RAND

Fertility, Education and Resources in South Africa

Duncan Thomas

October 1996

DRU-1508-RC

Labor and Population Program

Working Paper Series 96-15

This Working Paper is intended to transmit preliminary results of RAND research. Views or conclusions expressed herein are tentative and do not necessarily represent the policies or opinions of the sponsor. Do not quote or cite this Working paper without permission of the author.

Fertility, education and resources in South Africa

Duncan Thomas
RAND and UCLA

First version: February 1996
This version: July, 1996

I am grateful to SALDRU and The World Bank for providing access to the survey data used here. The comments of John Bongaarts, Elizabeth Frankenberg, Simon Mpele and Ingrid Woollard have been very helpful.

1. Introduction

South Africa has emerged from three-quarters of a century of apartheid which placed comprehensive restrictions on the geographic and economic mobility of its population. As those restrictions are relaxed and the society moves towards integration, one of the greatest challenges facing the people of South Africa will be the absorption of a young and rapidly growing labor force into an economy undergoing dramatic restructuring. While South Africa appears to be ahead of other African countries in its demographic transition, there is tremendous diversity within the country. It seems safe to conjecture, therefore, that population policy will play a key role in determining the success of social and economic development in the country (Chimere-Dan, 1993; African National Congress, 1994, 1995).

Using recently collected household survey data, this paper examines an important ingredient for the design of that policy: the relationship between fertility and resources, focussing on the role played by maternal education. A vast number of studies have demonstrated that education and fertility tend to be negatively correlated in a wide array of contexts. In South Africa, among all black women, education is a key correlate of fertility but the association is less clear among women of other races except, perhaps, those who are better educated. Over and above simply documenting these facts, this paper examines three potential mechanisms that attempt to provide insights into what underlies the observed association between education and fertility.

First, education is not randomly assigned within a population but people choose how much they invest in schooling. In the extreme, it might be argued that schooling provides no value-added but is simply a sorting mechanism: the more able spend more time at school in order to signal to their future employers (or spouses) their ability. Placing the spotlight on educational attainment around natural exit points in the South African education system, the evidence suggests that self-selection in education does play a role in explaining the effect of education on fertility in a regression context. Thus, a naive interpretation of this effect as being entirely causal would be mis-leading.

Second, education and household resources tend to be correlated and so a woman's education may simply be a proxy for her, or her family's, income. This turns out to not be the entire story in South Africa:

after controlling for spousal characteristics, household income, labor market choices and even community characteristics, female education continues to have a powerful negative association with fertility. Spousal education is also negatively correlated with fertility and the impact of male and female education are, in most cases, close in magnitude. In South Africa, men appear to have an important influence on demographic outcomes.

The third set of experiments attempts to isolate the relationship between skills that are likely to be learnt in school and demographic outcomes. Drawing on a sub-sample of women who completed a short comprehension and quantitative test, we find that even after controlling for income and education, performance on these tests has an independent impact on fertility. The impact of comprehension skills is particularly large in magnitude suggesting that the acquisition and assimilation of information may be important in affecting family decision-making.

The next section sets the stage for the main analysis of the paper by placing fertility and education attainment in South Africa in historical context. This is followed by three sections each of which uses recently collected household survey data to examine the three mechanisms discussed above. A final section concludes.

2. Fertility and education in historical perspective

Given the central role that population policy played in the apartheid system of South Africa, it is remarkable how little solid evidence exists on the demography of the country. Even to-day, few of the data sources collected before 1993 which contain information on fertility have been placed in the public domain. As a result, we are forced to rely on reports that have not been subject to the sort of scientific scrutiny they deserve. (See Caldwell and Caldwell, 1993, for an excellent discussion.) Fortunately, as the government has embraced the concept of openness and access to information, this situation has been remedied. Data that are collected by the Central Statistical Service and, in many cases, by units that are independent of the

government, are now routinely placed in the public domain: the Project for Statistics on Living Standards and Development (PSLSD) and the annual October Household Surveys provide good examples.

The 1994 October Household Survey estimates South Africa's population to be about 40 million, of whom over three-quarters are black; half the rest are white, nearly 9% are mixed-race coloreds and less than 3% are Asians, mostly of Indian descent. That survey also estimates the total fertility rate (TFR) to be 4.1 although the Central Statistical Service views this as a substantial under-estimate, particularly among blacks.

Much of the historical data on fertility and family planning in South Africa is described in van Zyl (1994) who also documents the methodologies used in the main surveys which were conducted by the Human Sciences Research Council (HSRC) and which form the bases of these estimates. There are good reasons to be skeptical about the quality of some of those surveys: not least of which is the fact that population policy was an important political issue in South Africa and it is far from clear that, at least at that time, HSRC played a role that was entirely divorced from the political system. It is also prudent to treat comparisons across time with considerable caution since the surveys are not always comparable and several focussed on specific sub-populations. For example, in many surveys, the so-called homelands (where many of the poorest South Africans lived) were excluded from the samples and in some surveys, fertility questions were asked only of married women. Putting aside the fact that the definition of marriage is complex in this society, many women who would not declare themselves as married have borne children and teenage pregnancy rates are very high: according to the 1994 October Household Survey, they are estimated to be about 33 per 100 women. See, for example, Preston-Whyte, (1988) for an insightful discussion.

Mindful of these caveats about data quality, it is still useful to attempt to place South Africa's fertility rate in some historical context. Estimates of total fertility rates over time from 1950 through 1990 for each of the four main racial groups in South Africa are presented in the upper panel of Figure 1; the data are drawn from Lucas (1992) and van Zyl (1994). Their evidence suggests that in 1950, the TFRs of blacks, coloreds and Indians were all high (above 6) and reasonably close to one another, whereas the fertility of

whites was much lower (slightly above 3). By 1990, the picture was dramatically different: fertility rates among coloreds and Indians had more than halved and were very close to rates of white women. But, the TFR of blacks remained much higher, at around 5.0. While black fertility had declined sharply during the seventies and early eighties, it had remained virtually constant during the earlier two decades. For them, it seems that the demographic transition began around a quarter-century ago.

In sharp contrast, rapid declines in fertility are recorded for Indian women dating back to the 1950s and their fertility stabilized around 1980. Coloreds fall between these two groups: their fertility actually rose in the 1950s so that in the early sixties, TFRs of blacks and coloreds were almost identical (around 7), but colored fertility declined during the following quarter century to a level that is now very close to that of Indians. The fertility of whites has changed very little during this period, having risen slightly during the fifties and declined slowly since then to below replacement levels.

If these estimates reflect reality, then several questions emerge. First, what underlies the differences in the timing of fertility decline among Indians, coloreds and blacks? Second, why has the fertility of coloreds and Indians fallen so dramatically while that of blacks has remained at levels that are comparable with neighboring Botswana and Zimbabwe whose populations are substantially poorer and less well-educated?

A plausible hypothesis centers around differences in community resources and, specifically, access to family planning services. There is, however, little direct evidence on the relationship between the fertility of individual women in South Africa and their access to services, and the evidence in both Botswana and Zimbabwe suggests that access to services, alone, cannot explain fertility decline there. Nevertheless, casual inspection of the evidence in South Africa does suggest that service availability may have played a role.

Prior to the mid-1960s, government had little involvement in family planning and it seems likely that only whites, and possibly Indians, would have had good access to services. Public investments in family planning began in the mid-sixties and were targeted largely towards urban dwellers: this coincides with the decline in the fertility of colored women, the majority of whom live in urban areas. In the mid-seventies the National Family Planning Programme was established and service access was massively

expanded with special attempts being made to serve rural women. In 1972, for example, there were less than 250 family planning clinics but by the early eighties, the number had risen to more than 36,000 (Lucas, 1992.) It was also during this period that black fertility began to decline in South Africa.

Yet, even today, access to family planning services is probably not universal. One suggestion of that is provided by data from the PSLSD, which indicates that there is a family planning clinic in the community for over three-quarters of Indian women (age 15 to 49), about half the colored women but only one-third of black women.[1]

Racial differences in fertility rates may also be explained by differences in household resources. The benefits of growth and development in South Africa have not been distributed evenly across races and the society is marked by very high levels of inequality. This is reflected, for example, in differences in education, as depicted in the lower panel of Figure 1 which displays mean educational attainment for women, by birth cohort, as reported in the 1993 PSLSD.[2] Among women born in 1935, whites are much better educated than coloreds, Indians and blacks: the average white woman had completed nine years of schooling, whereas the average black had completed less than two. Educational attainment of all except

---

[1]These discrepancies are likely to be under-estimates of differences in service availability for at least two reasons. First, many women in South Africa obtain family planning services from places other than family planning clinics and blacks are the least likely to use alternative sources. Second, the estimates are based on data collected at the community-level and it is well-known that those data are difficult to collect in a survey setting and are, therefore, prone to serious measurement error. (See Frankenberg, 1996, for a general discussion and Thomas and Maluccio, 1996, for a specific description of the nature and extent of problems that are evident in a community survey conducted in Zimbabwe in 1990.) Two issues are of special importance. First, it is not entirely clear how to define "community", particularly in urban and metropolitan areas and the definition may not mean the same thing to all respondents. Second, the so-called "community informants" who are "prominent members of the community such as school principals, priests and chiefs" (PSLSD, 1995, page v) may, themselves, not be very well informed. For example, the PSLSD reports a family planning clinic in two-thirds of urban communities, one-third of rural communities but only one-quarter of metropolitan communities. Yet, it is the metropolitan communities are likely to be the best-served of all.

[2]Completed years of education are defined as 1 if the woman completed sub-A, sub-B or Standard 1, then an additional year for completion of each grade until Standard 10 when most people take the matriculation (matric) examination. In the survey, post-secondary schooling is not reported in years but rather in terms of qualifications. Diplomas, technical degrees, teacher training, nursing and completion of some university education are assigned 12 years of schooling. Completion of a university degree is assigned 14 years of schooling. Since only 5% of women report attending school beyond Standard 10, the impact of making different assumptions about years of schooling for these women is likely to be small. Moreover, the specification of the regressions discussed in detail below are sufficiently flexible to ensure that coefficient estimates are not biased by this assumption.

whites has increased substantially since then, especially among Indians and, to a less extent, among blacks. Thus, among women born in 1975, Indians are at least as well educated as whites, and blacks are nearly as well educated as coloreds. While the convergence of average educational attainment across races is striking, there are substantial differences in the quality of schooling between racial groups and so it is unlikely that a year of education means the same thing to a black and a white. In fact, racially-segregated education was a central pillar that propped up the apartheid system: in 1975, for example, expenditure on the average white was over fifteen times larger than that on the average black student.

A comparison of the upper and lower panels of Figure 1 does suggest that educational attainment and fertility are negatively correlated. However, it remains difficult to explain the timing of declines in TFRs for each race using an argument based on the average education of women. Digging a little more deeply and examining changes in other parts of the education distribution, a more complex picture emerges.

Thomas (1996) exploits the large sample sizes of the 1991 South African Census to explore rates of growth in educational attainment at each quartile of the education distribution. He reports that among those born between 1920 and 1970, an Indian woman would have spent 1.5 years more at school if she had been born a decade later and the growth was fastest among those who were least educated; for example, growth rates were 1.8 years at the bottom quartile and 1.2 years at the top quartile of the distribution. A similar pattern emerges for coloreds although their average growth rate was only 0.7 years per decade. In sharp contrast, however, the least educated blacks were largely *excluded* from growth in education which was, instead, concentrated among the better educated. There is a glimmer of optimism in this dismal picture for the poorest black South Africans since, among those born in the later part of the period, increases in education have been spread among all black women. This more recent spreading of the fruits of development to the poorest may well be related to the tardiness of the fertility decline among blacks.

While they are suggestive, these aggregate data can only give us a very incomplete picture of the relationship between fertility and education at the micro-level. Therefore, we turn to survey data from the PSLSD and examine not only the correlation between fertility and education but also attempt to investigate some of the mechanisms that might underlie their association. We begin with an examination of how the

correlation changes across the education distribution, then focus on the role played by household resources and incomes and finally focus on other dimensions of human capital which are likely to be closely related to skills learned in school.

3. Relationship between fertility and education

The PSLSD is a nationally representative survey of some 9,000 households conducted in South Africa during October through December 1993, a few months before the first democratic elections in April, 1994. All women age 15 to 49 were asked the number of children ever born (CEB), how many survived to age 1, how many to age 5 and how many were alive at the time of the survey. Unfortunately, fertility in the last year (or last 5 years) was not recorded in the PSLSD. We are, therefore, forced to focus on children ever born as our measure of fertility.

Summary statistics for the 10,500 female respondents are reported in Table 1. Three-quarters of the women in the survey are black and, as indicated in Figure 1, they have borne more children than coloreds, Indians or whites. But, in contrast with the TFRs in Figure 1, the gap between blacks and coloreds is very small: blacks report 2.1 children on average whereas coloreds report 2.0. Indians and whites report about ½ a child less, 1.6 and 1.5 respectively. This clustering of coloreds with blacks and Indians with whites matches the education levels presented in the lower panel of Figure 1 and is also reflected in fertility of women age 40 to 49. (Because sample sizes of coloreds and Indians are small, we will use fertility of this relatively wide age group as our measure of completed fertility although it is important to recognize that many women in this age band will continue to have more children.) The 1994 October Household Survey (OHS) reports a birth history for each female respondent and among those age 40 to 49, fertility rates of whites and Indians are remarkably close to those reported in the PSLSD. (For whites, completed fertility is 2.39 in the OHS and 2.50 in the PSLSD. For Indians, it is 2.89 and 2.95, respectively). However, for coloreds and blacks, reported fertility is much lower in the OHS than in the PSLSD. (3.31 and 4.25 for coloreds and 2.49 and 5.00 for blacks in the OHS and PSLSD, respectively.) The Central Statistical Service

argues that the fertility estimates for blacks in the OHS are almost certainly under-estimates; the same is probably true for coloreds.

Precisely what underlies the discrepancy between the OHS and PSLSD estimates is not clear although the fact that OHS was conducted by the government -- whose agencies during apartheid had a history of discouraging fertility among blacks -- while the PSLSD was conducted by a consortium of private and quasi-government survey teams may be important. Whatever the reasons, the PSLSD estimates cast a shadow of doubt over the reliability of the time series of TFR estimates presented in Figure 1 and raises serious questions about what is thought to be known about fertility in South Africa.

Returning to the PSLSD, the correlation between fertility and education is reported in the first line of Table 2 which presents the coefficient (and standard error) from a linear regression of CEB on completed years of education controlling for age (splines) and indicator or dummy variables for urban or rural residence (with metropolitan areas excluded). There is a powerful association between fertility and education among black women: an additional year of education is associated with 0.12 fewer children. The correlation is almost as large for coloreds, half as large for Indians and relatively small for whites.

While this provides a simple summary of the data, it is not obvious that the relationship between fertility and education should be linear. Figure 2 presents the mean CEB for each year of completed education and indicates that the relationship is, in fact, not linear. Those estimates confound the role of education and age which, from Figure 1, we know are negatively correlated given the tremendous growth education across cohorts. Thus, Panel C of Table 2 reports the analogous regression estimates, controlling for age and location (which are also reported).

Before discussing those results, it is useful to examine the distribution of education which is reported in Panel B of Table 1. Primary school ends at Standard 5, many women exit secondary school at Standard 8 (after completing their Junior Certificate) and Standard 10 is the terminal year of secondary school at which time women write matric examinations (which are used for entry into universities, tecnicons and training programs). Looking first at black women, there is clear evidence of stacking of the distribution at the natural exit points, but there are a lot of women who left school at other times. Notice, in particular,

that a substantial fraction of women left in the year immediately prior to completing primary school (Standard 4) and in the first year of secondary school (Standard 6). Moreover, fully one-third of black women did not complete primary school, and among those who attended secondary school, only 12% completed matric (Standard 10). The shape of the distribution of education for coloreds is very similar (although it is shifted to the right relative to blacks). Indians and whites, however, display different patterns: only about 15% of them have not completed primary school, over one-third of Indians and more than half white women have completed matric. Whereas most whites leave school at either Standard 8 or Standard 10, the distribution is much smoother for Indians.

The semi-parametric estimates of the association between education and fertility in Panel C of Table 2 impose no restrictions on the shape of the fertility-education function since each year of completed education is represented by an indicator variable. Because the excluded education category is zero years, the coefficients should be interpreted as the impact of that level of schooling relative to having not attended school. For example, black women who completed Standard 5 have 0.59 children fewer that those who report no schooling; those who completed Standard 10 have 1.27 fewer children. Because so few blacks have a university degree (less than ½%), post matric schooling is combined into a single category.

The semi-parametric estimates provide several important new insights over and above the linear regressions in Panel A. First, the relationship between fertility and education is not linear for any of the racial groups. Second, focussing on blacks, the negative association between fertility and education is relatively weak at the bottom of the education distribution and is significant only among women with at least three years of schooling. Third, the marginal effect of an additional year of schooling is largest at schooling levels that are natural exit points in the schooling system. For example, women who complete matric (Standard 10) have 0.39 fewer children than those who only complete Standard 9. This is three times larger than the average effect for each year of schooling, which, from Panel A is 0.12 fewer children. Similarly, the marginal effect of competing Standard 8, relative to Standard 7, is 0.22 fewer children. If this reflects an increasing marginal impact of education as it rises, women who completed Standard 9 should

have a lot fewer children than those who graduated Standard 8. They do not: the marginal difference is a mere 0.04 children.

A similar pattern emerges around completion of primary school. The difference between women who just fall short of completing primary school (Standard 4) and those who do complete (Standard 5) is 0.17 children but another year of schooling is associated with only 0.03 fewer children. Among rural blacks, women who started secondary school but completed only one year (Standard 6) actually have *more* children than those who exited at the end of primary school (the effects being -0.59 and -0.65 respectively). While this upward flip in the fertility-education function is not significantly different from a flat, it is striking that the first two years of secondary schooling are associated with virtually no decline in fertility among rural women but there is a huge impact associated with completing the third year, Standard 8, when the Junior Certificate examination is taken.

There may be important age and education interactions since younger women are better educated in South Africa and fertility rises with age. To further isolate the relationship between fertility and education, Table 3 repeats the same regressions for women age 40 through 49. Among black women, reported in the first two columns, the same pattern emerges. Only 5% of women report more than Standard 8 schooling and so we focus on completion of primary school. There is a very large decline in fertility comparing women who completed Standard 4 with those who completed Standard 5. In terms of completed fertility, those who stayed at school for one more year (until Standard 6) look much more like the Standard 4 women than those who exited at Standard 5 and it is only those who completed Standard 8 who report fewer children than the Standard 5 women.

In sum, the fertility-education profile for black women in South Africa is characterized by a generally downward slope which is punctuated with steeper steps at natural exit points and flats (or upward shifts) immediately afterwards. A traditional "human capital" interpretation of this evidence would conclude that particular years of schooling are especially productive (at least in terms of their impact on reproduction) while others are, frankly, of little value. Or, put another way, if more women were to pass their

examinations such as the Junior Certificate in Standard 8 or matric in Standard 10, then fertility would decline even more rapidly. This seems a very unlikely scenario.

A more plausible interpretation of the evidence recognizes the fact that education is not randomly distributed across women but rather is the outcome of a set of choices made by each woman and her family when she was an adolescent. Those women who did not quite complete an important school hurdle, such as passing the Standard 8 examinations, are likely to be different in both observable and unobservable ways from women who did pass those exams. To attribute all the differences in the observed effect of education on fertility to productivity effects associated with schooling itself and ignore the role of the unobserved attributes of the women is likely to be very misleading. Following the same logic, women who started secondary school but only completed the first year (Standard 6) before dropping out may be even less able than those who chose to exit at the end of primary school. Thus, the small impact of education for those women does not mean that Standard 6 is unproductive but rather that the women who exit at that point are selected from a different part of the distribution of tastes and, possibly, abilities than those who exit at Standard 5.

In the wage function literature, evidence of steps and flats around completion of particular levels of education (or particular examinations) have been interpreted as "certification" effects. That interpretation has little appeal in our context. An observationally equivalent interpretation is that the steps and flats reflect self-selection in educational attainment which seems like a plausible explanation of *both* the wage- and fertility-education relationships.[3] (See Weiss, 1995, for a review and discussion in the context of wage functions.)

---

[3]Evaluating these interpretations of education in the context of fertility rather than wages has an important additional advantage: wages are earned only by those who are working in the labor market and that choice needs to be taken into account in the estimation. Unfortunately, there are no good instruments for labor market participation in the PSLSD. However, there is some evidence that self-selection in education is important for black women since the probability a woman works is nearly twice as high if she completed Standard 5 (9%) than if she completed Standard 4 or Standard 6 (5%). Conditional on working, women who complete Standard 8 have wages that are only 6% lower than those who leave school at Standard 9 but their wages are fully 75% higher than those who exit school at Standard 7. Both the participation and wage functions are, therefore, also characterized by steps and flats.

To be sure, the evidence in Tables 2 and 3 cannot say anything conclusive about the productivity of education in terms of its impact on fertility. The powerful negative correlation certainly suggests there is a causal link but without taking account of the potential endogeneity of education, we cannot be certain. However, the evidence does indicate that a naive causal interpretation of the magnitude of the association is probably flawed and that failure to take account of the selection process underlying educational achievement is likely to lead to substantially incorrect inferences.

The same pattern of steps and flats are apparent in the association between contraceptive use and education in neighboring Zimbabwe as demonstrated by Thomas and Maluccio (1996). They show that Zimbabwean women who complete primary school are twice as likely to use modern contraceptives than those who drop out in the year before completion (a step) and that primary school graduates are more likely to use contraceptives than those who attended one year of secondary school (a flat). Using data from Brazil, Lam and Duryea (1995) demonstrate a similar pattern exists for fertility of women age 30 to 34.

Turning to the remaining three columns in Tables 2 and 3, fertility of coloreds appears to rise with education until around Standard 4 whereupon it declines rapidly, following the inverted-U shape that has been observed in many other countries and is discussed, for example, in Cochrane (1983). As a simplified summary of the evidence, Panel B of the tables reports a spline specification with knots at 5 and 10 years of schooling. Among women with more than 5 years of schooling, there is a powerful negative association between education and fertility -- with each year of education associated with around 0.17 fewer children, which is larger in magnitude than the decline among similar black women. The fertility of Indian women also increases until around the completion of primary school and then falls dramatically (at about the same rate as coloreds) until completion of Standard 10 at which point it seems to stabilize. Thus, Indian women with no schooling have, on average, the same number of children as women who have more than ten years of education. A roughly similar pattern emerges for white women although the peak in fertility is observed among women with Standard 7 education; it is important to note, however, that fewer than 15% of white women have not completed at least Standard 8.

4. Influence of household resources on demographic outcomes

It has been argued above that part of the education effects in Tables 2 and 3 are likely to reflect the impact of observable and unobservable characteristics of the woman. It will be very difficult to take account of unobservable differences between women in a survey unless it incorporates a special experimental design that would permit comparisons among otherwise identical women who have different levels of education. See, for example, Ashenfelter and Krueger (1995) who compare the wages and educational attainment of monozygotic twins; even this design is not flawless since identical twin pairs who have different levels of education may also be different in unobserved ways. However, it is possible to take into account observable differences among women and this is the approach taken in the next two sections which exploit some of the breadth and richness of the PSLSD.

In this section, the focus is on income, wages and community characteristics. In the following section, attention is turned to alternative measures of human capital accumulation. It is important to recognize that by controlling for observed characteristics, we are not able to uncover "pure" estimates of the effect of education. In some sense, the reduced form estimates discussed above are "pure" or "full" estimates of those effects. Rather, by adding controls to the regression, we seek to better understand the mechanisms through which education affects fertility choices. It is also important to understand that in so doing we are trading off the (possible) purity of reduced form estimates with estimates that include outcomes of choices as regressors which are potentially endogenous. However, in view of the argument above that education is, itself, a choice, it seems that converting to purism now would be somewhat inconsistent.

The first column of Table 4A repeats the CEB regression in the first column of Table 2 for black women. Additional covariates are included and their effects are reported in Table 4B for the flexible regression with a semi-parametric specification for women's education. For reference, the associated linear and spline estimates with the same sets of additional controls are reported in Panels A and B of Table 4A. Results for the other three races are discussed below but not reported.

A natural starting point is the inclusion of spousal characteristics. While most women in South Africa do get married, slightly over half the black women in the survey had ever been married by the time

of the survey.[4] Among those who are married, only two-thirds are living with their husbands which reflects, in part, massive migration by black South African men, typically for employment reasons, leaving their wives and families behind. Fertility is higher among married women and highest among those whose husbands are present: they have 1.5 children more than unmarried women. In contrast, relative to not being married, a woman whose husband is absent only has a quarter of a child more on average. It is very unfortunate that the PSLSD provides very little information about these absent husbands and does not even report their education or location. Knowing more about the welfare of these families, including the non co-resident members, as well as understanding the strategies they adopt in times of crisis is likely to yield important insights into behavior which will, in turn, be important for policy design.

Among those black women who were married, and whose spouses were in the household at the time of the survey, the correlation between their education levels is 0.58 (which is considerably higher than among any of the other racial groups).[5] Thus, the inclusion of spousal characteristics in the fertility regression is associated with a decline of about one-third in the estimated female education effects and this decline is essentially constant across the entire education distribution. The estimated spousal education effects in Table 4B indicate that around completion of primary school, husband's education has a *bigger* depressing effect on fertility than wife's education. However, as his education increases, the impact on fertility does not increase much and so at the top of the education distribution, it is her education that plays a dominant role. The evidence is succinctly summarized in a linear spline specification: his education is associated with 0.087 fewer children for each year of schooling between 1 and 5, whereas her education is associated with only 0.071 fewer children. The relative importance of male and female education reverses

[4]This is because the PSLSD is a random sample of women and many in the survey are too young to be married by the survey date. The age of the average black female respondent is 28.

[5]The correlations are 0.5, 0.4 and 0.3 for coloreds, Indians and whites, respectively.

for those who attended secondary school with the effect of his education being smaller (0.061 per year) and her education being larger (0.089 per year).[6]

In many studies, conducted in a wide range of contexts, it has been shown that relative to the education of a mother, her husband's schooling has a smaller effect on the quantity of children and their quality as indicated by, for example, survival rates and health status. This is often attributed to the fact that men tend to bear less of the time-burden associated with child-rearing. If men spend no time on child care and if women's leisure time is weakly separable from that of their husbands, then male education will have *only* an income effect on fertility. These are strong assumptions and unlikely to be true although they are often imposed in empirical studies of household choices. Moreover, these sorts of extreme assumptions are unnecessary since it is possible to directly assess the extent to which education of both the man and woman are proxying for the role of household resources by including measures of household income in the fertility regression. As can be seen from the regression in the third column of Table 4, which includes the logarithm of household income, current resources have a significant, but small, effect on fertility. For example, a ten-fold increase in income would be associated with a 30% decline in fertility. Moreover, the inclusion of income results in the estimated male and female education effects being only slightly reduced (by about 10%) and, among those with little education, the reduction is trivial. For those who are better educated, and especially men and women with some secondary schooling, part of the effect of education does appear to reflect the role of household income.[7]

Non-linearities in the effect of income have been examined in some detail. The inclusion of quadratic and cubic terms in log(income) indicates a linear effect cannot be rejected. This inference has

---

[6]Since the effect of husband's education is relatively constant across the education distribution, the effect of the wife's education increases with education and there is a constant proportionate decline in her education effect when spouse's education is added to the regression, the correlation between the education of spouses must rise with education. It does: for women who did not complete primary school, the correlation is 0.25; for those who did, the correlation is 0.54.

[7]Ideally, we would like to examine the effect of income -- and changes in income -- on current fertility decisions. This is not possible with the PSLSD since respondents only report CEB. Assuming there is a good deal of serial correlation in income, we interpret it as a proxy for long-run household resources and assess its association with cumulative fertility at the time of the survey. Below, we discuss the link between CEB and household expenditure, an alternative measure of longer-run household resources.

been checked using non-parametric methods to estimate the fertility-income function (both unconditionally and also conditional on the woman's age, education and location as well as her spouse's education). The relationship is linear in logs for all women except those whose household income is in the top decile, for whom income and fertility are positively associated. The latter result may simply reflect measurement error in household income which is correlated with income. That issue can be addressed by examining the relationship between fertility and household expenditure, which may be a better indicator of longer-run household resources than income. Non-parametric estimates indicate that fertility and expenditure are negatively correlated at the top of the expenditure distribution, suggesting the income estimates are indeed contaminated by measurement error. The fact that income is measured with error and is, itself, not necessarily a good proxy for long run household resources raises a question regarding the interpretation of the education effects as being net of income since education *is* likely to be correlated with long-run income. However, the estimated male and female education effects are little changed by replacing income in the regressions with expenditure, a longer-run indicator of household resources. We conclude, therefore, that the education effects do not purely reflect the role of household resources.

Better-educated people tend to earn higher wages, which implies a higher market value of their time, and this is likely to partly explain the negative correlation between fertility and education. It is also likely to contribute to the negative correlation between fertility and income. In the fourth column of Table 4, the woman's (log) wages, her spouse's (log) wages and controls for whether they had worked during the year prior to the survey are included in the regression. Not only is working associated with fewer children, but women who earn higher wages tend to have smaller family sizes. Working spouses also tend to be associated with fewer children, but, conditional on working and his education, higher wages are associated with more children. This might be interpreted as a pure income effect.[8]

A higher value of time is, apparently, not the entire explanation for the negative correlation between education and fertility and, in fact, men whose wages are higher than would be expected, given their

[8]As with income, we assume there is sufficient serial correlation in wages so that current wages (conditional on age) are informative about wages over the life course.

education, indicate a desire for larger families. Dropping his education from the regression yields a wage effect which is zero (0.02 with a standard error of 0.05) indicating that a higher value of time among better educated men is indeed offset by a desire for a larger family. In contrast, dropping her education from the regression yields a female wage effect of -0.38 (and standard error of 0.04) suggesting that changes in the value of the women's time and in their tastes for children are mutually reinforcing as education increases.

Causality in this model is not unidirectional. On the one hand, if child-rearing costs rise with the number of children, then the shadow price of time for women who have borne more children will be higher and, *ceteris paribus*, they will be less likely to participate in the labor market. On the other hand, women with higher wages, holding age and education constant, are "more productive" in the labor market and so are less likely to leave the labor market to bear children. Part of this higher productivity may be a result of more labor market experience in which case it is the fact the woman has had fewer children that underlies her higher wages and its impact on fertility.

In principle, if there is a set of instruments which predicts labor market choices but has no direct bearing on fertility, then an instrumental variables approach would permit disentangling the influences in each direction. At least two classes of instruments have been used in the literature: nonlabor or asset income and indicators of local labor market demand. In the context of a static model, it may be argued that both are valid instruments. However, by their nature, fertility and labor supply choices demand a dynamic modelling framework: current fertility is the cumulation of choices from adolescence and there is evidence of substantial state dependence and serial correlation in labor market choices. Given the South African data, estimation of a dynamic model of labor supply and fertility is well beyond the scope of this analysis, but see Hyslop (1996) who demonstrates the empirical importance of taking seriously unobserved heterogeneity and state dependence in a dynamic model of labor supply and fertility choices. In the context of a dynamic model, treating non-labor income as pre-determined is not very appealing since it is, to a large extent, the cumulation of prior savings and thus reflects previous labor supply and consumption choices. Along the same lines, local labor demand is not exogenous unless women are immobile and employment opportunities do not affect their choice of residential location. In the context of South Africa, where pass laws have

restricted family and, particularly, female mobility in response to earning opportunities, treating local labor demand as exogenous seems like the lesser of two evils.

Implementation of the instrumental variables approach using local labor demand as the instruments involves empirically characterizing the local labor market (which is not straightforward) along with indicators of other local infrastructure (which is virtually impossible in these data, see footnote 1 above). As an alternative approach in the direction of accounting for unobserved heterogeneity, the regressions have been re-estimated controlling for community fixed effects where the communities are defined as sampling cluster units, Census Enumerator Sub-Districts.[9] These fixed effects absorb all observable and unobservable local market and community characteristics that are fixed across households. They absorb, therefore, all possible measures of local labor demand and so absorb any instruments that might be constructed at the local market level. If the only source of unobserved heterogeneity that affects the choice to work is fixed at the community level, then the fixed effects estimates in column 5 will be unbiased. The community fixed effects estimates also sweep out the influence of all formal and informal local information and infrastructure which may include, for example, local family planning programs and messages as well as the role of community-level social networks.

While the impact on fertility of female labor force participation decreases with the inclusion of community fixed effects, the association with female wages is little changed. Both female employment characteristics remain important and significant correlates of fertility choices. Male labor market choices, however, are all but wiped out: the effect of his employment is trivial and the impact of his wages is almost halved (and is not significant). This suggests that much of what would be attributed to a male employment effect in column 4 is, in fact, associated with community resources and infrastructure. Further evidence along these lines is provided by re-estimating the regression in column 3, which includes (log) household income, with community fixed effects: the estimated income effect is reduced from -0.069 to -0.019 (with

[9]There are 295 clusters in this sample and the median cluster contains 28 women age 15 through 49.

a standard error of 0.019). This suggests that community services may play a role in affecting fertility outcomes although identification of the critical services is not possible with the data available.

In contrast with income and male employment, the estimated roles of male and female education in the fertility function are remarkably robust to the inclusion of community fixed effects. Both covariates remain significant and remain very close to one another in magnitude. Caldwell (1977, 1979) has suggested that the nature of information in the community, as measured by community-level educational attainment, is a more important determinant of demographic outcomes than an individual woman's education. To the extent that the sampling clusters proxy the local community, the fixed effects estimates sweep out community-level education and so the results suggest that, in South Africa, individual education does remain an important correlate of demographic choices.

To directly investigate the relative importance of community education, the regression in column 3 has been re-estimated with the inclusion of the mean and standard deviation of education of women age 15 through 49 in the community. The male and female education effects in this specification are very close in terms of magnitude and significance to those in the fixed effects specification. Moreover, the mean education level in the community has a significant negative impact on fertility while the standard deviation of education in the community is not significant. This suggests that mean education in the community does a good job of proxying all community characteristics and it may be a sufficient statistic for heterogeneity in the community.

However, that inference is not supported by the evidence on the impact of household income. Recall that when community fixed effects are included in the model, the impact of household income is reduced to zero. When community characteristics are proxied by average education, the estimated impact of income remains large and significant. In fact, the coefficient estimate (-0.81) is larger than in the specification without any community controls.

In contrast with community-level education, the first two moments of (log) household income in the community does turn out to do a good job of capturing unobserved community-level heterogeneity. Re-estimating the model but replacing community-level education with community-level income, yields two

facts. First, the mean of (log) income has a significant negative impact on fertility (with a coefficient of -0.29 and standard error of 0.04) which is more than *four times* the magnitude of the impact of household-level income. Community resources appear to be important. Second, higher inequality in a community, as measured by the standard deviation of (log) household income, is associated with higher fertility (the estimated effect is 0.26 and standard error is 0.07). Community resources apparently do not benefit everyone equally. After controlling for community level income, household income has no effect on fertility, the estimated education effects are very similar to those in column 5 and both the mean and standard deviation of education in the community are unrelated to fertility.

These results also raise an important question of separately identifying the impact of community characteristics from local income on demographic outcomes. Intuitively, communities served by good infrastructure tend to be wealthier and so it is difficult to interpret effects of community services in models of fertility or child health that fail to fully control for household or at least local income levels. Since income is, at best, sketchy, in surveys like the Demographic Health Surveys, this is a serious concern for studies based on those sorts of data.

Restricting attention to black women age 40 through 49 yields essentially the same results. To summarize the differences, female education effects are slightly larger, the magnitude of household income is about the same, but it is not significant. The biggest differences emerge in the relationship between fertility and current labor market behavior: while her wages are negatively associated with fertility, neither her labor market participation nor her husband's wage or participation is correlated with family size. These results warrant an especially cautious interpretation since, among women at the end of their child-bearing, a dynamic framework that simultaneously models labor market and fertility choices over the life course would seem particularly germane.

Differences among the four main racial groups in the relationships between fertility and education, income and community resources are striking. First, the effect of female education is negative and large among colored women with at least five years of schooling and it persists even after controlling for income, wages and community fixed effects. Spousal education effects are smaller and, among labor market choices,

only female wages are associated with fertility. Second, the effect of own education on the fertility of Indian women follows an inverse-U shape (peaking towards the end of primary school). The effect is dramatically reduced when spousal education is controlled and his education plays a more important role in determining family size than female education. Moreover, among Indians, income effects and labor market factors are relatively unimportant suggesting that education, particularly male education, is capturing differences in tastes rather than the value of time. Third, the education of white women also follows an inverted U-shape but spousal education, income and even labor market characteristics do not seem to affect the shape of the relation. Working women and women with higher wages have substantially smaller families -- and the effects are little affected by the inclusion of community fixed effects. Labor market factors are, it seems, important correlates of fertility among whites.

In sum, education of both men and women play a powerful role in affecting fertility outcomes in South Africa. Among blacks, a relatively small part of the association between female education and family size can be attributed to the role of household income, labor market factors and community characteristics. The evidence suggests that part of the estimated education effects can be attributed to the role of unobserved characteristics of women who self-select into particular school grades. However, the magnitude of the education coefficients -- and their persistence across the education distribution -- suggests there may be some productivity gains associated with education itself. To explore that idea in more depth, the next section examines the relationship between fertility and performance on a set of cognitive tests that were conducted as part of the PSLSD.

5. Role of other measures of human capital

As noted above, there were vast differences in public investments in education across racial groups in apartheid South Africa and, according to data in the PSLSD, these gaps were reinforced by private expenditure on schooling. There are, therefore, dramatic differences in school quality across race, region and also across socio-economic group. Eight years of schooling probably does not mean the same thing to every South African woman. Even the standard examinations, like matric, had their own race- and region-

specific boards and standards were not uniform across those boards. The Indian board, for example, has a reputation of setting the highest standard.

In an effort to capture some of these differences in the meaning of schooling, a Literacy Assessment Module (LAM) was fielded in conjunction with the PSLSD. The LAM sought to measure three sets of basic skills: reading comprehension (6 questions), listening comprehension and practical mathematics (2 questions) and computational skill (6 questions). The specific questions appear in Appendix A. Fuller, Pillay and Sirur (1995) provide an extensive description of the data.

The LAM was intended to be given to a random sub-sample of 25% of all households and, within each household, the enumerator was instructed to randomly choose two household members for the test; one was to be age 13 through 18 and the other age 18 through 50. Unfortunately, the sampling scheme that was implemented in the field was not random. The LAM was completed in only 15% of households and within those households, enumerators tended to select younger, better educated and female respondents. In large part, this presumably reflects the fact that women were more likely to be at home and younger, better educated respondents would complete the module faster. Because sample sizes are small, we focus, in this analysis, on black women. Among them, there is no evidence of selection on the basis of education or marital status, but there is selection on the basis of age: younger black women were more likely to be given the literacy assessment.

The effect of this selection is reflected in the first column of Table 5 which reports the results of regressing fertility on education, controlling for age and location, drawing on data from the 778 black women who completed the LAM. The comparable regression, based on the entire sample of black women, is reported in the first column of Table 4. The correlation between education and fertility is stronger among women in the LAM sub-sample and, as is apparent from column 2, so are income effects.

Within this sub-sample, the inclusion of raw test scores has a substantial impact on the effect of education: it is reduced by more than one-third.[10] Moreover, the tests themselves are negatively correlated with fertility and, specifically, it is the reading comprehension test that is of particular relevance. A woman with better developed comprehension skills (who answered all 6 questions correctly) would, on average, have nearly half a child fewer than a woman who failed to correctly answer any of those questions. Since women who score well on these tests are likely to earn more and are likely to live in higher income households, the impact of test scores may simply reflect the role of household resources. Controlling for income, however, has very little impact on the estimates. More directly, in a regression of (log) wages on age, education and test scores, among black women it is computational skills that appear to be rewarded in the labor market: an additional correct answer to the computational questions is associated with a 15% higher wage (t statistic is 2.5), whereas a correct comprehension answer only garners a 7% higher wage (t statistic is 1.3). Thus, if test scores are simply a proxy for income, computational skills should have a bigger impact on fertility than comprehension skills. In fact, the reverse is true.

Why do comprehension skills affect demographic outcomes but not wages? Women with better comprehension skills may be better able to access and assimilate information in the community, in which case these women are likely to be better informed than their peers and may, therefore, be better able to effectively use services in the community.

As one attempt to examine this hypothesis, test scores are replaced with a control for whether or not the woman reported that she had read a newspaper in the previous two weeks. Slightly fewer than half the women in the sample had read a paper. Clearly reading a newspaper is a choice and so the interpretation of the regression is not ambiguous; however, the covariate is not significantly correlated with fertility and its inclusion in a regression with the test scores does not affect the estimated impact of comprehension skills.

---

[10]Put another way, test scores and education are highly correlated in these data. For example, among black women, controlling for age and location, an additional year of schooling is associated with a 0.21 higher score on the quantitative tests and 0.22 higher score on the comprehension test. Standard errors are 0.02 in both cases.

An alternative strategy for examining the information hypothesis is to include community fixed effects which capture all community-level information and services available to women. If women who score well on the tests live in communities with services that affect fertility, these effects will be soaked up by the fixed effects. While the impact of the total test score is robust to their inclusion (its impact is -0.047 with a standard error of 0.022), the impact of the comprehension score is halved and it is not significant. (In contrast, the impact of the quantitative score rises). This result provides a hint that access to information may play an important role in explaining the link between fertility and test scores, and therefore, education.

6. Conclusions

The scope of this study has been limited by the fact that only the number of children ever born to each female respondent is reported in the PSLSD. Without additional information, such as a pregnancy history, it is not possible to examine current fertility outcomes or estimate a dynamic model of the determinants of fertility over the life course. Nevertheless, even this limited information has shed considerable new light on fertility levels and their determinants in South Africa.

There is a powerful negative association between education and fertility among black women in South Africa. Part of the association seems to be related to skills that are likely to be learnt in school; in particular, comprehension skills appear to play a special role in affecting demographic outcomes. However, part of the association appears to have nothing to do with the education production function *per se* but is a reflection of the fact that education is not randomly distributed across the population. Specifically, women and their families choose their educational attainment and so the better educated are a self-selected sample of the underlying population. Only a relatively small part of the negative correlation between fertility and education can be attributed to the role of household and community resources.

It is, perhaps, also unfortunate that the South African survey does not provide sufficient detail to support a fuller investigation of the interaction between education (or household resources) and community services. In addition to being a potentially important mechanism through which education is associated with fertility, it is of considerable interest from a policy design point of view of policy design. For example, a

study of the determinants of contraceptive use in neighboring Zimbabwe indicates that outreach programs such as community based distributors and mobile family planning clinics have had a significant positive impact on adoption of modern methods (Thomas and Maluccio, 1996). However, not all women have been equally served by this infrastructure: community based distributors, which are intended to be targeted at the poorest, have, in fact, had their biggest impact on younger, better educated women whereas mobile clinics appear to have had more success with older, less educated women. The nature of public investments can, therefore, have important distributional consequences for the current, and probably future, generation. As South Africa embarks on a population policy and invests in community infrastructure and services, it is likely to be critically important to understand the link between fertility, education and the community in order to effectively target public investments towards those women for whom returns will be greatest.

Abstract

Population and education are likely to play a central role in public policy in South Africa as it emerges from years of apartheid. Using household survey data, collected as part of the Project for Statistics on Living Standards and Development, the paper examine some of the mechanisms that underlie the negative association between fertility and education. First, education is not randomly assigned within a population. By placing the spotlight on educational attainment around natural exit points in the education system, it is demonstrated that part, but not all, of the association between education and fertility does reflects self-selection in educational attainment. A naive interpretation of the effect as entirely causal would be mis-leading. Second, education and household resources tend to be correlated and so a woman's education may simply be a proxy for her, or her family's, income. This turns out to not be the entire story in South Africa: after controlling for spousal characteristics, household income, labor market choices and even community characteristics, female education continues to have a powerful negative association with fertility. The third set of experiments attempts to isolate the relationship between skills that are likely to be learnt in school and demographic outcomes. After controlling for income and education, performance on a set of quantitative and comprehension tests has an independent impact on fertility. The impact of comprehension skills is particularly large in magnitude suggesting that the acquisition and assimilation of information may be important in affecting family decision-making.

References

African National Congress. (1994). *The Reconstruction and Development Programme*, Johannesburg: Umanyano Publications.

African National Congress. (1995). *Population Policy for South Africa?* Ministry of Welfare and Population Development, Green Paper, Pretoria.

Caldwell, John. (1977). The economic rationality of high fertility: An investigation illustrated with Nigerian survey data. *Population Studies*, 31.1:5-27.

Caldwell, John. (1979). Education as a factor in mortality decline: An examination of Nigerian data. *Population Studies*, 33.3:395-413.

Caldwell, John and Pat Caldwell. (1993). The South African Fertility Decline, *Population and Development Review*, 19.2:225-261.

Chimere-Dan Oreiji. (1993). Population Policy in South Africa, *Studies in Family Planning*, 24.1:31-39.

Cochrane, Susan. (1983). Effects of Education and Urbanization on Fertility. In Rodolofo Bulatao and Ronald Lee (eds.) *Determinants of Fertility in Developing Countries*, New York: Academic Press.

Fuller, Bruce, Punday Pillay and Neeta Sirur. (1995). Literacy Trends in South Africa: Expanding Education while Reinforcing Unequal Achievement? Mimeo, Harvard University.

Hyslop, Dean. (1995). Estimation of a dynamic model of female labor force participation. Industrial Relations Working Paper, Princeton University.

Lam, David and Suzanne Duryea. (1995). Effects of Schooling on Fertility, Labor Supply and Investments in Children, with Evidence from Brazil. Mimeo, University of Michigan Population Studies Center, Ann Arbor.

Lucas, David. (1992). Fertility and Family Planning in Southern and Central Africa, *Studies in Family Planning*, 23.3:145-158.

Preston-Whyte, Eleanor. (1990). Qualitative Perspectives on Fertility Trends among African Teenagers, in W. P. Mostert and J. M. Lotter (eds.) *South Africa's Demographic Future*, Pretoria: Human Sciences Research Council.

Project for Statistics on Living Standards and Development. (1994). *South Africans Rich and Poor: Baseline Household Statistics*, Cape Town: Southern African Labor and Development Research Unit.

Thomas, Duncan. (1996). Education Across Generations in South Africa, *American Economic Review*, forthcoming.

Thomas, Duncan and John Maluccio. (1996). Fertility, Contraceptive Choice and Public Policy in Zimbabwe, *World Bank Economic Review*, 10.1:189-222.

van Zyl, Johan. (1994). History, Scope and Methodology of Fertility and Family Planning Surveys in South Africa. Mimeo, Human Sciences Research Council, Pretoria.

Weiss, Andrew. (1995). Human Capital vs. Signalling Explanations of Wages, *Journal of Economic Perspectives*, 9.4:133-55.

Figure 1
Total fertility rates and education of females

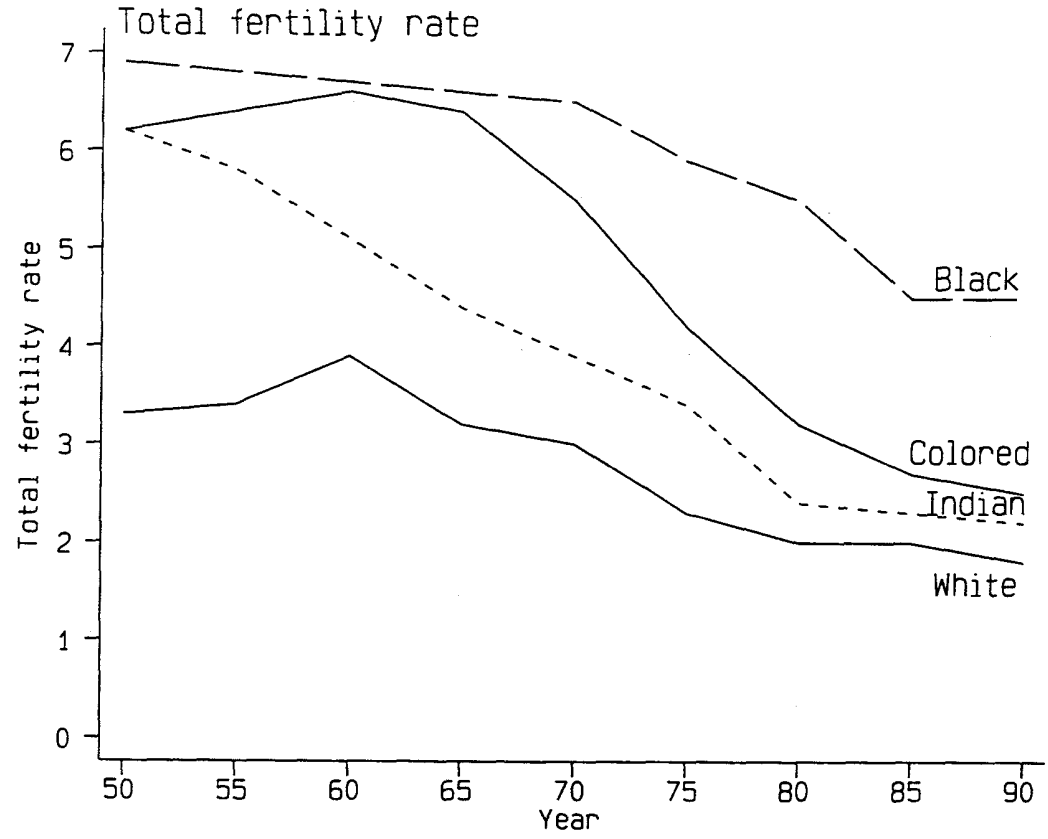

Figure 2
Children ever born and female education

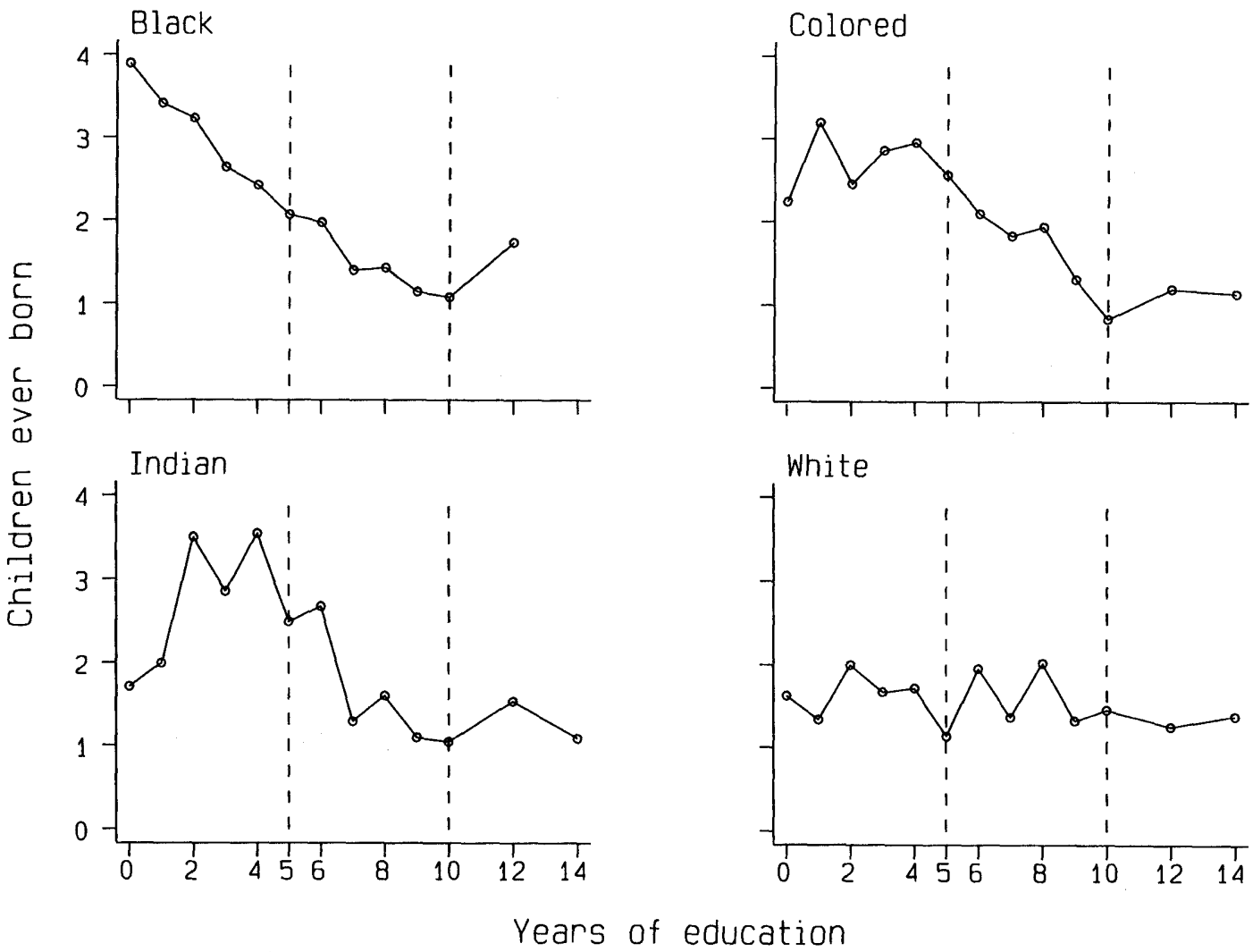

Table 1: Means and [standard errors]

	Black	Colored	Indian	White
# children ever born	2.106	2.002	1.604	1.535
	[0.026]	[0.068]	[0.088]	[0.044]
(among 40-49 year olds)	5.000	4.250	2.949	2.503
	[0.117]	[0.273]	[0.277]	[0.107]
Woman's characteristics				
Years of education	5.654	6.489	8.023	9.140
	[0.036]	[0.094]	[0.160]	[0.113]
Fraction completed				
Standard 0	0.109	0.041	0.041	0.074
Standard 1	0.041	0.022	0.006	0.003
Standard 2	0.048	0.025	0.006	0.004
Standard 3	0.061	0.047	0.021	0.006
Standard 4	0.075	0.074	0.032	0.026
Standard 5	0.114	0.115	0.035	0.014
Standard 6	0.127	0.162	0.120	0.042
Standard 7	0.099	0.134	0.091	0.041
Standard 8	0.118	0.165	0.170	0.161
Standard 9	0.088	0.071	0.123	0.055
Standard 10	0.091	0.108	0.276	0.324
Diploma/> Standard 10	0.029	0.028	0.044	0.135
University degree	.	0.008	0.035	0.118
Age	28.472	30.150	30.704	32.544
	[0.105]	[0.318]	[0.535]	[0.290]
Fraction worked in last year	0.176	0.335	0.290	0.433
ℓn(wage)	6.140	6.562	7.000	7.508
	[0.026]	[0.049]	[0.059]	[0.025]
Monthly Wage (Rs)	705.730	929.008	1327.217	2102.629
	[17.226]	[36.406]	[98.809]	[55.561]
Fraction in urban sector	0.173	0.357	0.531	0.248
Fraction in rural sector	0.651	0.069	0.003	0.077
Fraction ever married	0.546	0.567	0.660	0.750
Spouse's characteristics				
Fraction dead	0.058	0.053	0.040	0.016
Fraction absent	0.292	0.122	0.053	0.049
Fraction present	0.650	0.825	0.907	0.935
Years of education	2.975	5.589	8.049	9.778
	[0.053]	[0.160]	[0.264]	[0.146]
Fraction completed				
Standard 1	0.051	0.018	0.004	0.005
Standard 2	0.040	0.022	0.013	0.001
Standard 3	0.038	0.045	0.004	0.000
Standard 4	0.059	0.049	0.004	0.012
Standard 5	0.074	0.079	0.027	0.004
Standard 6	0.078	0.152	0.080	0.028
Standard 7	0.034	0.079	0.049	0.016
Standard 8	0.057	0.165	0.147	0.118
Standard 9	0.027	0.067	0.120	0.025
Standard 10	0.047	0.087	0.298	0.264
Diploma	0.015	0.033	0.044	0.257
University degree	0.005	0.010	0.084	0.164
Household income	1143.240	2382.135	4483.229	6936.798
	[17.251]	[65.842]	[492.055]	[312.383]
ℓn(Household income)	6.577	7.469	7.994	8.545
	[0.012]	[0.031]	[0.049]	[0.024]

Table 2: Children ever born and female education
Women age 15-49

	Black	Black Rural	Colored	Indian	White
A. Linear					
Years of education	-0.117*	-0.119*	-0.094*	-0.056*	-0.037*
	[0.006]	[0.007]	[0.018]	[0.023]	[0.009]
B. Spline					
0-5 years	-0.106*	-0.103*	0.051	0.172*	0.185*
	[0.013]	[0.015]	[0.044]	[0.067]	[0.034]
6-10 years	-0.134*	-0.134*	-0.168*	-0.175*	-0.160*
	[0.012]	[0.016]	[0.033]	[0.045]	[0.027]
> 10 years	-0.059	-0.119*	-0.175+	-0.046	-0.070*
	[0.041]	[0.053]	[0.092]	[0.066]	[0.022]
C. Semi-Parametric					
Standard 1	-0.128	-0.156	0.874*	0.388	-0.566
	[0.102]	[0.119]	[0.398]	[0.882]	[0.638]
Standard 2	-0.079	-0.208+	0.236	1.432	0.117
	[0.097]	[0.111]	[0.385]	[0.875]	[0.556]
Standard 3	-0.338*	-0.383*	0.529	0.679	-0.045
	[0.090]	[0.107]	[0.322]	[0.538]	[0.460]
Standard 4	-0.423*	-0.371*	0.731*	1.681*	0.151
	[0.085]	[0.102]	[0.294]	[0.472]	[0.239]
Standard 5	-0.592*	-0.650*	0.578*	1.021*	0.429
	[0.076]	[0.092]	[0.275]	[0.456]	[0.307]
Standard 6	-0.623*	-0.589*	0.163	0.849*	0.726*
	[0.075]	[0.093]	[0.266]	[0.360]	[0.203]
Standard 7	-0.699*	-0.660*	0.252	0.285	0.862*
	[0.081]	[0.102]	[0.271]	[0.383]	[0.210]
Standard 8	-0.921*	-0.933*	0.015	0.460	0.515*
	[0.077]	[0.100]	[0.265]	[0.350]	[0.147]
Standard 9	-0.961*	-0.969*	-0.047	0.329	0.447*
	[0.083]	[0.106]	[0.299]	[0.365]	[0.188]
Standard 10	-1.274*	-1.331*	-0.283	0.179	0.009
	[0.083]	[0.108]	[0.282]	[0.341]	[0.135]
Diploma	-1.401*	-1.577*	-0.785*	-0.009	-0.303*
	[0.117]	[0.153]	[0.371]	[0.435]	[0.152]
University degree	.	.	-0.990+	-0.078	-0.223
			[0.592]	[0.460]	[0.156]
Age spline					
< 30	0.185*	0.193*	0.161*	0.164*	0.158*
	[0.005]	[0.006]	[0.014]	[0.020]	[0.012]
30-39	0.161*	0.180*	0.162*	0.079*	0.091*
	[0.007]	[0.010]	[0.019]	[0.026]	[0.013]
40-49	0.109*	0.123*	0.068*	0.006	0.004
	[0.011]	[0.014]	[0.027]	[0.037]	[0.015]
(1) if urban	0.195*	.	-0.159	0.012	0.142+
	[0.060]		[0.105]	[0.130]	[0.078]
(1) if rural	0.498*	.	0.203	-0.456	0.270*
	[0.049]		[0.201]	[1.170]	[0.126]
Intercept	-2.763*	-2.511*	-2.889*	-3.329*	-3.242*
	[0.140]	[0.161]	[0.419]	[0.562]	[0.313]
F(all covariates)	579.87	480.27	57.17	20.59	49.21
R^2	0.533	0.560	0.525	0.520	0.440
Sample size	8142	5303	896	341	1084

Notes: Standard errors below coefficients; p-values below F statistics.

Table 3: Children ever born and female education: Women age 40-49

	Black	Black Rural	Colored	Indian	White
A. Linear					
Years of education	-0.136*	-0.152*	-0.124*	0.010	-0.054*
	[0.023]	[0.031]	[0.062]	[0.053]	[0.020]
B. Spline					
0-5 years	-0.150*	-0.175*	0.146	0.172	0.233*
	[0.040]	[0.052]	[0.130]	[0.134]	[0.071]
6-10 years	-0.140*	-0.085	-0.362*	-0.145	-0.249*
	[0.066]	[0.114]	[0.129]	[0.117]	[0.061]
> 10 years	0.016	-0.265	-0.026	0.154	-0.069
	[0.193]	[0.338]	[0.292]	[0.196]	[0.051]
C. Semi-Parametric					
Standard 1	-0.053	-0.010	1.249	.	-1.381
	[0.290]	[0.351]	[1.094]		[1.281]
Standard 2	-0.058	-0.106	1.572	-0.546	0.258
	[0.300]	[0.347]	[1.226]	[1.706]	[0.921]
Standard 3	-0.505+	-0.668+	1.343	0.731	0.497
	[0.280]	[0.350]	[0.886]	[0.880]	[0.772]
Standard 4	-0.659*	-0.680+	2.595*	1.710*	0.397
	[0.270]	[0.344]	[0.804]	[0.827]	[0.511]
Standard 5	-0.930*	-1.069*	1.424+	1.188	1.710
	[0.260]	[0.345]	[0.782]	[0.850]	[1.285]
Standard 6	-0.677*	-0.716*	0.459	0.565	0.995*
	[0.235]	[0.323]	[0.775]	[0.700]	[0.406]
Standard 7	-0.753*	-0.391	0.991	0.017	0.847
	[0.361]	[0.662]	[0.834]	[0.959]	[0.567]
Standard 8	-1.140*	-1.222*	0.345	0.089	0.315
	[0.306]	[0.604]	[0.788]	[0.781]	[0.289]
Standard 9	-1.367*	-1.703+	0.542	0.945	0.212
	[0.465]	[0.925]	[1.038]	[0.830]	[0.415]
Standard 10	-1.649*	-1.592+	0.953	0.318	-0.075
	[0.472]	[0.805]	[2.154]	[0.882]	[0.275]
Diploma	-1.424*	-1.782*	0.743	0.829	-0.965*
	[0.446]	[0.621]	[1.366]	[1.013]	[0.338]
University degree	.	.	-1.047	0.809	-0.263
			[1.604]	[1.125]	[0.334]
Age in years	0.104*	0.133*	0.056	0.045	0.063*
	[0.024]	[0.032]	[0.056]	[0.075]	[0.025]
(1) if urban	0.660*	.	-0.202	-0.297	-0.029
	[0.227]		[0.335]	[0.371]	[0.172]
(1) if rural	1.192*	.	1.063	.	0.241
	[0.192]		[0.686]		[0.276]
Intercept	-0.204	-0.266	0.509	0.424	-0.434
	[1.072]	[1.435]	[2.614]	[3.417]	[1.141]
F(all covariates)	11.190	4.200	2.290	0.880	3.080
	[0.000]	[0.000]	[0.006]	[0.579]	[0.000]
R^2	0.103	0.057	0.164	0.139	0.140
Sample size	[1377]	[852]	[191]	[85]	[300]

Table 4A:
Children ever born, female education, household and community resources
Black women age 15-49

	Baseline	Add Spouse Characs	Add Household Income	Add Wages and LFP	Include Community Fixed Effects
A. Linear					
Years	-0.117*	-0.080*	-0.073*	-0.072*	-0.068*
	[0.006]	[0.006]	[0.006]	[0.006]	[0.007]
B. Spline					
0-5 years	-0.106*	-0.071*	-0.069*	-0.069*	-0.071*
	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]
6-10 years	-0.134*	-0.089*	-0.079*	-0.080*	-0.070*
	[0.012]	[0.012]	[0.012]	[0.012]	[0.013]
> 10 years	-0.059	-0.067+	-0.051	-0.004	-0.014
	[0.041]	[0.040]	[0.041]	[0.041]	[0.042]
C. Semi-parametric					
Standard 1	-0.128	-0.016	-0.001	-0.013	-0.050
	[0.102]	[0.099]	[0.100]	[0.099]	[0.100]
Standard 2	-0.079	0.075	0.120	0.094	0.044
	[0.097]	[0.094]	[0.096]	[0.094]	[0.096]
Standard 3	-0.338*	-0.179*	-0.184*	-0.176*	-0.187*
	[0.090]	[0.088]	[0.089]	[0.088]	[0.090]
Standard 4	-0.423*	-0.235*	-0.217*	-0.216*	-0.245*
	[0.085]	[0.083]	[0.085]	[0.083]	[0.085]
Standard 5	-0.592*	-0.385*	-0.368*	-0.368*	-0.371*
	[0.076]	[0.076]	[0.077]	[0.076]	[0.079]
Standard 6	-0.623*	-0.390*	-0.372*	-0.373*	-0.402*
	[0.075]	[0.075]	[0.076]	[0.075]	[0.078]
Standard 7	-0.699*	-0.437*	-0.402*	-0.415*	-0.421*
	[0.081]	[0.081]	[0.082]	[0.081]	[0.083]
Standard 8	-0.921*	-0.561*	-0.512*	-0.525*	-0.497*
	[0.077]	[0.078]	[0.079]	[0.078]	[0.081]
Standard 9	-0.961*	-0.572*	-0.527*	-0.548*	-0.547*
	[0.083]	[0.083]	[0.085]	[0.083]	[0.087]
Standard 10	-1.274*	-0.829*	-0.764*	-0.768*	-0.746*
	[0.083]	[0.083]	[0.085]	[0.084]	[0.087]
> Standard 10	-1.401*	-0.992*	-0.874*	-0.739*	-0.747*
	[0.117]	[0.118]	[0.121]	[0.125]	[0.129]
D. Test statistics					
F(all covariates)	579.87	359.03	336.15	311.16	35.700
	[0.00]	[0.00]	[0.00]	[0.00]	0.00
R^2	0.533	0.570	0.571	0.573	0.599

Notes: 8,142 observations. Standard errors below coefficients; p-values below F statistics. See Table 4B for controls.

Table 4B:
Children ever born, female education, household and community resources
Black women age 15-49

	Baseline	Add Spouse Characs	Add Household Income	Add Wages and LFP	Include Community Fixed Effects
Spouse's characterics					
Standard 1	.	-0.112	-0.099	-0.103	-0.159
		[0.121]	[0.123]	[0.121]	[0.122]
Standard 2	.	-0.073	-0.113	-0.080	-0.112
		[0.134]	[0.138]	[0.133]	[0.135]
Standard 3	.	-0.212	-0.202	-0.222	-0.254+
		[0.136]	[0.137]	[0.135]	[0.137]
Standard 4	.	-0.280*	-0.202+	-0.286*	-0.253*
		[0.117]	[0.118]	[0.117]	[0.118]
Standard 5	.	-0.448*	-0.467*	-0.451*	-0.405*
		[0.110]	[0.112]	[0.110]	[0.111]
Standard 6	.	-0.604*	-0.628*	-0.608*	-0.557*
		[0.108]	[0.110]	[0.108]	[0.110]
Standard 7	.	-0.231	-0.191	-0.258+	-0.260+
		[0.144]	[0.147]	[0.145]	[0.146]
Standard 8	.	-0.681*	-0.644*	-0.656*	-0.620*
		[0.120]	[0.122]	[0.122]	[0.123]
Standard 9	.	-0.554*	-0.537*	-0.566*	-0.571*
		[0.158]	[0.161]	[0.160]	[0.161]
Standard 10	.	-0.785*	-0.732*	-0.765*	-0.719*
		[0.129]	[0.131]	[0.133]	[0.134]
> Standard 10	.	-0.532*	-0.461*	-0.481*	-0.343+
		[0.185]	[0.187]	[0.194]	[0.198]
(1) if dead	.	1.023*	1.014*	1.026*	1.002*
		[0.107]	[0.110]	[0.107]	[0.108]
(1) if absent	.	0.251*	0.243*	0.266*	0.371*
		[0.053]	[0.054]	[0.053]	[0.058]
(1) if present	.	1.524*	1.511*	1.599*	1.569*
		[0.081]	[0.083]	[0.086]	[0.088]
Income and wages					
ℓn(HH income)	.	.	-0.069*	.	.
			[0.018]		
ℓn(female wage)	.	.	.	-0.223*	-0.217*
				[0.047]	[0.051]
(1) if employed	.	.	.	-0.216*	-0.155*
				[0.049]	[0.052]
ℓn(spouse's wage)	.	.	.	0.129*	0.076
				[0.053]	[0.059]
(1) if spouse employed	.	.	.	-0.191*	-0.041
				[0.059]	[0.063]
Woman's age (spline)					
< 30	0.185*	0.136*	0.136*	0.139*	0.139*
	[0.005]	[0.005]	[0.005]	[0.005]	[0.006]
30-39	0.161*	0.144*	0.144*	0.148*	0.149*
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
40-49	0.109*	0.102*	0.107*	0.101*	0.102*
	[0.011]	[0.010]	[0.011]	[0.010]	[0.010]
Location					
(1) if urban	0.195*	-0.085	0.136*	0.121*	.
	[0.060]	[0.076]	[0.059]	[0.058]	
(1) if rural	0.498*	0.189	0.367*	0.352*	.
	[0.049]	[0.122]	[0.049]	[0.048]	
Intercept	-2.763*	-2.160*	-1.709*	-1.662*	-1.143*
	[0.140]	[0.140]	[0.185]	[0.415]	[0.481]

Notes: See Table 4A.

Table 5: Children ever born and cognitive test scores
Black women age 15-49

	Baseline	HH Income	Test: Total	Test: Separate	Income & Tests	Access Information	All
Years of education							
Woman	-0.147*	-0.102*	-0.089*	-0.087*	-0.082*	-0.096*	-0.079*
	[0.016]	[0.016]	[0.018]	[0.018]	[0.018]	[0.017]	[0.018]
Spouse		-0.057*	-0.066*	-0.066*	-0.056*	-0.057*	-0.056*
		[0.025]	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]
ℓn(HH income)	.	-0.147*	.	.	-0.133*	-0.142*	-0.130*
		[0.045]			[0.045]	[0.045]	[0.045]
Test scores							
Total	.	.	-0.052*	.	.	.	.
			[0.017]				
Comprehension	.	.	.	-0.076*	-0.068*	.	-0.067*
				[0.033]	[0.033]		[0.033]
Quantitative	.	.	.	-0.033	-0.030	.	-0.028
				[0.028]	[0.028]		[0.028]
(1) if read paper in last 2 weeks	.	.	.	.	.	-0.099	-0.061
						[0.096]	[0.097]
F(all human capital)	.	.	28.27	19.09	15.87	20.12	11.99
			[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
F(test scores)				5.04	4.06		3.72
				[0.01]	[0.02]		[0.02]
F(all covs)	279.14	179.93	179.49	164.54	154.09	165.04	143.00
R^2	0.69	0.72	0.72	0.72	0.72	0.72	0.72

Notes: Standard errors in parentheses below coefficients; p-values below F test statistics. Regressions include controls for age (spline), spouse present, absent or dead, location of residence. 778 women included in each regression.

Appendix A

SALDRU, UNIVERSITY OF CAPE TOWN
Project for Living Standards and Development

LITERACY ASSESSMENT MODULE [LAM]

Section A: Listening, Comprehension, and Practical Math (about 5 minutes)

Question 1: "Imagine that you are taking a trip on the bus to a town ship that is located 280 kilometres away. The bus driver says that he will drive at a speed of 80 kilometres per hour. How many hours will the trip take to complete?"

Question 2 [in Mother Tongue]: "Meshack would like to set up a fruit stand in the town market. The manager of the market says that Meshack must pay him R 100 to set up his stand. He must also pay R 25 per month to the market manager. Over the first year, how much in total must Meshack pay to the manager?"

Section B: Reading Comprehension (15 minutes)

Question 3: "When Mbaya was a child, he got very excited when his mother, Corfu, asked if he would like to go to the meat market with her. As they walked into the centre of town, the wonderful odours of meat--both fresh and spoiled--could be smelled up to one kilometre away. The hundreds of market stalls formed a row of almost 1 and 1/2 kilometres long. It took almost one hour to walk slowly from one end of the meat market to the other.

"Sometimes Corfu would let Mbaya choose what meat they would buy that morning. The smell of fresh beef was Mbaya's favorite. But sometimes Mbaya would accidentally choose the beef that was not fresh. Corfu would go up close to the big piece of meat hanging from the rack and smell it. Once she was close to it, Corfu could tell immediately that the beef was not fresh. Then she would laugh at Mbaya and tease him for picking spoiled meat. The meat seller would be angry, as Corfu let on to other shoppers that his beef was not fresh. Mbaya would then start looking around for beef that seemed more fresh, no longer trusting that his nose is the best instrument for finding fresh meat."

Q3a. How long was the row of meat stalls, from one end to the other end?

a. 1 and 1/2 kilometres long.
b. 1 kilometre long.
c. It was very close from one end to the other end.
d. Hundreds of stalls were lined up.

Q3b. What did Mbaya most like to do inside the meat market?

a. Try to find spoiled meat.
b. Walk from one end to the other end of the market.
c. Have his mother tease him when he found spoiled meat.
d. Find fresh beef for his mother to buy.

Q3c. What did not happen when Mbaya would choose a spoiled piece of meat?

a. The meat seller would get angry.
b. Mbaya and his mother would leave the market.
c. Corfu would tease Mbaya.
d. They would keep shopping for fresh meat.

"Zenariah was riding to work in her usual combi. The driver and the woman sitting next to him, named Roseline, were arguing over whether it was any use for the woman's son to stay in school. The son, named Philemon, was 16. His secondary school had been closed for many days over the past 6 months. Teachers often did not show up for work. But the woman felt that if he could pass matric, Philemon could eventually find a good job, perhaps as a clerk or office worker. The driver, however, claimed that even university graduates were having difficulty finding jobs as clerks. Zenariah had graduated from the University of the Western Cape, and it had taken her 3 months to find her job as an assistant accountant. She was sympathetic to the woman's position, but also had to agree that until the economy improved, education would not guarantee a good job."

Question 4

Q4a. When Zenariah goes to work in the morning..

a. She usually takes the combi.
b. She always sits next to Roseline.
c. She tries to find different drivers and combis.
d. She usually talks about her son, Phileon, in the combi.

Q4b. What kind of job did Philemon's mother hope he would find?

a. Assistant accountant.
b. Combi driver.
c. Office worker.
d. Teacher.

Q4c. What was the combi driver's position?

a. Schools are of high quality.
b. Philemon should go to University of the Western Cape.
c. Completing school will lead to a good job.
d. Schooling does not guarantee a good job.

Section C: Computational Problems (15 minutes)

Question 5: 103 kg - 37 kg = _____ kg

Question 6: R 35.50 x 7 = R _____

Question 7: 25% of R 228 = % _____

Question 8: R 22.25 - R 7.88 = R _____

Section D: Practical Math Problems (10 minutes)

Question 9: "According to the doctor, the mother must buy 0.30 litres of cough mixture for her two sick children. She can either buy three bottles, each containing 0.10 litres, for R 9.50 per bottle or she can but four bottles, each containing 0.08 litres, for R 7.00 per bottle. What is the least amount of Rand she needs to spend to get the 0.30 litres required by the doctor?

Question 10: "Namane was trying to figure out her transport costs from the township to the city to get to her job. The combi cost R 2.00 each day. If she took a combi, then a taxi for part of the trip, she would have to spend R 3.50 each day. How much more would the taxi plus the combi cost for the week, than just taking a taxi, if she went to work five days during the week?"

Section E: Spoken Languages and General Reading

Question 11: What language do you speak?

a. At home or when talking with friends?

b. At work (if currently working, otherwise Go to Q12).

Question 12: During the past two weeks, did you read any parts of the following items?

a. A newspaper?
If yes, in what language?

b. A magazine?
If yes, in what language?

c. A book of any kind?
If yes, in what language?

RAND

1700 Main Street
Santa Monica, CA 90407

Labor and Population Program Working Paper Series

1996

Series Number	Order Number	Title	Author
96-15	DRU-1508-RC	*Fertility, Education and Resources in South Africa*	Duncan Thomas
96-14	DRU-1474-RC	*Wage Losses of Displaced Workers in the 1990s*	Robert F. Schoeni Michael Dardia
96-13	DRU-1461-RC	*Do Children of Immigrants Make Differential Use of Public Health Insurance?*	Janet Currie
96-12	DRU-1453-RC	*Does Aid to Families with Dependent Children Displace Familial Assistance?*	Robert F. Schoeni
96-11	DRU-1448-NICHD	*Beliefs About Children's Illness Among Rural Guatemalan Women*	Anne Pebley Elena Hurtado Noreen Goldman
96-10	DRU-1423-NICHD	*Welfare Reform and Abortion: Research Perspectives*	Jacob Alex Klerman
96-09	DRU-1422-NICHD	*The Economics of Fertility in Developed Countries: A Survey*	V. Joseph Hotz Jacob Alex Klerman Robert J. Willis
96-08	DRU-1415-NIA/NICHD	*A Chronicle of Abortion Legality, Medicaid Funding, and Parental Involvement Laws, 1967-1994*	Jon F. Merz Jacob A. Klerman Catherine A. Jackson
96-07	DRU-1378-NIA	*Long-Term Determinants of Supplemental Health Insurance Coverage in the Medicare Population*	Lee A. Lillard Jeannette Rogowski Raynard Kington
96-06	DRU-1343-NIA	*Demand for Prescription Drugs in the Medicare Population*	Lee A. Lillard Jeannette Rogowski Raynard Kington
96-05	DRU-1327-NIA	*Socioeconomic Differentials in the Returns to Social Security*	Constantijn W. A. Panis Lee A. Lillard
96-04	DRU-1316-NIA	*Demographic and Economic Correlates of Health in Old Age*	James P. Smith Raynard Kington
96-03	DRU-1305-NICHD	*Data on Reasons for No or Short Breastfeeding: Are They Reliable and Do They Help Us Understand Infant Feeding Behavior?*	Barthelemy Kuate Defo Julie DaVanzo

96-02	DRU-1303-NICHD	*Parental Investments in Schooling: The Roles of Gender and Resources in Urban Brazil*	Duncan Thomas Robert F. Schoeni John Strauss
96-01	DRU-1287-NICHD	*Nutritional Status in Indonesia: Evidence from the 1993 Indonesian Family Life Survey*	Elizabeth Frankenberg Wayan Surisatini Duncan Thomas

1995

Series Number	Order Number	Title	Author
95-25	DRU-1275-RC	*Abstracts of 1995 Labor and Population Program Working Paper Series*	
95-24	DRU-1260-NICHD	*Labor Supply Effects of State Maternity Leave Legislation*	Jacob Alex Klerman Arleen Leibowitz
95-23	DRU-1238-NICHD/NIA	*Health, Nutrition and Economic Development*	John Strauss Duncan Thomas
95-22	DRU-1234-RC	*Unconditional Demand for Curative Health Inputs: Does Selection on Health Status Matter in the Long Run?*	William H. Dow
95-21	DRU-1233-RC	*Welfare Impacts of Health Care User Fees: A Health-Valuation Approach to Analysis with Imperfect Markets*	William H. Dow
95-20	DRU-1232-RC	*Discrete Choice Estimation of Price-Elasticities: The Benefits of a Flexible Behavioral Model of Health Care Demand*	William H. Dow
95-19-1	DRU-1178-NICHD-1	*Race, Children's Cognitive Achievement and the Bell Curve*	Janet Currie Duncan Thomas
95-18	DRU-1135-NICHD	*Updating Women's Life Course: Theoretical and Methodological Considerations*	Dawn M. Upchurch Lee A. Lillard Constantijn W. A. Panis
95-17	DRU-1125-NIA	*Intergenerational Earnings Links: Sons and Daughters*	Lee A. Lillard M. Rebecca Kilburn
95-16	DRU-1124-NIA	*Does Supplemental Private Insurance Increase Medicare Costs?*	Lee A. Lillard Jeannette Rogowski
95-15	DRU-1101-RC	*A Multilevel Hazards Model for Hierarchically Clustered Data: Model Estimation and an Application to the Study of Child Survival in Northeast Brazil*	Narayan Sastry

95-14	DRU-1096-NICHD	*A Review of Abortion Policy: Legality, Medicaid Funding, and Parental Involvement, 1967-1994*	Jon F. Merz Catherine A. Jackson Jacob A. Klerman
95-13	DRU-1094-RF	*Community Characteristics, Individual and Household Attributes, and Child Survival in Brazil*	Narayan Sastry
95-12	DRU-1093-NICHD	*Poverty, Public Assistance and Children in Intact and Single-Mother Families*	Lingxin Hao
95-11	DRU-1089-NICHD	*Health, Wealth, and Wages of Men and Women in Urban Brazil*	Duncan Thomas John Strauss
95-10	DRU-1063-NIA/NICHD	*Race, Socioeconomic Status, and Health in Late Life*	James P. Smith Raynard Kington
95-09	DRU-1057	*Transfer Behavior Within the Family: Results from the Asset and Health Dynamics Survey*	Kathleen McGarry Robert F. Schoeni
95-08	DRU-1055-NIA	*Marriage, Assets, and Savings*	James P. Smith
95-07	DRU-1036-RC	*Public Policy and Anthropometric Outcomes in the Côte d'Ivoire*	Duncan Thomas Victor Lavy John Strauss
95-06	DRU-989-NIA	*Wealth Inequality Among Older Americans*	James P. Smith
95-05	DRU-988-NIA	*Improving the Quality of Economic Data: Lessons from the HRS*	F. Thomas Juster James P. Smith
95-04	DRU-962-NICHD	*Pension Underfunding and Liberal Retirement Benefits Among State and Local Government Workers*	Richard W. Johnson
95-03	DRU-956	*Regulating Child Care: The Effects of State Regulations on Child Care Demand and Its Cost*	V. Joseph Hotz M. Rebecca Kilburn
95-02	DRU-955-RC	*Restrictions on Medicaid Funding of Abortion: Effects on Birth Weight and Pregnancy Resolutions*	Janet Currie Lucia Nixon Nancy Cole
95-01	DRU-939	*Research on Aging Using the Panel Study of Income Dynamics*	Lee A. Lillard

RAND Labor and Population Program Working Paper Order Form:

Name:_____

Title: _____

Company or affiliation: _____

Address: _____

City, State, and Zip: _____

Please send me the following Working Papers:

L&P WP#	RAND DRU#	Author(s)	Order
96-15	1508	Thomas	_____
96-14	1474	Schoeni & Dardia	_____
96-13	1461	Currie	_____
96-12	1453	Schoeni	_____
96-11	1448	Pebley et al.	_____
96-10	1423	Klerman	_____
96-09	1422	Hotz et al.	_____
96-08	1415	Merz et al.	_____
96-07	1378	Lillard et al.	_____
96-06	1343	Lillard et al.	_____
96-05	1327	Panis & Lillard	_____
96-04	1316	Smith & Kington	_____
96-03	1305	Defo & DaVanzo	_____
96-02	1303	Thomas et al.	_____
96-01	1287	Frankenberg et al.	_____

L&P WP#	RAND DRU#	Author(s)	Order
95-25	1275	ABSTRACTS	_____
95-24	1260	Klerman & Leibowitz	_____
95-23	1238	Strauss & Thomas	_____
95-22	1234	Dow	_____
95-21	1233	Dow	_____
95-20	1232	Dow	_____
95-19-1	1178-1	Currie & Thomas	_____
95-18	1135	Upchurch et al.	_____
95-17	1125	Lillard & Kilburn	_____
95-16	1124	Lillard & Rogowski	_____
95-15	1101	Sastry	_____
95-14	1096	Merz et al.	_____
95-13	1094	Sastry	_____

L&P WP#	RAND DRU#	Author(s)	Order
95-12	NOW RP-489	Hao	_____
95-11	1089	Thomas & Strauss	_____
95-10	1063	Smith & Kington	_____
95-09	1057	McGarry & Schoeni	_____
95-08	1055	Smith	_____
95-07	NOW RP-566	Thomas et al.	_____
95-06	989	Smith	_____
95-05	988	Juster and Smith	_____
95-04	962	Johnson	_____
95-03	956	Hotz and Kilburn	_____
95-02	955	Currie et al.	_____
95-01	939	Lillard	_____

Order Information

Shipping and handling charge is $3.00 for first item; $1.00 for each additional item; and an additional $1.00 for each item on shipments outside the United States. Please allow 3-6 weeks for delivery.

Order by:	☐ Check or money order payable to RAND	☐ VISA ☐ MASTERCARD Credit card number: _____ Expiration date: _____ Signature: _____ [required if using credit card]
Telephone: 310-451-7002 FAX: 310-451-6915 Internet: order@rand.org Mail: RAND Distribution Services P.O. Box 2138 Santa Monica, CA 90407		

Labor and Population Program on the World Wide Web: http://www.rand.org/organization/drd/labor/