

Teenage Motherhood and Long-Run Outcomes in South Africa

By

By Siv Gustafsson[†] and Seble Worku^{††}

Abstract:

Teenage motherhood is very high in South Africa. In 2001, 55 per thousand African South African women and 82 per thousand Coloured South African women were teenage mothers as compared to 8 among Indian South Africans and 3 among White South African women. In this paper we use the South African General Household Survey data of 2002 with complete retrospective fertility history to study teenage childbearing and a number of outcomes in 2002 such as completed high school and satisfaction with life. Our main findings are that teenage childbearing is negatively correlated with completing high school, but most other outcome measures do not show the negative effects from teenage motherhood as has been found in many previous US and UK studies. We estimate a 2SLS model on the joint determination of the probability of teenage motherhood and completing high school, identifying by abortion rates, the numbers of doctors and nurses by region and the distance to the nearest clinic. All the instruments are significant except for the regional abortion rates. We find that the effect of teenage childbearing on high school completion risks is highly significant and a Hausman test shows that teenage birth is not exogenous to high school completion decisions.

Keywords: Teenage motherhood; high school completion; endogeneity; 2SLS; South Africa

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[†] University of Amsterdam, Department of Economics; S.S.Gustafsson@uva.nl

^{††} Statistics South Africa; Seblew@statssa.gov.za (corresponding author)

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1 Introduction

Teenage childbearing is generally considered a poor life choice since responsibilities of early childbearing may have long lasting effects on the socio-economic well being of the mothers and their children. The most commonly cited outcomes for teenage mothers are interrupted education, reduced earning potential, reduced career prospects and poor marital outcomes. In particular many studies in the United States and United Kingdom have observed that schooling of teenage mothers is less than the schooling of similar women, who had their birth later or have had no birth up to the interview time. For example Ermisch and Pevalin (2005), studying the British cohort of women born in 1970, find that having had a teenage birth causes a woman to fare worse in the marriage market, greatly increasing her chances of partnering with poorly educated and unemployment prone men. Using the US National Longitudinal Survey of Youth (NLSY) data, Hotz, McElroy and Sanders (2005) find negative and significant effects of a teenage birth on having a high school diploma by age 28, and being a single mother at age 28. Also, teenage mothers have fewer hours of work and lower annual earnings at age 28 but they also show that causal effects are likely to be much smaller. These results for the United States reproduce many earlier studies including Moore and Waite (1977), Card (1981), Mott and Marsiglio (1985) and Upchurch and McCarthy (1999).

The question is to what extent we do observe negative outcomes because this woman has grown up in a family that has negative outcomes in general and also if there are no teenage births. This reason for finding negative outcomes of teenage births is the selection effect. Two methods have been used to disentangle the selection effect from the causal effect: one is the sisters' comparison (Gerominus and Korenman, 1992; Holmlund, 2005) and the other is using a quasi-experiment as an instrument (Hotz et al, 2005; Ermisch and Pevalin, 2005). All studies that have used sisters comparisons and quasi-experiments to control for the selection effect find much smaller negative effects from teenage births and adults outcomes.

Holmlund (2005) uses Swedish register data and is able to extract a sample of teenage mothers and their sisters who are not teenage mothers¹. Her outcome variables are years of education completed in 2002 for women born 1974 to 1977. In addition to being able to get rid of the family selection effect by studying sister differences, she has information on the pre-pregnancy school grading at age 16 which makes it possible to control for within family heterogeneity. Interestingly, she finds that both the teenage mothers and their sisters have less education than a control group of women of the same cohort who have no teenage births and

¹ Statistics Sweden has created a multigenerational register that contains connections between parents and children via biology and adoption. This register includes all Swedes who were born in 1932 or later and registered as living in Sweden any time from 1961 onwards. Because all Swedes have a personal identifier since 1947, the data of the multigenerational register can be merged to other registers of Statistics Sweden (Björklund, 2006). For example, Holmlund (2005) uses the multigenerational register; the censuses 1975, 1980, 1985 and 1990; the education register and the school registers on data collected from schools, on grade received at age 16, when leaving compulsory school. Researchers are then allowed to buy the custom made data set from which the personal identifiers are deleted but new identifiers linking the data sets are introduced.

have no sisters with teenage births. However, one of Holmlund's most surprising results is that there is an inter-sibling difference in pre-pregnancy school results to the favour of non-teenage sisters. Holmlund concludes that when controlling for pre-motherhood school performance the sibling approach is not more informative than a traditional cross-section.

The quasi-experiment used by Hotz et al (2005) is miscarriages, so that the comparison of teenage mothers is to women who had teenage pregnancies that ended in miscarriages. They conclude on the basis of their study of the NLSY that in the United States the adverse outcomes are much smaller and shorter lived when using this natural experiment than has been found in most previous studies.

Ermisch and Pevalin (2005) use information on pregnancies, miscarriages and abortions arguing that while teenage pregnancy is likely to be an unplanned event, the decision to actually give birth is a choice. At age 30, teenage mothers in Britain are more likely to form partnership with low earning unemployment prone men. The instrument variable estimators of teenage motherhood using miscarriages and abortions as instruments are not very different from the estimator obtained without instrumental variables techniques.

Because teenage motherhood and completing high school education have been found to be negatively correlated although the causal direction is not clear, estimating these two events as simultaneously determined is a solution. Ribar (1994) estimates a bivariate probit on the joint probability of having a teenage birth and completing high school for US women also using the NLSY. He uses availability of obstetricians and gynecologists by region, woman's age at menarche and the regional abortion rate as instruments for teenage pregnancy. In this paper, we study the causal impact of teenage motherhood on high school completion, using regional variation in health care facilities using the General Household Survey 2002 with complete retrospective fertility history.

This paper is organised as follows. The second section describes the data and variables used. The third section presents descriptive statistics on teenage motherhood in South Africa. Section 4 presents the econometric approach used. Section 5 discusses the results and section 6 concludes.

2 Data and samples

The General Household Survey (GHS) is a household based survey conducted by Statistics South Africa since 2000 around July each year and was preceded by the October Household Survey for the years 1995 to 1999. We are using the General Household Survey of 2002. Information is collected on everyone currently living in the household and there is full retrospective information about fertility for women aged 50 or younger in 2002 even if the child doesn't live in the household or has died (Statistics South Africa, 2003). This makes it possible to study long-run outcomes at age 40 and short-run outcomes at age 24 in our definitions.

There are many outcomes in 2002 available in our data including a measure of happiness, and wealth. The wealth variable is an index that runs from minimum 0 to maximum 1. We

constructed this variable as an index by combining the main type of material used to construct the roof and walls of the house in which the woman lives in 2002 with the condition of the walls and roofs, the number of rooms and ownership status of the house. Highest scores are allocated to the main materials used to construct the roof and walls of the house. The details of the construction of this variable are shown in appendix B1. In addition, we include whether the woman has ever been employed, her employment status in 2002, her occupation, whether she is married in 2002 and if so her husband's occupation. We also use complementary information on abortion rates, the numbers of nurses and doctors by region and per 1,000,000 inhabitants in 2002 and the distance to the nearest clinic measured in minutes that we use as identifying instruments. Further, we have information on contraceptive use by population groups, age, education and urban/rural in 1998 from the South African Demographic and Health Survey. We use the data to impute values on the availability of contraceptives to a woman. These variables are created from Table A1 giving the individual woman a propensity that is formed by the group she belongs². We have information about HIV infection rates by the nine regions from the 2002 Human Science Research Council Survey/Nelson Mandela Survey data sets³.

We construct four different samples: 1) "all women", 2) "all mothers" 3) "educated women" and 4) "young women" samples and compare outcomes in 2002 for teenage mothers in each of these samples. The first sample includes all women aged 18 to 50 in 2002 and the second sample includes all mothers aged 18 to 50. These two samples make up 24,973 women and 17,576 mothers. The third sample is more restricted and includes all women aged 18 to 50 who have at least completed high school education. This sample includes 8,039 women. The last sample includes women aged 18 to 24 in 2002 and contains 7,288 women. The first sample compares teenage mothers to all other women, whether they are mothers or not. The second sample compares teenage mothers to other mothers who have had their children later. Education has been shown to increase life chances in many respects and we therefore study all women who have completed at least a high school education. The reason for studying young women aged 18-24 in 2002 separately is that those women who are teenage mothers have recently experienced this event. Using the "young women" sample, we can include some

² The Depo-Provera is a long-acting progestin form of birth control manufactured by Pfizer. It is injected once every three or six months and its estimated effectiveness in preventing pregnancy is 99%. Depo-Provera has long been controversial because of its health risks. It can cause infertility, lack of bone density, increase in body weight, excessive bleeding or no bleeding and it does not protect against the transmission of HIV. We used the full appendix Table A2 to impute a value on the probability of using a type of contraceptive by population group (4); age group (8); urban/rural (2) and education (4). This means that the probability of each of the four contraceptive uses can have $4 \times 8 \times 2 \times 4 = 256$ different values depending on which group the woman belongs to.

³ South Africa has a very high rate of HIV infected people estimated to be 11.4 % of the population in 2002 (Shisana and Simbayi 2002; Shisana et al, 2005). There is a recent discussion about the negative effects of HIV on fertility (United Nations, 2002; Zaba and Gregson, 1998; (Allen et al 1993; Batter et al, 1994; Carpenter et al 1997). The negative effects of HIV on fertility occur through miscarriages, spontaneous abortions and stillbirths (Gray et al, 1997). The HIV prevalence is however only available for the nine provinces (see Table A2).

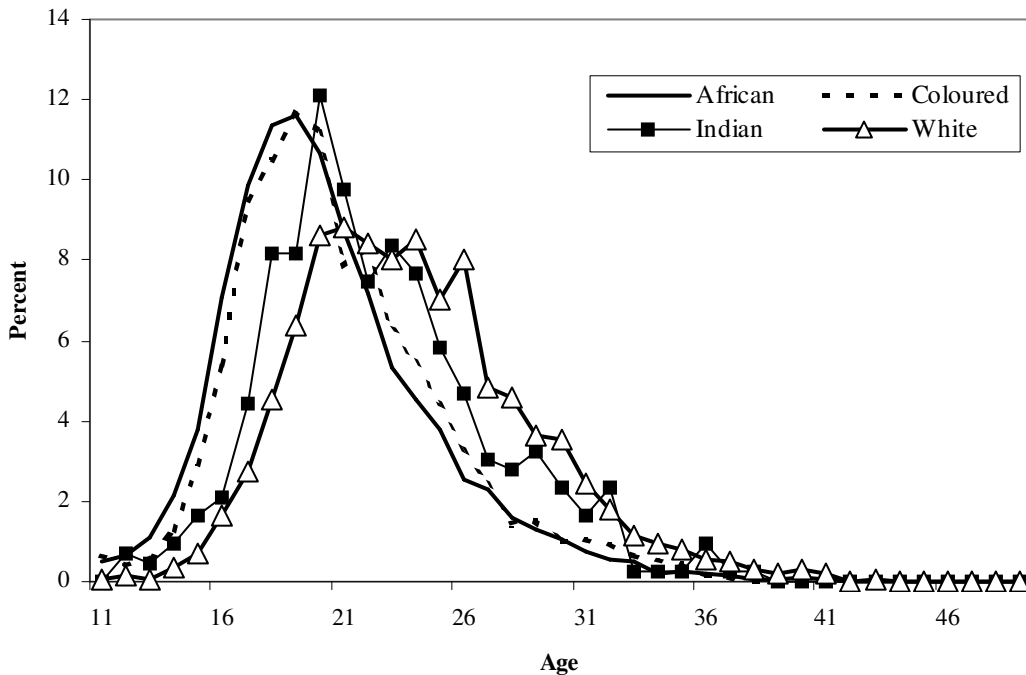
additional information for recent years such as the prevalence of contraceptive use, the HIV prevalence rates, the number of abortions, the number of doctors and the number of nurses by region to carry out further analyses.

Means and standard deviations for the four samples are presented in appendix Table A1. The proportion of teenage mothers is 44% (Table A1) among all mothers. Among all first birth to African women, the proportion of teenage mothers is 47% (see Worku, 2007).

3 Descriptive statistics on teenage fertility

In South Africa, people self-report themselves as belonging to one of the four population groups: African (77%), Coloureds (12%), Indian (3%) or White (8%) as shown in the sample of women aged 18-50 in 2002 (see appendix Table A1). Figure 1 shows the pattern of first births according to the age of the mother by population group. African women and Coloured women are clearly younger at having their first birth than Indian and White women. The peak age at having first birth is at age 19 for African and Coloured women. Women who were 50 years old in 2002 have been 11 years old as early as in 1963. This means that Figure 1 is an average across a time period ranging from 1963 to 2002.

Figure 1: First birth by mother’s age and population group



Source: Own computations based on the GHS 2002, including all women aged 50 or less in 2002

To give a picture of recent teenage fertility, we use the births that took place in 2001 to compute the number of births per thousand women by age group and present them in Table 1. The African and Coloured South African women have 55 and 82 births per thousand women in the age group 15-19. In comparison, Britain with more teenage births than any other Western European country has 29 births per thousand women aged 15-19. African South African women aged 15-19 have more than twice as many births as British women aged 15-19. Indian and White South African women have low numbers of teenage mothers, closer to the Swedish numbers. There is a concern in South Africa that teenage childbearing might be rising⁴. However Worku, 2007 shows that teenage fertility of the cohort of women born 1980-1984 is almost half of that of women born in 1960-1964.

Table 1: Births per thousand women in 2001 by age group

ASFR	Britain	Sweden	S.A: African	S.A: Coloured	S.A: Indian	S.A: White
<15	0	0	5	5	0	0
15-19	24	5	55	82	8	3
20-24	69	41	102	117	83	31
25-29	92	100	101	127	136	96
30-34	88	107	83	100	44	78
35-39	42	51	49	40	9	19
40-44	7	10	19	13	11	3
45-49	0	1	7	3	0	0
Total	323	314	422	487	291	229
Number of births	588,819	95,815	1,497	244	30	73
Number of women (thous)	19, 622	2,040	25,103	3,621	780	2,326
TFR	1.61	1.57	2.11	2.4	1.5	1.15

- Notes: 1. Estimated TFR published by Statistics Sweden for 2001 are: 1.57;
 2. Estimated TFR published by UK National Statistics Office for 2001 are 1.63;
 3. Estimated TFR published by Statistics South Africa for 2001; for South African Africans are: 3.0, for Coloureds: 2.4; for Indians: 2.0 and for Whites are 1.7;
 4. ASFR: Age Specific Fertility Rates are calculated as the number of births in a year to mothers in five-year age groups per women of the same age group.

Source: Own computation based on the General Household Survey 2002 (South Africa); Statistics South Africa: Mid-year population estimates 2004. Statistics Sweden: Live birth in Sweden by age of the mother and mid-year populations estimates (Sweden); Office of the National Statistics: Maternities, live births and stillbirths by age of mother and occurrence within/outside marriage and mid-year population estimates 2000-2002 (Britain).

⁴ The public broadcaster (SABC) aired in its weekly Special Assignment Program on July 25 2006, a documentary entitled: Imali Ye Qolo –Rent A Womb. The program discusses the rise in teenage pregnancies and the community members around the country beliefs that the reason for this alarming trend is the child grant.

Many observers are convinced that the child support grant introduced by the government in 1997 is tempting teenagers to get pregnant⁵. This type of incentive has been extensively discussed by American scholars whereby researchers have tried to establish causal links between the size of the monthly AFDC benefits and the decision to give birth (Ellwood and Bane, 1985; Lundberg and Plotnick, 1990; Moffitt, 1992; Klawitter, Plotnick and Edwards, 2000). As a result of these debates, benefit policies have been changed in several of the 50 states in the US to stimulate work rather than spawn benefit dependence among women with dependent children. These changes have been incorporating some aspects of Earned Income Tax Benefits (see e.g. Ehrenberg and Smith, 2006).

In Table 2 number of births per thousand woman aged 19 or younger (teenage fertility) and the total fertility rates are presented for selected countries. Teenage childbearing in South Africa is similar to the United States, Turkey and Brazil of around 45 per thousand teenage women having birth as indicated in Table 2. In comparison, countries with less than 10 per thousand include Denmark, Italy, Spain and Sweden. Some African countries included in Table 2 have more than a 100 teenage births per thousand teenagers namely Kenya, Nigeria and Zimbabwe. In those countries, total fertility rates are also well above replacement rates. The US, Australia and Canada have 2-digits level rates, although in the latter the total fertility rates remain close or below the replacement levels. Among European countries, the United Kingdom stands out with 29 births per thousand teenage women.

4 Econometric approaches

The cross sectional data from GHS 2002 allow us to analyse correlations between having had a teenage birth in the past and various outcomes in 2002. We estimate regressions of the following type:

$$Y_i = \alpha_0 + \alpha_1 T_i + \alpha_2 X'_{2i} + \varepsilon_i \quad (1)$$

where Y_i is an outcome variable of a woman i in 2002; T_i is a dummy variable which equals 1 if the woman had a teenage birth in the past and 0 otherwise; X'_{2i} is a matrix representing other control variables X_2 for woman i affecting outcomes in 2002. These are primarily the birth cohort of the woman and her population group; α_0, α_1 and the vector of α_2 are parameters to be estimated. If the true model instead is:

⁵ The child support grant was introduced in 1997 by the government to alleviate poverty. The grant is means-tested and is paid via the primary caregiver of the child, to all children who qualify. It amounts to R170 per month as of 1 April 2004, is currently available for children under the age of 14 years who live in households with an income of below R800 per month, or R1,100 per month if the child and his or her so-called 'primary care-giver' either live in a rural area or in an informal settlement.

Table 2: Teenage fertility and total fertility rates in 2002 for selected countries

Country	Teenage fertility	Total fertility rates
Australia	18	1.75
Brazil	44	2.30
Botswana	60	3.20
Canada	22	1.52
Denmark	7	1.72
France	11	1.89
Germany	13	1.31
Italy	7	1.26
Kenya	113	5.00
Mexico	51	2.40
Netherlands	8	1.73
New Zealand	14	1.90
Nigeria	124	5.80
Norway	10	1.75
Poland	15	1.24
Portugal	20	1.47
South Africa	46	2.80
Spain	9	1.25
Sweden	7	1.65
Turkey	49	2.46
United Kingdom	29	1.64
United States	43	2.01
Zimbabwe	104	3.60

Note: Teenage fertility France and Germany for 2001; Spain and Portugal for 2000; Turkey for 1998.

Source: Teenage fertility and total fertility rates from Society at a Glance: OECD Social Indicators, 2005, <http://www.oecd.org/dataoecd/34/13/34542721.xls>; US Bureau of Census; ILO:<http://laborsta.ilo.org/>

$$Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 X'_{ij} + f_j + U_{ij} \quad (2)$$

where Y_{ij} is the outcome of individual i in family j . Sisters data allows the researcher by differencing over siblings to get rid of the unobserved family component f_j which our data does not allow. This means that our estimates will also include the selection effect f_j . Our analysis below therefore includes the potential effect of belonging to a family prone to

adverse outcomes, the selection effect and the proper causal effect of teenage motherhood on outcomes.

In order to be able to compare outcomes at a given age we follow King, Tomz and Wittenberg (2000) to simulate short-term outcomes at age 24 in 2002 and long-term outcomes at age 40 in 2002 for African women, who had a teenage birth in comparison to those who did not for the different samples described earlier. The advantage of this simulation procedure above simple predictions is that it gives us an estimate both of the predicted value and a standard deviation around it. We use a program called CLARIFY developed by King et al (2002) and is a set of macros written in STATA. Once we have estimated the model in equation (5.1) we obtain the estimated coefficients and variance matrix:

$$\hat{\gamma} = \begin{bmatrix} \hat{\alpha}_1 \\ \hat{\alpha}_2 \\ \hat{\alpha}_0 \end{bmatrix} \quad \hat{V} = \begin{bmatrix} V_{\hat{\alpha}_1\hat{\alpha}_1} & V_{\hat{\alpha}_1\hat{\alpha}_2} & V_{\hat{\alpha}_1\hat{\alpha}_0} \\ V_{\hat{\alpha}_2\hat{\alpha}_1} & V_{\hat{\alpha}_2\hat{\alpha}_2} & V_{\hat{\alpha}_2\hat{\alpha}_0} \\ V_{\hat{\alpha}_0\hat{\alpha}_1} & V_{\hat{\alpha}_0\hat{\alpha}_2} & V_{\hat{\alpha}_0\hat{\alpha}_0} \end{bmatrix} \quad (3)$$

where $\hat{\alpha}_2$ is a vector of several coefficients.

To simulate one value of Y_i from equation 5.1, we consider an African woman aged 40 who had a teen birth. We then generate k random draws of the parameters from the multivariate normal distribution $\tilde{\gamma} \sim N(\hat{\gamma}, \hat{V})$ that are stored in k new variables. Thus each draw is a vector of simulated parameters such that:

$$\tilde{\gamma} = \begin{bmatrix} \tilde{\alpha}_{11} \\ \tilde{\alpha}_{21} \\ \tilde{\alpha}_1 \end{bmatrix} \begin{bmatrix} \tilde{\alpha}_{12} \\ \tilde{\alpha}_{22} \\ \tilde{\alpha}_2 \end{bmatrix} \dots \begin{bmatrix} \tilde{\alpha}_{1k} \\ \tilde{\alpha}_{2k} \\ \tilde{\alpha}_k \end{bmatrix} \quad (4)$$

The default number of simulations is 1,000. After simulating the parameters, the program sets values for the explanatory variables and calculates bounds on the values of the explanatory variables. Then one can simulate various quantities of interest such as predicted values, expected values and first differences. Simulated expected values are equivalent to simulated probabilities for all discrete choice models (probit and ordered probit) used in our analysis. In these models, the quantities presented are the *Probability (Y=1)* for the probit model and the *Probability (Y=j) for all j* for the ordered probit model. For the OLS model, the expected value of Y or $(E(Y))$ is estimated. We use four different sub-samples in our estimation of (5.1) and simulation exercise.

We estimated univariate probits on the probability of completing high school and being a teenage mother respectively and a two stage least squares (2SLS) model in which the probability of teenage motherhood and the probability of high school completion are simultaneously estimated. This model is equivalent to a maximum likelihood bivariate probit

model and is preferred when both the dependent variable and the endogenous variable are binary (Angrist, 2001 and Wooldridge 2002, p.622). In the first stage of the 2SLS approach we use Ordinary Least Squares (OLS) to estimate the following model of teenage motherhood in terms of observed factors:

$$T_i = \theta\varpi_i + e_i \quad (5)$$

where T_i is 1 if the person had teenage birth and 0 otherwise; ϖ_i is a vector of individual and geographical characteristics; θ is a parameter to be estimated and e_i is the error term. In the second stage of 2SLS, we assume that the teenage motherhood decision is determined by:

$$S_i = \delta_1 Z_i + \delta_2 T_i + u_i \quad (6)$$

where Z_i are the exogenous identifying instruments; δ_1 and δ_2 are parameters to be estimated and u_i is the error term. Consistent estimates are obtained by 2SLS regardless of the underlying error distributions (Angrist, 2001).

The choice of Z_i is very important. We use a number of instruments as suggested by the literature: abortion rates by region, number of doctors per 1,000,000 of the population by region and number of nurses per 1,000,000 of the population by region. In addition, we use distance to the nearest clinic which is observed from the data as an additional instrument. These variables are most likely to affect childbearing but not educational attainment and thus represent acceptable potential instruments. Appendix Table A1 shows the means and standard deviations of these variables and appendix Table A3 shows their values across the nine regions. Unfortunately the variations of these variables are only across the nine regions. In this analysis we use the ‘young women’ sample, women aged 18-24 in 2002 because the instruments are for recent years.

5 Results

The coefficient on the dummy variable of having had a teenage birth in the past as estimated according to equation (1) above in various analyses is shown in Table 3. The first row of Table 3 shows that teenage mothers are less likely to have completed high school in comparison to all other women and to all mothers. These two coefficients are about -0.5 for both comparisons. For those women who are young and recently had a teenage birth, the coefficient is still more negative (-0.6). This shows that there are strong negative effects of teenage births on high school completions which are in line with results from previous studies on the United States, Britain and Sweden cited above.

The second line of Table 3 shows results from having had a teenage birth on the wealth variable. Also this outcome is significant and negative for teenage mothers in three of the

four samples. It is not significant among the group of educated women comparing women who had a teenage birth but also managed to complete high school to women with high school education who did not have a teenage birth. Furthermore, women with teenage birth are less likely to be employed. The employment history, the probability of being married and spouse's occupation are not negative to teenage mothers.

Table 3: Outcomes in 2002, estimated coefficient of the dummy variable of having had a teenage birth in the past

Sample Age	All women 18-50		All mothers 18-50		Educated women 18-50		Young women 18-24		Method
	Coeff	z-value	Coeff	z-value	Coeff	z-value	Coeff	z-value	
	1. Completed high school or higher	-0.516	-25.8	-0.487	-21.6	-	-	-0.615	
2. Wealth	-0.017	-7.2	-0.013	-4.9	-0.007	-1.5	-0.026	-5.7	OLS
3. Married/Cohabiting	0.287	15.4	0.032	1.6	0.308	7.8	0.713	17.1	Probit
4. Employed in 2002	0.047	0.3	-0.036	-1.8	-0.025	-0.6	0.175	3.9	Probit
5. Ever worked	0.171	8.8	0.080	3.6	0.111	2.7	0.243	6.2	Probit
6. Woman's occupation	-0.087	-5.1	-0.129	-6.9	-0.097	-2.7	0.112	2.6	Oprobit
7. Spouse's occupation	0.181	11.1	-0.043	-2.4	0.206	5.6	0.636	15.9	Oprobit
8. Satisfaction with life	-0.029	-2.0	-0.027	-1.6	0.037	0.9	-0.019	-0.7	Oprobit

Note: We also controlled for population group and cohorts.

Source: Own computations based on the GHS 2002 data

In Tables 4 and 5, we show simulated outcomes based on the full analyses underlying Table 3. The simulations are performed as described in section 4 above. The simulations allow a prediction at a given age and give a standard deviation for the prediction. It would not be appropriate for example to compare wealth between people of different ages because a younger person would be expected to have much less wealth than an older person. For binary variables such as whether the woman completed high school or not, the simulated value gives the probability that a woman of a certain characteristics has completed high school. The main impression in Tables 4 and 5 is small differences in many of the outcomes between teenage mothers and other mothers. There are however big differences in the proportion who completed high school between teenage mothers and other women whereas 13% of all mothers who had teenage birth have also completed high school, the proportion is 28% if they did not have teenage birth. For young women, the difference is also large, whereas 52% of women who have no teenage birth have completed high school at age 24, this is only true for 29% of the teenage mothers.

The simulated results of wealth at age 40 do not differ between teenage mothers and other women although the coefficient is negative and significant as shown in Table 3 above. The simulated results are 0.70 for teenage mothers and 0.71 for non-teenage mothers respectively. They do however differ between educated women and all mothers with the value of the index

decreasing from 0.70 to 0.62. Having completed high school increases the probability of being employed in 2002 which can be seen by comparing the outcomes for the “educated women” sample to the outcome of the “all mothers” sample. There are no differences in being married or cohabiting in 2002, or being employed between mothers who had a teenage birth and mothers who had their children at a later age.

Table 4: Simulated outcomes in 2002 at age 40 and 24 for African women

Sample	Predicted at age	If teen birth	If not teen birth	If teen birth	If not teen birth
		<i>A. Completed high school</i>		<i>B. Wealth</i>	
Educated women (aged 18-50)	40	-	-	0.70	0.71
		-	-	(0.005)	(0.003)
All mothers (aged 18-50)	40	0.13	0.28	0.62	0.63
		(0.004)	(0.006)	(0.002)	(0.002)
Young women (aged 18-24)	24	0.29	0.52	0.60	0.62
		(0.015)	(0.013)	(0.005)	(0.004)
		<i>C. Married/cohabiting</i>		<i>D. Employed</i>	
Educated women (aged 18-50)	40	0.67	0.54	0.64	0.64
		(0.014)	(0.011)	(0.015)	(0.011)
All mothers (aged 18-50)	40	0.57	0.56	0.44	0.46
		(0.007)	(0.006)	(0.007)	(0.006)
Young women (aged 18-24)	24	0.40	0.17	0.24	0.19
		(0.017)	(0.010)	(0.014)	(0.010)

Note: Standard errors in parentheses.

Source: Own computation based on the GHS 2002 data

Table 5 shows that the educated women have better jobs, with 30% of them in professional or senior management positions. Among educated women who are married or cohabiting, 23% have professional husbands if they had teenage birth whereas 27% have professional husbands if they did not have teenage birth. Again, the differences are between educated and non-educated women and not between who did or did not have teenage birth within the educated or non-educated groups. In panel C of Table 5, we show predicted values for satisfaction with life which we estimated by ordered probits. Whereas other simulated values: wealth, whether employed, woman’s occupation and husband’s occupation show higher values for educated women than for non-educated women, the differences to the advantage of educated women are very small, with regards to satisfaction with life. Adding ‘very satisfied’ to ‘satisfied’ shows among educated women with no teenage birth 46% are satisfied whereas the corresponding percentage for mothers in general is 41%. But 22% of educated women are ‘dissatisfied’ or ‘very dissatisfied’ as compared to 29% of all others.

Our main result from the analyses presented in Tables 4 and 5 is that teenage mothers are less educated than non-teenage mothers and that educated women have better life chances: higher wealth, more likely to be employed, better occupation and better husband's occupation than women on average. There is a conflict between the desirability of increasing human capital among the population and the high propensity of teenage births in South Africa. We will therefore turn to an analysis of the relationship of completing high school and teenage motherhood.

Table 5: Simulated outcomes in 2002 for African women at age 40

Sample Age	All mothers 18-50		Educated women 18-50	
	If teen birth	If not teen birth	If teen birth	If not teen birth
<i>A. Woman's occupation</i>				
1. Professional/Senior official	0.06 (0.002)	0.08 (0.003)	0.27 (0.012)	0.30 (0.009)
2. Clerk and service worker	0.10 (0.003)	0.12 (0.003)	0.24 (0.006)	0.25 (0.006)
3. Skilled agric., craft /mach operator	0.04 (0.002)	0.05 (0.002)	0.03 (0.002)	0.03 (0.002)
4. Elementary occupation/Domestic worker	0.20 (0.003)	0.21 (0.003)	0.07 (0.003)	0.07 (0.003)
5. No work	0.59 (0.006)	0.54 (0.006)	0.38 (0.014)	0.35 (0.010)
<i>B. Spouse's occupation if the woman is married or cohabiting</i>				
1. Professional/Manager/Senior official	0.06 (0.003)	0.08 (0.002)	0.23 (0.015)	0.27 (0.011)
2. Clerk and service worker	0.07 (0.003)	0.08 (0.002)	0.13 (0.007)	0.14 (0.006)
3. Skilled agric. or craft /mach. operator	0.25 (0.005)	0.27 (0.003)	0.26 (0.008)	0.26 (0.008)
4. Elementary occupation/Domestic worker	0.13 (0.004)	0.13 (0.002)	0.05 (0.005)	0.05 (0.004)
5. Spouse unemployed	0.23 (0.005)	0.22 (0.002)	0.15 (0.008)	0.14 (0.008)
5. Spouse does not live in household	0.26 (0.007)	0.21 (0.003)	0.17 (0.013)	0.15 (0.009)
<i>C. Satisfaction with life</i>				
1. Very satisfied	0.11 (0.003)	0.12 (0.003)	0.14 (0.008)	0.13 (0.006)
2. Satisfied	0.27 (0.004)	0.27 (0.004)	0.33 (0.006)	0.33 (0.006)
3. Indifferent	0.33 (0.004)	0.33 (0.004)	0.32 (0.006)	0.32 (0.006)
4. Dissatisfied	0.17 (0.004)	0.17 (0.003)	0.13 (0.006)	0.13 (0.005)
5. Very dissatisfied	0.13 (0.004)	0.12 (0.003)	0.08 (0.005)	0.09 (0.004)

Note: Standard errors in parentheses.

Source: Own computation based on the GHS 2002 data

We estimated univariate probits on the probability of completing high school and a 2SLS where high school completion is estimated using fitted values of the teenage motherhood equation. Because we are using instruments created from characteristics as of 1998, the South African Demographic and Health Survey and use an average of 1997-2000 data (see appendix

Tables A2 and A3), we use the young women sample for analysis. The results are shown in Table 6.

From the univariate probits we can see that teenage childbearing has strong negative impacts on completing high school which is in accordance to our results shown above and to results of previous studies on the US, UK and Sweden. Contraceptives availability is shown by our variables propensity of Depo Provera use and propensity of modern contraceptive use which are compared to the probability of using no contraceptives. Contraceptives use to young women has a strong positive effect on high school completion rates and negative effects on teenage childbearing. Particularly, the coefficient for propensity of modern contraceptive use is strongly positively significant in the univariate high school completion probit. We also present linear probability results using OLS for comparison purposes.

The 2SLS model has been suggested in the literature to take account of the endogeneity problem. Our result for the 2SLS model shows that the coefficient for teenage motherhood is negative and significant. This means that even when the endogeneity is taken into account, teenage motherhood has still a significant impact on the high school completion risk. Among the instruments, only the regional abortion rate is not significant and all the rest are significant although they seem to have very weak affects. In particular, the higher the number of nurses the less likely is the occurrence of teenage motherhood and the larger the distance to the nearest clinic the more likely is the occurrence of teenage motherhood. A joint significance test of these instruments shows that they are jointly significant.

Although our test for exogeneity using a Hausman test cannot be rejected at the 5% level of significance, it can be rejected at the 10% level of significance⁶. Due to the availability of limited number of variables, we are only able to control for exogenous characteristics like population group, propensity of contraceptive use and HIV prevalence although several other characteristics have been shown to have an influence in previous studies. We therefore have an omitted variables problem and our results would very likely have been improved if we had had access to information on parents' education level, their income and whether the woman comes from an intact family.

6 Conclusions

In this study, teenage motherhood in South Africa has been shown to be associated with a decrease in the probability of completing high school. Completing high school is associated with better life chances: higher wealth, higher probability of being employed, a better occupation and a better husband's occupation. In South Africa, teenage birth is not a minority but half of all first births for women aged 18-50 in 2002. Following suggestions in the literature we model teenage motherhood as being endogenous to high school completion. We use four instruments three of which unfortunately vary by the nine regions: the regional

⁶ We conduct a modified Hausman test in which the residual from the teenage motherhood equation is added as a regressor in the high school completion model.

abortion rate, the number of doctors and nurses per 1,000,000 inhabitants. The fourth instrument which is the distance to the nearest clinic in 2002 varies for each woman. We carry out the 2SLS on the sample of young women aged 18-24 in 2002 because our supplementary information is for a recent year.

Our finding indicates that teenage motherhood has a strong negative effect on the high school completion when treated as exogenous. When modeling the simultaneity of the two events, there is significant evidence of endogeneity and the effect of teenage motherhood on high school completion decreases. We must conclude that there is statistical evidence of simultaneity between high school completion and teenage motherhood and our instruments do a fairly good job of controlling for endogeneity. Also the strong negative correlation between teenage motherhood and high school completion and the better life chances for educated women suggest that there is a policy implication from our research. Information on contraceptives use and increased access to contraceptives by teenagers, much more effective sex education and increased awareness of the negative consequences of early childbearing to mothers can raise high school completion rates and decrease teenage childbearing. Failing to supply contraceptive education can result in failures to increase high school completion rates. Although this paper does not address the consequences for the children it is likely that a child born to a more mature woman who is married to the father of the child may have better life chances.

Table 6: Effects of teenage childbearing on high school completion: young sample age 18-24 in 2002

	Teenage motherhood						High school completion					
	Probit		OLS		2SLS		Probit		OLS		2SLS	
	Coef.	z-value	Coef.	t-value	Coef.	t-value	Coef.	z-value	Coef.	t-value	Coef.	t-value
Intercept	-0.488	-5.12	0.314	10.45	0.344	8.33	-1.957	-19.53	-0.146	-4.85	-0.037	-0.51
Coloured	0.087	1.39	0.029	1.42	0.050	2.13	0.671	10.56	0.212	10.58	0.222	10.08
Indian	-0.486	-2.46	-0.123	-2.34	-0.130	-2.46	1.278	7.60	0.477	9.09	0.434	7.11
White	-0.903	-6.92	-0.192	-5.69	-0.175	-5.15	1.879	17.73	0.662	19.74	0.596	11.25
HIV prevalence rate	0.005	0.75	0.002	0.79	0.005	2.18	0.034	5.26	0.010	5.19	0.011	5.10
Propensity of Depo Provera use	-0.002	-0.01	-0.016	-0.32	-0.009	-0.19	1.328	7.86	0.474	9.61	0.468	8.95
Propensity of modern contraceptive use	-0.665	-1.12	-0.115	-0.85	-0.112	-0.83	3.328	5.69	0.840	6.25	0.800	5.55
Urban	-0.285	-7.38	-0.094	-7.73	-0.068	-5.06	0.310	7.98	0.096	7.89	0.063	2.73
Teenage mother							-0.501	-12.43	-0.144	-12.38	-0.492	-2.40
Regional abortion rates					0.058	0.66						
Number of doctors per 1,000,000					0.001	2.01						
Number of nurses per 1,000,000					-0.001	-3.50						
Distance to the nearest clinic					0.001	2.52						
Number of observations	7,288		7,288		7,288		7,288		7,288		7,288	
Log likelihood	-4033.14						-3965.84					
R-squared (%)	2.77*		2.73		3.08		13.05*		15.62		5.31	

Note: 1. Exogeneity test: $\chi^2(1) = 3.23$ Prob> $\chi^2 = 0.0723$;
 2. Joint significance test of instruments: $F(4, 7276) = 6.61$ Prob> $F = 0.0000$;
 3. References: African, No contraceptives;
 4. In *, Pseudo R-square are reported.

Source: Own computation based on the GHS 2002 data

References

- Allen S., Semfilira A., Gruber V., Kegeles S., Van de Perre P., Carael M. and Coates T., 1993, Pregnancy and Contraception Use Among Urban Rwandan Women After Testing and Counseling, *American Journal of Public Health*, Vol. 83, pp. 705-710.
- Angrist J., 2001, Estimation of limited-Dependent Variable Models with Binary Endogenous Regressors: Simple Strategies for Empirical Practices, *Journal of Business and Economic Statistics* 19, 2-16.
- Batter V., Matela B. and Nsuami M., 1994, High HIV1 Incidence in Young Women Masked by Stable Overall Prevalence Among Childbearing Women in Kinshasa Zaire: Estimating Incidence From Serial Sero-prevalence Data, *Aids*, Vol. 8, pp. 811-817.
- Becker G.S., 1981, 1994, (1st, 2nd ed.), *A Treatise on the Family*, Harvard University Press.
- Björklund A., Ginther D. and Sundström M., 2007, Family Structure and Child Outcomes in the USA and Sweden, forthcoming, *Journal of Population Economics*, Vol. 20, No.
- Björklund A., 2006, Family Background and Outcomes later in Life: A (Partial and Personal) Survey of Recent Research Using Swedish Register Data, Paper prepared for the Conference Longitudinal Surveys in an International Perspective, Montréal, Canada, January 25-27, 2006.
- Caldwell J. and Caldwell P., 1993, The South African Fertility Decline, *Population and Development Review*, Vol. 19 (2), pp 225-262.
- Card J., 1981, The long-Term Consequences for Children of Teenage parents, *Demography*, Vol. 18, No.2, pp-137-56.
- Carpenter L.M, Nakiyingi J.S, Ruberantwari A., Malamba S., Kamali A. and Whitworth J., 1997, Estimates of the Impact of HIV1 Infection on Fertility in Rural Ugandan Population Cohort, *Health Transition Review*, Vol.7 (Supplement), pp. 113-126.
- Chevalier A. and Viitanen T., 2005, The long-run Market Consequences of Teenage Motherhood in Britain, Vol. 16, pp-399-422.
- Cigno, A., 1991, *Economics of the Family*, Oxford, Clarendon Press.
- Department of Health, 1998, 1999, *South African Demographic and Health Survey Preliminary Report*, Department of Health, Pretoria. <http://www.doh.gov.za/docs/reports-f.html>.
- Department of Health, 2004, *2003 South African Demographic and Health Survey Preliminary Report*, Department of Health, Pretoria. <http://www.doh.gov.za/docs/reports-f.html>.
- Department of Health, 2004, *National HIV and Syphilis Antenatal Sero-Prevalence Survey in South Africa*, Department of Health, Pretoria.
- Ellwood, D. and Bane, M., 1985, In: Ehrenberg, R., ed., The Impact of AFDC on Family Structure and Living Arrangements, *Research in Labor Economics* 7, pp. 137-207.

- Ermisch J., 2003, *An Economic Analysis of the Family*, Princeton University Press, Princeton and Oxford.
- Ermisch J. and Pevalin D., 2003, Who has a Child as a Teenager? *ISER Working Papers* No. 2003-30.
- Ermisch J. and Pevalin D., 2005, Early Motherhood and Later Partnership, *Journal of Population Economics*, Vol. 18, pp. 469-489, Greenwich, CT: JAI Press.
- Espenshade T.J., Guzman J.C. and Westoff C.F., 2003, The Surprising Global Variation in Replacement Fertility, *Population Research and Policy Review*, Vol. 22 pp. 575-583, Kluwer Academic Publishers.
- Gerominus A. and Korenman S., 1992, The Socio-economic Consequences of Teenage Childbearing Reconsidered, *The Quarterly Journal of Economics*, 107 (4), pp.1187-1214.
- Gray R.H., 1997, Reduced Fertility in Women with HIV1 Infection: A Population Based Study in Uganda, *The Lancet*, Vol. 351, pp. 98-103.
- Greene W., 2003, *Econometric Analysis*, 5th edition, Prentice Hall International Edition.
- Holmlund H., 2005, Estimating Long-Term Consequences of Teenage Childbearing: an Examination of the Siblings Approach, *The Journal of Human Resources*, Vol. 40, No. 3, pp-716-743.
- Hotz J., Mc Elroy S. and Sanders S., 2005, Teenage Childbearing and its Life Cycle Consequences: Exploiting a Natural Experiment, *The Journal of Human Resources*, Vol. 40, No. 3, pp-683-715.
- King G., Tomz M. and Wittenber J. , 2000, Making the Most of Statistical analyses: Improving Interpretation and Presentation, *American Journal of Political Science*, Vol. 44, No.2, pp-341-355.
- Klawitter M, Plotnick R. and Edwards M., 2000, Determinants of Initial Entry onto Welfare by Young Women, *Journal of Policy Analysis and Management*, Vol. 19, No. 4, pp-527-546.
- Lundberg S. and Plotnick R., 1990, Effects of State Welfare, Abortion and Family Planning Policies on Premarital Childbearing Among White Adolescents, *Family Planning Perspectives*, Vol. 22, No.6 (Nov-Dec, 1990), pp-251-275.
- Moffit R., 1992, Incentives Effects of the US Welfare System: A Review, *Journal of Economic Literature*, Vol. 30 pp. 1-61.
- Moore K. and Waite L., 1977, Early Childbearing and Educational Attainment, *Family Planning Perspectives*, Vol. 9, pp-220-225.
- Mott F. and Marsiglio W., 1985, Early Childbearing and Completion of High School, *Family Planning Perspectives*, Vol. 17, pp. 234-237.
- Ribar D., 1999, The Socioeconomic Consequences of Young Women's Childbearing: Reconciling Disparate Evidence, *Journal of Population Economics*, Vol. 12, pp-547-565.

- Schultz P., 1997, Demand for Children in Low Income Countries, In Rosenzweig M., and Stark O. (eds.), *Handbook of Population and Family Economics*, Vol. 1A, Elsevier, Amsterdam.
- Schultz P., 2001, The Fertility Transition: Economic Explanations, Yale University Economic Growth Center, Discussion Paper No. 833.
- Shisana O. and Simbayi L., 2002, Nelson Mandela/HSRC Study of *HIV/Aids: South African National HIV Prevalence, Behavioural Risks and Mass Media Household Survey 2002*. Cape Town: Human Sciences Research Council.
- Shisana O., Rehle T., Simbayi L., Parker W., Zuma K., Bhana A., Connolly C., Jooste C., Pillay V., 2005, *South African National HIV Prevalence, HIV Incidence Behaviour and Communication Survey 2005*, Cape Town: Human Sciences Research Council.
- Statistics South Africa, 2003, General Household Survey 2002, *Statistical release P0318*, Statistics South Africa.
- Statistics South Africa, 2004, Mid-year population estimates, *Statistical release P0302*, Pretoria, South Africa.
- Statistics South Africa, 2005, Mid-Year Population Estimates, *Statistical release P0302*, Pretoria, South Africa.
- United Nations, 2002, The Future of Fertility in Intermediate-Fertility Countries, *a background paper for the Expert Group Meeting on Completing the Fertility Transition*, 11-14 March, New York.
- Upchurch D. and McCarthy J., 1999, the Timing of a First Birth and High School Completion, *American Sociological Review*, Vol. 55 pp-224-234.
- Worku S., 2007, *Marriage Markets and Fertility in South Africa with comparisons to Britain and Sweden*, No. 410, Thela Thesis.
- Zaba B. and Gregson S., 1998, Measuring the Impact of HIV on Fertility in Africa, *AIDS* 12(S1): s41-s50.
- Zuberi T., Sibanda A. and Udjo E. (eds), 2005, *The Demography of South Africa*, General Demography of Africa series Vol. 1, New York: M.E. Sharpe.

Appendix

Table A1: Samples means and standard deviations of variables

Sample	All women	All mothers	Educated women	Young women
Age	18-50	18-50	18-50	18-24
African	0.77	0.77	0.66	0.81
Coloured	0.12	0.13	0.10	0.11
Indian	0.03	0.02	0.05	0.02
White	0.08	0.08	0.20	0.05
Born in 1950-1954	0.06	0.07	0.04	0.00
Born in 1955-1959	0.10	0.14	0.07	0.00
Born in 1960-1964	0.14	0.18	0.12	0.00
Born in 1965-1969	0.14	0.17	0.15	0.00
Born in 1970-1974	0.16	0.19	0.20	0.00
Born in 1975-1979	0.17	0.15	0.23	0.24
Born in 1980-1984	0.22	0.10	0.20	0.76
Western Cape	0.11	0.11	0.12	0.10
Eastern Cape	0.13	0.13	0.10	0.13
Northern Cape	0.05	0.05	0.03	0.04
Free State	0.08	0.08	0.07	0.08
KwaZulu-Natal	0.17	0.17	0.15	0.18
North West	0.10	0.10	0.10	0.10
Gauteng	0.15	0.14	0.22	0.13
Mpumalanga	0.09	0.09	0.09	0.10
Limpopo	0.12	0.13	0.11	0.13
Urban	0.59	0.58	0.75	0.55
Age	31.62 (9.31)	34.28 (8.55)	30.59 (8.30)	20.79 (1.97)
Teen birth	0.31	0.44	0.18	0.26
HIV prevalence rate				11.31 (2.66)
Propensity of no contraceptive use				0.53 (0.18)
Propensity of Depo Provera use				0.45 (0.19)
Propensity of modern contraceptive use				0.06 (0.05)
Number of doctors per 1,000,000				61.97 (47.27)
Number of nurses per 1,000,000				210.14 (79.05)
Regional abortion rates				0.13 (0.12)
Distance to the nearest clinic				25.7 (18.3)
Completed high school	0.32	0.29	1.00	0.32
Wealth	0.64 (0.18)	0.63 (0.18)	0.71 (0.17)	0.63 (0.18)
Married/cohabiting	0.42	0.53	0.41	0.13
Employed	0.37	0.42	0.48	0.14
Ever worked	0.59	0.68	0.64	0.24
Woman's occupation	1.82	1.92	2.50	1.31
Man's occupation	2.43	2.80	2.79	1.43
Satisfaction with life	3.24	3.24	3.46	3.20
Number of observations	24,973	17,576	8,039	7,288

Note: Standard deviation in brackets.

Source: Own computation based on the GHS 2002 data.

Appendix B1: Construction of the wealth variable

We constructed the wealth variable using the following variables:

the roof material=0 if it is plastic, cardboard, asbestos or mud;
the roof material=1 if it is a mixture of mud and cement, wattle and daub or thatching;
the roof material=2 if it is corrugated iron zinc, or mud or wood;
the roof material=3 it is brick, cement block/concrete, wood and tile.

the wall material=0 if it is plastic, cardboard or asbestos;
the wall material=1 if it is corrugated iron zinc, mud or thatching;
the wall material=2 if it is a mixture of mud and cement, wattle and daub or thatching;
the wall material=3 it is brick, cement block/concrete or wattle and daub.

the roof condition=0 if it is very weak or weak;
the roof condition=1 if it needs minor repairs;
the roof condition=2 if it is good;
the roof condition=3 if it is very good.

the wall condition=0 if it is very weak or weak;
the wall condition=1 if it needs minor repairs;
the wall condition=2 if it is good;
the wall condition=3 if it is very good.

the ownership status=0 if the house is occupied rent free not as part of employment contract of a family member;
the ownership status=1 if the house is rented or occupied rent free as part of employment contract of a family member;
the ownership status=2 if the house is owned but not yet fully paid;
the ownership status=3 if the house is owned and fully paid for.

the number of rooms=0 if the number of rooms is one (excluding bathrooms and toilets); the
number of rooms=1 if the number of rooms is 2 to 4;
the number of rooms=2 if the number of rooms is 5 to 6;
the number of rooms=3 if the number of rooms is 7 or more.

Finally the wealth index is computed as:

Wealth= ((roof material x 30) + (wall material x 30) + (roof condition x 15) + (wall condition x 15) + (ownership x 10) + (room x 20))/360.

If the index is close to 1 then the wealth status is high.

Table A2: Contraceptive use in 1998

Age	African				Coloured				Indian				White			
	None	Depo	Modern	Tradi- tional	None	Depo	Modern	Tradi- tional	None	Depo	Modern	Tradi- tional	None	Depo	Modern	Tradi- tional
15-19	66.8	26.6	5.9	0.8	78.6	18.8	2.5	0.0	93.7	1.6	4.8	0.0	86.2	2.6	11.2	0.0
20-24	41.9	45.0	12.5	0.6	50.8	39.1	10.1	0.0	60.7	4.9	34.4	0.0	54.1	12.2	33.8	0.0
25-29	41.2	43.6	14.2	1.0	40.7	39.3	20.0	0.0	36.7	2.0	61.2	0.0	33.0	9.7	56.3	1.0
30-34	42.3	37.9	18.6	1.2	37.9	30.8	31.3	0.0	15.9	7.9	73.0	3.2	27.7	2.5	68.9	0.8
35-39	48.1	26.6	24.5	0.8	31.6	25.0	43.0	0.4	28.1	5.3	66.7	0.0	22.6	3.2	74.2	0.0
40-44	56.4	17.5	26.0	0.1	42.9	13.5	42.9	0.6	35.8	0.0	64.2	0.0	20.2	0.9	75.4	3.5
45-49	69.9	6.9	22.9	0.3	50.0	6.4	43.6	0.0	34.0	0.0	66.0	0.0	37.1	1.0	61.9	0.0
Total	51.5	31.8	15.9	0.8	48.5	26.4	25.0	0.1	44.5	3.3	51.7	0.5	39.3	4.1	55.8	0.8
Urban	44.0	35.9	19.6	0.6	48.8	24.5	26.5	0.2	44.2	3.4	51.9	0.5	38.8	4.1	56.1	0.9
Rural	58.3	28.2	12.6	0.9	47.4	32.5	20.1	0.0	62.5	0.0	37.5	0.0	42.7	4.2	53.1	0.0
None	68.9	17.2	12.7	1.3	49.4	21.8	28.7	0.0	80.0	0.0	20.0	0.0				
Low	59.8	24.9	14.6	0.7	47.7	25.8	26.5	0.0	16.7	0.0	83.3	0.0	75.0	0.0	25.0	0.0
Medium	48.7	35.1	15.5	0.7	48.3	28.0	23.6	0.1	44.4	3.3	51.7	0.6	41.8	4.5	53.2	0.4
High	32.4	36.3	30.5	0.8	53.0	9.1	36.4	1.5	53.8	5.1	41.0	0.0	33.5	3.3	61.6	1.7

Notes: 1. The 1998 South African Demographic and Health Survey (SADHS) is a national two-stage stratified household survey and included approximately 12,000 women aged 15-49. It was designed principally to produce reliable estimates of demographic rates (particularly fertility and childhood mortality rates), maternal and child health indicators, and contraceptive knowledge and use for the country as a whole, the urban and the non-urban areas separately, and for the 9 provinces;

2. Contraceptive use rates are calculated for women aged 15 to 49 by education level: none, low, medium and high; population group: African, Coloured, Indian and White; age groups: 15-23, 24-28, 29-33, 34-38, 39-43, 44-48, 49-50; by geography urban, rural. None includes all those with no education, low include all those up to grade 6 (standard 5), medium from grade 7 to 12 and high more than high school education. The overall modern contraceptive prevalence rate is estimated at 61%.

Source: Own computation based on the South African Demographic and Health Survey 1998.

Table A3: HIV prevalence rate, abortion rates, the number of doctors and nurses

Province	HIV prevalence rate	Abortion rates	Number of doctors	Number of nurses
Western Cape	0.107	0.13	153.1	309.8
Eastern Cape	0.066	0.07	30.7	180.2
Northern Cape	0.084	0.01	43.0	189.9
Free State	0.149	0.10	56.5	253.9
KwaZulu-Natal	0.117	0.15	54.4	191.8
North West	0.103	0.03	24.6	165.4
Gauteng	0.147	0.41	135.4	353.6
Mpumalanga	0.141	0.06	33.6	128.9
Limpopo	0.098	0.03	14.8	110.4
Total	0.114	0.13	64.7	214.8

Note: The Nelson Mandela/HSRC survey is a representative national household survey which consists of close to 10, 000 households stratified by province and urban/rural. It is the first household based survey designed principally to produce estimates of HIV prevalence and to track, knowledge, attitudes and practices related to HIV. Respondents' specimens of oral transudate and the ELISA test were used to test nearly 8,500 participants in the survey. The overall response rate for the survey is 62.3%.

Source: Human Science Research Council Survey/Nelson Mandela Survey, 2002-Department of Health 1997-2000.