisted of 1170 households.

The SALDRU and the KIDS data sets, which have a 5-year interval, allow an exploration of the link between education and fertility over time. Thus, one can observe whether there has been a chronological change in fertility with a substantial change in education in households over time. However, this study will not be considering fertility changes among households. In terms of comparison, these two data sources permit quantification of the contribution of education to the observed fertility trend. Moreover, these data sets allow us to explore trends in education over time. Finally, the collection of data at two points in time improves the precision of the analysis.

There were 1841 Zulu speaking African women between ages 15 and 49 in the sample. The analysis consists of a sample of 1 529 women. These women met the following additional criteria. Firstly, the screened sample consisted of women that appeared in both surveys. The analysis is restricted to these women, so as to avoid making assumptions about new household members aged between 15-49 in the KIDS survey and those that have been omitted in the KIDS survey (probably due to death or migration). In other words, women that did not appear in the 1993 survey but were included in the 1998 are excluded from the analysis. Again the same is true for those women who appeared only in 1993 survey and not in the 1998.

Secondly, only women aged between 15-44 in 1993 and 20-49 in 1998 are included in the analysis. This age range was chosen so as to be able to do a cohort analysis. This is because in the two surveys data on fertility was collected among women aged 15 to 49. Thus, since the study focuses on cohort fertility, women aged 45-49 in 1993 were not included because their fertility cannot be traced in 1998, as they will have joined the 50-54 aged group, which is not usually captured in fertility analysis. Similarly women aged 15-19 in 1998 are not included given that they were in the age group 10-14 in 1993 and did not fall in the 15 to 49 category in 1993. In addition, two other variables were used to eliminate inconsistencies. Firstly, given that the study has a 5-year interval, age differences were monitored using the variable *agediff*. This variable considered the age differences among the women in the two surveys, thus women showing age differences between 4 and 6 were considered. Further, an education variable *educdiff* was introduced. Since it is expected that education should either be constant or increasing those women showing negative differences were eliminated. However the cut off point was assigned to differences greater or equal to -1 rather than greater or equal to 0.

Information on education was obtained for all respondents and they were asked to state their highest level of education completed. With regard to information on fertility, only women aged 15 to 49 were interviewed. Both surveys included questions on birth histories. These covered previous and current pregnancies, childbirth and child death.

The data sets have the following limitations (see May, *J et al*, 1999, for a detailed discussion): firstly, the KIDS survey is not nationally representative. This restricts the analysis to KwaZulu-Natal. Furthermore, the KIDS study did not survey white and coloured households. As a result, one cannot generalise to the country as a whole. The two surveys did not collect any information on current fertility thus an estimation of the total fertility rate is precluded by the lack of information. Given that information was obtained at the household level, attempts to link children to their mothers where there was more than one woman in

the household was not always possible, hence the decision to use the average number of children ever born as the actual measurement of fertility. These data sets do not allow for the estimation of the proximate determinants of fertility. This may affect the analysis given the selection criteria, one has to note the impact of attrition in the KIDS data. Moreover, given that new households were not included in the sample frame, the KIDS data is not representative of KwaZulu-Natal.

## **4.2 Techniques of analysis**

In order to demonstrate the relationship between education and fertility, the combined information on children born was subjected to an evaluative test for evidence of an association between education and fertility behaviour. The comparison of these two data sources permits the quantification of the contribution of education to the observed fertility trend.

The methodology was divided into 2 parts, one method dealing with levels and trends and the other with the associations. Children ever born are used as a measure of fertility while the highest level of schooling attained was used as the measure of development.

With regard to average parity, the estimate refers to the mean number of children ever born to a particular woman. It is an aggregate measure of her lifetime fertility up to the moment the data are collected. The data required include children ever born, which is obtained from information on how many children were born alive. This question only concerns those children born alive and excludes stillbirths and miscarriages. Average parity was computed by dividing the number of children ever borne by women in the specific age groups by the total number of women in that age group.

However, this estimate does not provide information on timing, so it is impossible to obtain information on age patterns or the time trends of fertility. The other problem is that the information collected is subject to errors in the number of children reported and errors in the classification of women in particular age groups. With regard to children ever born, 3 errors can be identified. Firstly, some children ever born can be omitted. This is usually in the case of children who have died and those living outside the household. The second error arises from the inclusion of stillbirths or late foetal deaths among live born children. Finally, the third error is introduced when the parity of some women is not stated. This tends to add bias, in that while the women are included in the denominator, the exclusion of their children in the numerator may push average parity downwards.

With regard to errors pertaining to the women, misclassification errors may arise from misreporting the age or duration of marriage and may transfer women from one group to another. The other issue is in the case of cohort fertility whereby average parity may be affected by mortality of the women thus could overestimate cohort fertility.

The second level of analysis used to analyse fertility was the multivariate regression technique. It was used to identify the relationship between education and fertility controlling for age, rural-urban residence, head of household and wealth. The equation for the multiple regression is as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_kX_k$$

Where Y is the dependent variable,  $b_0$  is the constant and represents the value of Y when variables  $X_1$  to  $X_k$  are equal to zero. Each  $b_k$  represents the change in Y associated with a unit increase in the X by which it is multiplied, holding all other X's constant. Eight models are presented. In all 8 models, the dependent variable is actual fertility, which is measured as the total number of live-born children by the respondent at the time of the survey. A full description of the models is presented below:

<b>Models</b>	<b>Predictors</b>
Model 1	Women's education.
Model 2	Women's education and women's age
Model 3	Women's education and place of residence
Model 4	Women's education and income
Model 5	Women's education and housing structure
Model 6	Women's education and tv/radio ownership
Model 7	Women's education and head of the household
Model 8	Women's education and access to land

Dummy variables are introduced into the regression since categorical data is used. The following indicators are used:

1. Ages 15-49 are grouped as 5-year age groups: These are the standard age groups used 15-19, 20-24, 25-29, 30-34, 35-35, 40-44 and age group 45-49. The age 15-19 was used as the contrast variable in the 1993 regression and 20-24 was the contrast variable in the 1998 regression model.
2. Education categories were assigned the following indicators:
  - No schooling;

- Primary education was broken down into four ranks: 1 to 3 years of schooling (coded as a 1), standard 2, standard 3, standard 4 and standard 5. The first two indicators are sometimes referred to as lower primary, while standards 3 to 5 refer to upper primary school;
- Secondary schooling: standard 6, standard 7, standard 8, standard 9, and standard 10. Standards 6 to 8 depict junior secondary school, while Standards 9 to 10 represent senior secondary. Finally, education levels beyond standard 10 were called post secondary education. This variable refers to women with more than 12 years of schooling.

It is noteworthy to mention that these variables are analogous to the standards assigned in the two data sets. On the other hand, all qualifications beyond secondary school were combined to form one indicator (also referred to as tertiary education). This category has been combined because there are few cases for women that have attained beyond secondary school. Zero years of schooling were omitted from the model and is used as the contrast category.

3. Place of residence where indicators for rural and urban metropolitan were created. Urban and metropolitan were combined because there were a few cases in the latter category. Rural residence was used as the contrast category.
4. Income was broken down into 3 categories: less than R500, R501 to R2550 and R2551 or more; Less than R500 was used as the contrast variable.
5. Household structure (wall material) has been divided into 5 categories: bricks, cement, mixed mud and cement, wattle and daub and mud.
6. Ownership of tv/radio: was divided into a yes or no category, where the no category was the reference category.
7. Household head, this is a binary variable and was divided into the 1= head of the household and 2 = not head of the household. The latter being the contrast variable.
8. Access to land was divided into 6 categories: less than 1 hectare, 1 to 4.99 hectares, 5 to 9.99 hectares, 10 to 19.99 hectares, 20 to 49.99 hectares, 50 to 99.99 hectares and 100 or more hectares. The less than 1-hectare category was omitted from the regression model and used as the reference category.

## 5. Results:

### 5.1 Education Trends

Before discussing the relationship between education and fertility, it is imperative to consider the education distribution of the 1529 women aged 15-44 in 1993 and 20-49 in 1998. The table compares the findings for 1993 and 1998. It appears that the majority of women have secondary education in both 1993 and 1998, while the tertiary education category has the lowest proportion of women.

**Table 1: Education trends 1993-1998 (%)**

Levels of education completed	1993	1998
None	9.1	7.1
Primary	34.1	24
Secondary	54.8	64.5
Tertiary	1.9	4.4

The results show that in the last five years education has improved. This is depicted by the movement of women from the lower bands of education (none and primary) to the higher levels of education (secondary education. Consequently, there are more women who have completed secondary (standards 6 to 10) and post-secondary education. Most notably there has been a significant increase in the proportion of women with tertiary education. In 1993 about 2% of the women had tertiary education, while in 1998 as many as 4.4% had received tertiary education, thus showing an increase of 57%. While this may show a significant improvement in educational attainment, the proportion of women with tertiary education is still low. Furthermore, given that by the time women begin childbearing they should have completed secondary education, the results suggest that the improvements in the levels of education is more pronounced among the younger cohort. In addition, it might be expected that the influence of education is more likely to have a larger impact on them, as they will postpone childbearing or subsequent births in order to complete their studies.

With regard to the specific age cohorts, it is not surprising, that younger women have higher levels of education than the older women. For example, in 1993 women born between 1974-1978 have the highest proportion of education attained for standards 3 to 7.<sup>8</sup> Again, in 1998 this birth cohort exhibits higher levels of attainment for standards 5 to 9. Furthermore, the results show that the most educated are women born between 1969-1973, since they are largely represented in the secondary and tertiary education categories.<sup>9</sup> For instance, among standards 8 to 10 these women have at least 30% of secondary education in 1993. Likewise, in 1998 women of this birth cohort have at least 20% of post secondary education. On the other hand, older women (those born between 1949 and 1953) have the lowest levels of education. In both years, at least 17% have no education. Moreover, a minority of these women (8%) have some form of education. A partial explanation for this is the inequalities of the educational system in South Africa that delayed their progress through secondary school. This is largely due to the apartheid policies, which provided Africans with inferior quality of education. As a result, there was a large resistance to Bantu education. For instance, in the mid-1970's schools became the platform on which the apartheid government was challenged. Thus despite high enrolment rates, completion rates suffered because of the disruptions that took place in most schools. In addition, Fuller *et al.* (1995) point out that there were lower literacy rates among females than among men, which they suggest can be explained by greater perseverance among males than is the case among females.

The results demonstrate that rural women have lower levels of education than women in urban or metropolitan areas. In 1993, almost 11% of rural women had no education while only 2% of urban women have no education. Similarly in 1998, about 9% of rural women have no education compared to 2% in urban areas. The gap between rural and urban education can be explained by the disadvantage experienced by rural areas compared to urban areas. For instance, secondary school in rural areas is not readily accessible (Krige, 1989: 179). Urban areas and metropolitan areas show very little differences for all education levels. However the gap between metropolitan and rural women is more pronounced at higher levels of schooling.

The results confirm that education improved for all areas, with the most significant change in education levels is among women with tertiary education. As noted earlier, women with tertiary education exhibit high increases in all the areas over the 5 years. For instance, among rural and metropolitan women a 53% increase in post secondary education has been observed, while in urban areas the proportion of women with tertiary education grew by 67%.

## 5.2 Fertility trends

Table 2 shows the mean number of children ever born by age group of mother, for the two surveys.

**Table 2: Trends in Mean Number of Children Ever Born by birth cohort, 1993-1998**

Birth Cohort	Mean number of Children (MCEB)	
	1993	1998
1974-1978 (15-19 in 1993, 20-24 in 1998)	1.27	1.10
1969-1973 (20-24 in 1993, 25-29 in 1998)	1.39	1.23
1964-1968 (25-29 in 1993, 30-34 in 1998)	2.11	1.78
1959-1963 (30-34 in 1993, 35-39 in 1998)	3.28	2.40
1954-1958 (35-39 in 1993, 40-44 in 1998)	3.97	3.73
1949-1953 (40-44 in 1993, 45-49 in 1998)	5.23	4.15
1944-1948 (45-49 in 1993, 50-54 in 1998)	5.4	5.38
<b>Total sample</b>	3.10	2.93

Not surprisingly, the average number of children ever born to women in both years increases with each successive 5-year age group. In both 1993 and 1998, fertility peaks at 5 children per woman for women aged 45 to 49. The results show an increase in the average number of children ever born for each cohort from 1993 to 1998, and simply show that lifetime fertility rises with increases in age. Average parity appears to have declined for the youngest age cohort (1.27 MCEB in 1993 compared to 1.23 MCEB in 1998). This suggests that the younger cohort of women are delaying subsequent births compared the older cohorts of women. A plausible explanation for this outcome may be attributed to the increasing accessibility of contraceptive methods among the younger cohort than has been the case for the older women. This improvement has been driven partly by the government's initiative to make contraception readily available to all men and women (Dept of Health, 1997: 107). Furthermore, legislation has made access to contraceptives without parental consent more readily available for those aged 14 and above.

More generally, when one considers period fertility, it is clear that there has been a decline in fertility in 1998. In addition, the results reveal comparatively higher levels of total fertility than other studies because the sample includes only African women. For example, Mazur (1995) found a total average of 2.14 children ever born in KwaZulu-Natal in his analysis of the SALDRU data set.

With regard to specific age groups, all women showed a decline in fertility in 1998. However, women aged 30-34 register the greatest decline (27%). The observed decline among the specific age groups is consistent with other studies that have shown that fertility in South Africa has been declining.

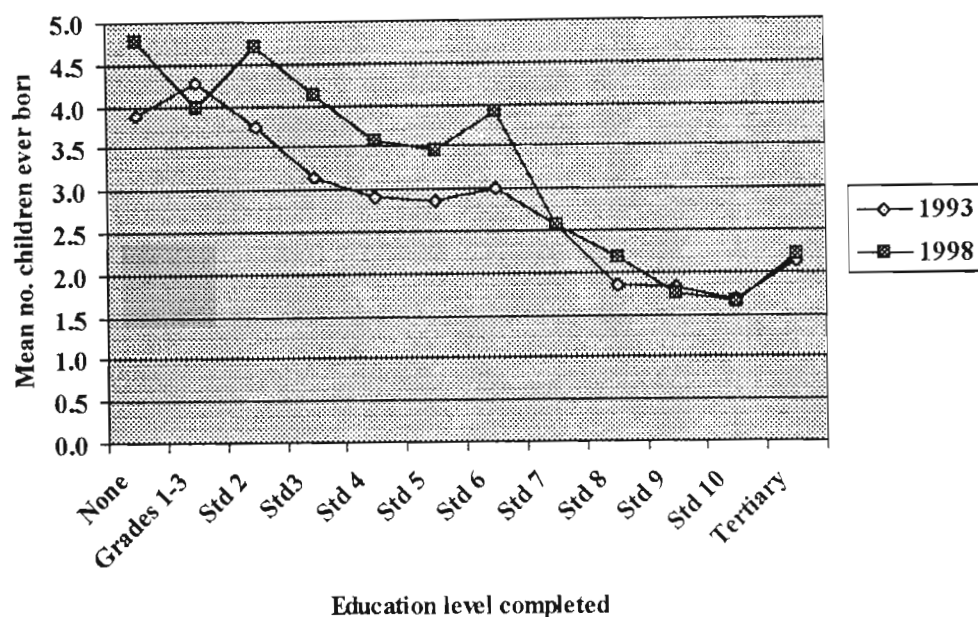
In the next section, the relationship between fertility and education is discussed. Figure 1 displays the mean number of children ever born in 1993 and 1998 according to levels of education. The most striking feature is that fertility levels are higher in 1998 than in 1993. This outcome suggests that fertility has increased at all levels of education except for women with 1 to 3 years of schooling and those with a more than standard 7. However, once again, this increasing trend must be treated with some caution because this pattern reflects life-cycle changes and does not take into account the changing age distribution within the education categories. Thus, if age were controlled for, as is done below, a different picture emerges. An obvious explanation for these puzzling results shown on the figure is that the women in the panel have aged, they have increased both their education and the number of children that they have had.

Nonetheless, the figure does show that fertility declines as education increases for both years. However, this does not always follow a continuous downward trend. At the lower levels of education (between 1 to 4 years of schooling) women have higher fertility than those with no schooling. In 1993, women with 1 to 3 years of schooling have higher fertility than those with none. Likewise in 1998, those with standard 2 have higher fertility than those with no schooling and those with 1 to 3 years. While the former observation is consistent with findings by other researchers, the latter seems to be an anomaly. For instance, with regard to the comparison between few levels of education and no schooling, Mostert and Hofmeyr (1988), using the 1987/1989 DHS, found a positive relationship among South African Africans existed between a few years (1 to 5 years) of education and marital fertility. Chimere-Dan (1997) has also found that women with some primary school education have higher fertility than those with none. In addition, Kalule-Sabiti (1992) has found that women with 1 to 4 years of education have higher fertility than those with none. In the short run, such a rise in the level of fertility is largely attributed to the breaking down of traditional family planning practises such as breastfeeding and sexual abstinence, which have been known to suppress fertility (Kalule-Sabiti, 1992: 47-48 ; Singh and Casterline, 1985: 208).

When one considers the lower levels of average parity among women with 1 to 3 years of schooling in 1998 than in 1993, it is not immediately clear why this is the case. However, two explanations can be put forward. Firstly, while this trend might seem to be an aberration, the observed decline is expected given that we are considering period fertility.<sup>10</sup> Accordingly, average parity should be declining in 1998. Secondly, the lower level in 1998 may be due to the number of women in the group in question, thus

causing the variations. In other words, unlike age, the cohort within a specific education band might change. As a result this suggests that some women may have moved to another education group in 1998. Furthermore, when the education groups are combined to primary, secondary and tertiary, education follows a continuous decline in 1998, while in 1993 women with lower primary have higher fertility than those with none. Despite this, fertility levels in 1998 continue to exceed those observed in 1993 except among women with secondary and above levels of education.<sup>11</sup>

**Figure 1: Mean Number of Children Ever Born by Levels of Education-1993-1998**



Another interesting observation in the two trends is the rise in fertility among women with standard 6 and those with post secondary education. The peculiarity about these trends is that, not only do they divert from the common trend but also that by standard 6 women already have about 8 years of schooling thus, education should have already begun to have an effect as observed in other studies. Similarly, at higher levels of education fertility begins to steadily increase, and this again does not conform to the usual negative education-fertility relationship observed at higher levels of education. Although an increase in fertility at higher levels of education (e.g. tertiary level) is uncommon, some studies have shown that this trend is likely to occur in developed countries or societies. For instance, Bledsoe et al (1999) draw findings from Roudi (1995) and Freedman (1995). In Roudi's analysis of the 1990 DHS, women with at least secondary education were found to have more closely spaced births than those with less education.

Freedman also observed similar patterns in Taiwan, where educated women were found to have remarkable increases in fertility despite delayed marriages and childbearing.

### 5.3 Multiple Regression Analyses

Table 3 (Appendix A) presents the results from a linear regression of children ever born by mothers' education, controlling for several variables. These variables include age, place of residence, income, housing structure, head of household, access to land and television or radio ownership. Before discussing the results I will give the rationale for estimating eight models. Model 1 serves as the standard against which all the other models will be judged. Thus the purpose of controlling for so many variables is to determine whether the education and fertility relationship still holds once other variables have been introduced. I look at the indicators separately so as to capture the individual effect they have on the education and fertility relationship. Most of the variables considered provide an indication of the socio-economic status of the women. The variables are broken down into dummy variables so as to identify the unique significance of each variable.

Model 1 illustrates the relationship between fertility and education. The results confirm that education on average has a negative effect on fertility. With increasing levels of education there is a decline in fertility. This pattern is observed for both 1993 and 1998. The negative influence of literacy on the fertility equation is consistent with other studies in South Africa and elsewhere (Mostert and Hofmeyr, 1988; Chimere-Dan, 1997 and Thomas, 1999). However, I have to caution that in this model, the fertility and education relationship is not statistically significant among women with standards 3 or less.

In 1993, women with 1-3 years of schooling have a positive association with children ever born. However, this result is not statistically significant. This means that fertility increases among women with lower primary. Moreover, the value of 0.388 suggests that they have 0.4 more children than those with no education. Again, this trend is replicated in other studies in South Africa and other sub-Saharan countries and confirms that a few years of education does not necessarily lead to a decline in fertility. In fact, Chimere-Dan (1997) in his analysis of the SALDRU data set has found that women with some primary education have higher fertility than those with no education. Thomas (1999: 154) has also found that the negative association between fertility and education is relatively weak at the lowest level of the education distribution, but is significant for women with at least 3 years of education. Again, some studies (Kalule-

Sabiti, 1992) have suggested that such increases may arise from the erosion of traditional family planning practises, which may increase fertility at the lower levels of education.

On the contrary, the education and fertility relationship in 1998 is negative throughout the education cycle. This means that educated women have lower fertility than women with no schooling at all education levels. The results show that on average the impact of education is much stronger in 1998 than it was in 1993. This is particularly more evident among women with standards 7 or more. This is probably due to the fact that women that are still in the education system are either completing secondary school or are likely to be pursuing their post secondary education. Otherwise, the majority of women have gone beyond the education system. Consequently, when considering how much of the variation in fertility is explained by education, the resulting values of the  $R^2$  suggest that in 1993, 16% of the variation in fertility is explained by education, while in 1998, 26% of the variation in education is explained by education. This also demonstrates that education is having larger influence fertility in 1998 than it did in 1993.

The results indicate that as years of schooling increase, women with higher levels of education exhibit larger differences in fertility levels compared to those with no education. Comparisons of fertility for those that have attained Std 5 and Std 10 with the other levels, demonstrate that at the primary school level, women with Std 5 show a difference of 0.039 fewer births to those with a Std 4 education in 1993. While in 1998 there were 0.116 less births for women with Std 5 than there were with women with a Std 4. When considering the changes over the 5 years, this implies that in 1998 the significance of having a Std 5 qualification was more robust than in 1993.

However, when comparing those with a Std 5 to those with a Std 6, an increase or stability in fertility is observed. For example, in 1993 women in Std 6 had 0.242 more births than those in Std 5. Likewise in 1998, there was an increase of 0.550 births for those with a Std 6. Again, the finding is replicated in Thomas' (1999) analysis, where he suggests that achieving an additional year of school after completing primary education does not cause a decline in fertility. Nonetheless, as education increases the impact on fertility also changes.

With regard to the 5-year interval, this suggests that there were more births among women with a Std 6 in 1998 than there were for women with a Std 6 in 1993. What this demonstrates is that there has been a rise in the proportion of women who have had children in secondary school. In other words, while taking note that the women may not have been currently enrolled during the survey, this may provide further insight into the increasing levels of teenage pregnancies in secondary schools.

Among women with senior secondary education, differences are observed in both 1993 and 1998. For 1993, women with Std 10 have 0.142 fewer births than women with Std 9, while in 1998 only 0.095 less births are observed. Once more, this replicates the earlier finding of the comparison between women with a Std 5 and those with a Std 6. However, this is marginal. Hence the proportion of women having less births is lower in 1998 than in 1993. On the other hand, when comparing women with Std 10 to those with more than Std 10, an increase in fertility is observed for those with tertiary education. Those with post secondary have 0.447 more children in 1993 and 0.645 more children in 1998 than those with a Std 10. Despite the fact that this increase does not correspond with previous studies of fertility in South Africa, there are two issues to consider. Firstly, that fewer women have obtained education levels higher than Std 10, in both 1993 and 1998. Consequently, this could account for the resulting decline in the impact of higher education on fertility. The second issue has already been mentioned in the literature review, namely, that women with higher levels of education may decide to increase their fertility due to higher incomes.

In order to establish whether changes in education have had any effect on fertility, transitions from no schooling to Std 5, Std 5 to Std 8, Std 8 to Std 10 and Std 10 to tertiary education will be considered.<sup>12</sup> The fertility of women with no schooling is higher than that for women that have completed primary school. Women with a primary school education have 1.018 less children than women with no education in 1993, while in 1998 women with primary schooling have 1.309 fewer births than those with no schooling. These findings imply that having a primary education by 1998 has had more effect (about 22%) on fertility than in 1993. When women move from Std 5 to Std 8, they lose 1.037 children in 1993 and 1.28 in 1998. Again, the impact of having a Std 8 in 1998 is greater than that of having a Std 8 in 1993 (that is 19% greater). Between standards 8 and 10, the magnitude is smaller, with women likely to have 0.149 less children in 1993 and 0.52 in 1998. As already noted, the reduction in fertility is greater in 1998, and this shows that in 1998, having a Std 10 was 71% more effective in influencing fertility than in 1993. Finally, when considering the transition from Std 10 to post secondary education, women with a post secondary education have 0.447 more children in 1993, while in 1998 they have 0.545 more children. This suggests that women with a post secondary education in 1998 have had about 17% more children than women with a post secondary education in 1993.

In model 2 of the regression, age is added to the equation. The negative association between education and fertility still exists, although it has weakened for both 1993 and 1998. However in 1993, women with 1-3 years of schooling not only show higher fertility levels than those with no education but also have a

higher positive influence than in model 1 (0.388 versus 0.520). By the same token, in 1998 women with Std 2 have more children than those with no schooling. From the model, we can observe that a tertiary education has a greater influence on fertility than the education levels for all the other age groups. On the other hand, women with Std 8 have a more negative impact on fertility than women with a Std 9 or 10. This is true for both 1993 and 1998.<sup>13</sup> A similar pattern can be observed among with Std 4 and 5, who show a larger negative impact than women with Std 6 and 7.<sup>14</sup>

When comparing the relationship between education and fertility for the two years, it is clear that in 1998 education is having a profound impact on fertility compared to 1993. This suggests that in 1998, women are having fewer births than women in 1993. Education and age explain 45% and 48% (1993 and 1998 respectively) of the variation in fertility. This demonstrates that age and education have a larger influence on fertility than education alone. This is expected given that age is one of the primary factors in the reproductive life cycle. The gap between the 1993 and 1998 is narrowed when age is controlled. For example, in model 1, there was a 38% difference in the variation in fertility between 1993 and 1998. However, when age is introduced in the equation the gap between 1993 and 1998 is reduced to 6%.

Models 3 to 8 show that the influence of education does not change significantly from the levels observed in model 1. The addition of place of residence, income and housing structure suggests that the influence of education on fertility is marginally stronger. This suggests that women residing in urban areas are more likely to be educated and thus this has a more negative impact on fertility. Similarly, when income is taken account, the results suggest that higher income intensifies the negative impact on fertility. Furthermore, the results also show that one's housing condition may increase the impact of education on fertility, thus the better the housing conditions the stronger the influence on education. On average, the wall material has the greatest impact on the fertility-education function.

Other indicator variables controlled for include household head, ownership of a television or radio and access to land. Like age, these variables weaken the impact of education on fertility (if at all). The magnitude in which they affect education is minimal.

In terms of the dynamics between the two years, on average all models indicate that having Std 7 or more not only restores the negative relationship between education and fertility but that the negative in 1998 is reinforced. The greatest effect is seen among women with Std 7, which ranges from a low of 36% (when controlling for housing structure), to a high of 55% (when controlling for age).

## 6. Concluding remarks

The results provide evidence of the hypothesised negative relationship between education and fertility. However, the relationship between education and fertility is not always linear. One can discern two trends operating simultaneously. Firstly, we see that women with few years of schooling have higher fertility than those with none. This observation is more evident in 1993 than in 1998. Secondly, the results show that women with tertiary education have higher fertility than those with secondary education. Despite that the latter observation might be due to the small sample of the women with tertiary education, neither of the trends is unique to KwaZulu-Natal. Various studies tend to indicate that the first trend is common to least developed societies or countries in the beginning of the fertility transition, while the second trend is generally associated with developed societies or those in the later stages of the fertility transition. Since women with higher levels of education may be able to afford larger families through higher incomes, it is recommended that policies for population development should target those women or communities with lower levels of education.

When other variables are controlled for, the net effect of education on fertility remains negative. The impact of education on fertility is either static, weakened or strengthened, depending on the variables added into the model. Place of residence, housing structure and income, strengthen the education fertility relationship. Conversely, age, head of household, access to land and ownership of a television set or radio set weakens the education relationship. While it would be appropriate to suggest that those variables that contribute more to the negative effect of education on fertility should take precedence when identifying measures to reduce fertility, manipulating these variables is not clear-cut. This is partly due to the fact that, unlike education, the decision to reside in an area or earn a certain income is endogenous to the household. However with education transition from one class to the next is a significant element of the school system (*ceteris paribus*).<sup>15</sup>

With regard to dynamics, the most striking findings between the 1993 and 1998 surveys are that the relationship between fertility and education continues to be negative. Moreover, education continues to have a profound effect in 1998. The results have also shown that having standard 7 or more plays a larger role in reinforcing the negative relationship between fertility and education. Additionally, women with a standard 7 level of education have experienced greater changes in fertility over the 5 years.

This research has not captured the unobserved effects of the impact of education on fertility. Thus, a fruitful direction for further analysis would be to control for the time-invariant effects. A key advantage of

the KIDS panel data is that unobserved time-invariant factors at the household and individual level can be taken into account.

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**Endnotes:**

<sup>1</sup> Total fertility rates are 2.9 in South Africa, 4.0 in Zimbabwe, 4.1 in Botswana, 4.3 in Lesotho and 4.7I in Kenya.

<sup>2</sup> In other words, as educational attainment increases, fertility rates decrease.

<sup>3</sup> For example, the contraceptive prevalence rate was 13% in Tanzania in 1996, 14% in Zambia in 1996, 8% in Uganda in 1995, 14% in Malawi in 1992, 42% in Zimbabwe in 1994 and 26% in Namibia in 1992 (South Africa DHS, 1998: 73).

<sup>4</sup> Economic status is measured using income, access to land, household structure and ownership of a television set or radio

<sup>5</sup> Lam and Duryea (1999), Kirk and Pillet, (1998), Population Council (1998), Martin, (1995), Martin and Juarez (1995), Weinberger et al (1989), Weinberger (1987).

<sup>6</sup> This means that poverty has deepened and thus an increase of about 14% of income would be required to reach the poverty line.

<sup>7</sup> Human Development Index is a composite measure of literacy (years of schooling), income (GDP) and longevity (life expectancy)

<sup>8</sup> Aged 15 to 19 in 1993 and 20 to 24 in 1998

<sup>9</sup> Aged 20 to 24 in 1993 and 25 to 29 in 1998

<sup>10</sup> Fertility has been declining thus it is expected that in 1998 fertility will be lower than in 1993

<sup>11</sup> Education groups were grouped as those with none, lower primary-classes 1 to 4, higher primary-standards 3 to 5, junior secondary-standards 6 to 8, and senior secondary an above-standards 9 or more.

<sup>12</sup> These cut off points are the exit points in the education system.

<sup>13</sup> This only refers to women with standard 9.

<sup>14</sup> In 1998 the comparison is limited to women with standard 6.

<sup>15</sup> This refers to post apartheid South Africa.

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## Appendix A: Multiple Regression Results (Table 3)

**Table 3 Multiple Regression Analysis-Children ever born -1993-1998**

1993	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	education	age	location	income	housing	tv/radio	Hh head	Land
<b>R<sup>2</sup></b>	<b>0.160</b>	<b>0.451</b>	<b>0.161</b>	<b>0.162</b>	<b>0.168</b>	<b>0.160</b>	<b>0.185</b>	<b>0.160</b>
<b>Education</b>								
1 to 3	0.388°	0.520°	0.38°	0.376°	0.345°	0.390°	0.438°	0.380°
std 2	-0.145°	-0.0619°	-0.160°	-0.145°	-0.213°	-0.146°	0.129°	-0.144°
std 3	-0.727°	-0.316°	-0.745*	-0.727*	-0.785*	-0.722*	-0.728°	-0.720**
std 4	-0.979*	-0.737*	-1.005*	-0.979*	-1.093*	-0.973*	-1.036*	-0.975*
std 5	-1.018*	-0.744*	-1.047*	-1.042*	-1.094*	-1.010*	-1.039*	-1.011*
std 6	-0.876*	-0.417*	-0.916*	-0.885*	-0.958*	-0.871*	-0.8548	-0.868*
std 7	-1.321*	-0.518*	-1.379*	-1.343*	-1.460*	-1.314*	-1.275*	-1.310*
std 8	-2.055*	-1.1558*	-2.125*	-2.089*	-2.177*	-2.049*	-2.025*	-2.035*
std 9	-2.062*	-0.923*	-2.116*	-2.072*	-2.173*	-2.055*	-1.967*	-2.059*
std 10	-2.2048*	-1.139*	-2.274*	-2.278*	-2.282*	-2.195*	-2.206*	-2.192*
Post secondary	-0.776°	-0.345°	-0.797°	-0.776°	-0.796°	-0.811°	-0.766°	-0.823°
<b>1998</b>								
<b>R<sup>2</sup></b>	<b>0.263</b>	<b>0.483</b>	<b>0.264</b>	<b>0.267</b>	<b>0.270</b>	<b>0.265</b>	<b>0.266</b>	<b>0.266</b>
<b>Education</b>								
1 to 3	-0.0511°	0.099°	-0.0556°	-0.0749°	-0.0508°	-0.0467°	-0.0597°	-0.0831°
std 2	-0.647°	-0.594°	-0.659°	-0.678°	-0.705°	-0.622°	-0.626°	-0.706°
std 3	-1.193*	-0.894*	-1.212*	-1.219*	-1.3*	-1.196*	-1.211*	-1.206*
std 4	-1.309*	-1.071*	-1.322*	-1.341*	-1.396*	-1.254*	-1.291*	-1.403*
std 5	-0.859*	-0.695*	-0.92*	-0.891*	-0.956*	-0.815*	-0.889*	-0.862*
std 6	-2.207*	-1.153*	-2.247*	-2.275*	-2.282*	-2.16*	-2.184*	-2.219*
std 7	-2.589*	-1.675*	-2.637*	-2.65*	-2.699*	-2.532*	-2.556*	-2.576*
std 8	-3.014*	-1.533*	-3.05*	-3.06*	-3.076*	-2.973*	-2.960*	-3.000*
std 9	-3.109*	-1.744*	-3.17*	-3.186*	-3.23*	-3.053*	-3.047*	-3.115*
std 10	-2.564*	-1.775*	-2.632*	-2.961*	-2.794*	-2.497*	-2.553*	-2.537*
Post secondary								

Significant at p=0.05

° Not significant at p=0.05

## **Appendix B: Southern African Journal of Demography Editor's requirements**

Produced by the Demographic Association of Southern Africa and  
The Centre for Population Studies, University of Pretoria

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### **Editor**

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Department of Sociology  
University of Pretoria  
PRETORIA  
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### **Editorial Policy**

Contributions to be considered for inclusion in the Journal should be sent to the Editor. All original contributions will be reviewed by two referees on whose advice contributions will be accepted or rejected by the Editorial Committee. Any article submitted for possible publication should not be under the concomitant consideration of any other journal. In addition to articles on a wide range of demographic topics, critical comments on articles previously published, abstracts of current publications, book reviews and other documents in the field of demography or relevant to demography are also welcomed. Contributions accepted may be subject to minor editorial change. Authors are responsible for the correctness of facts and figures presented.

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### **Information for contributors**

Manuscripts should be typewritten, using one-and-a-half spacing, and submitted to the Editor in triplicate. An abstract of 100 words or less, author's name and surname, academic degrees, titles and affiliations (occupation and/or employment) should be included with the manuscript. Contributions should be limited to approximately 10 000 words (approximately 30 pages, including tables, figures, notes, references and appendices). The Haryard reference technique should be used. Notes, instead of footnotes, are to be listed numerically and should appear before the list of references.

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Enquiries about membership should be addressed to the Secretary, Ms Alida Stofberg, DEMSA, c/o Centre for Population Studies. University of Pretoria, PRETORIA, 0002.  
Members receive the Journal free.

## Appendix C: Personal Involvement in the Research

My involvement in the KwaZulu-Natal Income Dynamics Study (KIDS) began in August 1998, when I was appointed as a research intern at the Population and Poverty Studies Research Unit (PRU) located in the School of Development Studies. A principal requirement of the internship was my participation in one of the unit's research projects. I eventually opted for the KIDS for two fundamental reasons. Firstly, it allowed me to use the knowledge gained from my undergraduate studies to investigate important demographic issues. Secondly, it offered me the opportunity of collaborating with the team of researchers involved in the ongoing analysis of KIDS, the first large-scale longitudinal panel study in South Africa.

After an extensive review of the KIDS questionnaire and the critical demographic themes which the study enabled me to pursue, my initial proposal centred on providing a profile of the fertility experiences among the women in the reproductive age group contained in the two waves of the KIDS panel dataset. As such, my research began as a broad examination of the socio-economic factors affecting African fertility in KwaZulu-Natal, though the focus was later narrowed to specifically consider women's education.

In order to gain a better understanding of the statistical requirements entailed in my proposed area of study, I attended the Institute for Social Research's (ISR)<sup>1</sup> Summer Institute in Survey Research Techniques for the months of June and July 1999. The courses I undertook were *Analysis of Survey Data I and II*, as well as *Computer Analysis of Survey Data I and II*. As part of the ongoing research process that culminated in this dissertation article, a detailed research proposal was presented in September 1999, to peer review, at the School of Development Studies, and at a conference held at the School of Oriental and African Studies (SOAS, University of London).

Between mid-1998 and November 1999, the dataset was exposed to continuous and intensive data cleaning. As an indication of the magnitude of this exercise, three successive versions of the data were released for scrutiny by the researchers in the unit, prior to the final release in November. I was part of the team that assessed each version, so as to avoid inconsistencies that could introduce bias into the results.

Apart from submitting the article to the *Southern African Journal of Demography* after revisions have been completed, I will be involved in a follow-up study which will use the own-child technique for measuring period fertility levels, but also control for the impact of time.

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<sup>1</sup> University of Michigan