Children's School Participation and Parental Perceptions of the HIV Epidemic: Evidence from Rural Malawi

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ABSTRACT

Studies on the relationship between HIV/AIDS and children's educational attainment largely focus on the direct impacts of parental illness and death, overlooking the potential indirect impact that parental perceptions of the HIV epidemic may have on children's school enrollment. I combine analysis of the 2004 and 2006 survey rounds of the Malawi Diffusion and Ideational Change Project (MDICP) with findings from qualitative interviews with parents collected in summer 2006. The analysis will examine their knowledge of their HIV status, the role of the parent's health expectations and concern about HIV/AIDS, and their perception of the future of the HIV epidemic. Preliminary findings suggest that parental uncertainty about HIV is associated with lower levels of school participation. Interventions that target this uncertainty, such as HIV testing programs, may make a significant contribution to maintaining children's educational attainment in communities affected by HIV/AIDS.

The well-being of children orphaned by the HIV/AIDS epidemic receives considerable attention. Recent studies using longitudinal data note that patterns of school dropout emerge prior to the death of a parent (Ainsworth, Beegle and Koda, 2005; Evans and Miguel 2004). This change in educational behavior is attributed to shifts in household labor demands and different levels of income and expenditure brought on by the period of illness preceding a parent's death. However, this focus on the direct impacts of parental illness and death overlooks the possibly equally important indirect impact that parental perceptions of the HIV epidemic may have on children's school enrollment. Parents' perceptions of their own health and survival prospects may play an important role in decisions about their children's schooling. If health and survival are becoming more uncertain in the context of HIV, parents may be less willing to invest in human capital formation, in particular the education of their children. For instance, high morbidity during childhood may decrease the returns on schooling by influencing the timing of school entry, attendance patterns, and a child's ability to learn (Alderman et. al 2001). Likewise, high adult mortality may exercise an effect in that a child's schooling may be truncated by the death of a parent (Barnett and Whiteside 2002) or that parents may be less inclined to invest in a child's schooling if they do not expect to live—or expect their child to live—to see the returns on their child's education (Montgomery 2000; Cohen and Montgomery 1998).

The demographic literature posits that as life expectancy increases, parents have greater certainty that their children will survive to adulthood, leading to smaller families and greater investments in the quality of children, in particular through increased educational attainment. Given that the HIV/AIDS epidemic has reversed some health advances in Sub-Saharan Africa (Timaeus and Jasseh 2004), it is plausible that the emergence of the epidemic has led to increasing health uncertainty in affected areas; yet the social consequences of these health

reversals remain under-examined. If parents have inaccurate health and survival expectations or maintain a fatalistic perspective, the time horizon in which they make decisions may shift from the long term to the more immediate future, leading to declines in human capital investment (Montgomery 2000).

Malawi is a good context for examining the association between parents' health uncertainty and their children's schooling because of its moderately high HIV prevalence rates and the pervasiveness of misperceptions about the epidemic. Although HIV prevalence rates are estimated to be around 14 per cent nationally (UNAIDS 2006), survey respondents place prevalence closer to 40 per cent (Anglewicz 2006). Evidence suggests that the majority of survey respondents express a high level of correct knowledge about HIV transmission modes and prevention strategies (Watkins 2004), but overestimate the likelihood of HIV transmission per sexual act. When individuals evaluate their own and others' sexual histories, they overestimate their risk of being HIV positive (Anglewicz 2006). Whether these misperceptions of the epidemic have an impact on household decision-making and social outcomes has not received much attention in the literature; this paper seeks to examine whether parents' health perceptions and uncertainty are associated with children's school enrollment.

Beginning in 1994, the government of Malawi removed school fees at the primary level, which ends at grade eight. Since that time, school participation has increased significantly. Retrospective data from the 2000 Malawi Demographic and Health Survey indicate that over the past twenty years the per cent of 15-19 year old girls who completed four or more years of school almost doubled from 38.2 to 71.4 per cent (Macro 2000). Although there are no school fees through the end of eighth grade, families are still responsible for the cost of uniforms and school supplies. Furthermore, families must consider the opportunity cost of children's school

enrollment, since children could be participating in wage or household labor or offsetting the labor demands created by ill household members (Kadzamira and Rose 2003). Misperceptions of health and survival probabilities may lead to stagnation or decline in school participation rates and educational attainment, as parents use partial or incorrect information about potential health shocks to make decisions about their children's education.

This paper seeks to explore how parents make decisions about their children's education in the midst of the HIV/AIDS epidemic and discern the role that health expectations play in the process. Data will be drawn from two complementary sources: longitudinal data from the Malawi Diffusion and Ideational Change Project (MDICP) collected in 2004 and 2006, and qualitative interviews with a subsample of MDICP respondents that focused on how parents make decisions about their children's education. Considered together, the multivariate analysis and qualitative data will provide a nuanced description of whether parents' health expectations are associated with children's educational attainment and the factors that parents consider during the decision making process. In particular, the analysis will test the hypothesis that greater levels of uncertainty are associated with disinvestments in children's educational attainment. The second hypothesis is that parents respond to information about their HIV infection status by reaffirming their commitment to educate their children, either for fear that no one else would send the children to school in the event of the parent's death or because they believe that having an educated child would be an asset should the parent need help seeking medical care.

Literature Review

Models relating the mortality environment to decisions about the quantity and quality of children assume that parents want to insure that a minimum number of children will survive to adulthood, both to provide care and assistance to the parents when they are old and also to insure

their genetic and social reproduction to the next generation. Even with perfect information about average life expectancy, mortality is a stochastic process with a level of uncertainty about the survival prospects of oneself and one's children (Heer and Smith 1968). Recent cross-national research in sub-Saharan Africa hypothesized that the impact of the HIV/AIDS epidemic on young adult mortality would reinforce the "insurance effect" of fertility. The findings of a recent analysis of 44 countries suggest that the HIV epidemic is slowing the pace of fertility decline and improvements in educational attainment in countries affected by the epidemic (Kalemli-Ozcan 2006). She attributes stalling gains in education, measured by the gross primary enrollment ratio, to both a decline in the resources available to individual children within families with higher fertility and to a lower rate of return on education given higher rates of adult mortality. While Kalemli-Ozcan suggests that changing levels of adult mortality may influence parents' perceptions of their children's survival, she does not consider the extent to which parents' perceptions of their own mortality risks may influence their decisions that affect their children's futures, nor is she able to directly test these hypotheses through her use of ecological data.

In contrast, Soares (2005) considers the impact of both changes in child mortality and adult longevity. While child mortality affects only the benefits of having a large family, improving adult longevity increases the time horizon over which the benefits of investment—human capital or otherwise—can be enjoyed. Greater adult survival also increases the returns on education which encourages greater investment in educational attainment. Although his model uses data from developed countries with improving health conditions, the implications for contexts with health reversals are clear. Increasing adult mortality may have the opposite effect, shortening the time horizon of investment. If parents invest in their children's education as a way to improve the quality of intergenerational transfers from the children when the parents are

elderly, then the parent's lowered likelihood of survival to older ages would lower the motivation to invest in children's education. Likewise, if children are not expected to live long enough into adulthood to realize the returns on their education, parents may decrease human capital investments independent of family size. According to Becker and Tomes (1986), in imperfect capital markets negative income shocks, such as the death of a parent, would not affect investments in human capital, provided that the household had sufficient assets. Therefore, it may be the case that parents' health expectations may have a more significant effect in poor families or communities.

While these models of household decision-making imply that perceptions of survival probabilities influence demographic and human capital outcomes, the majority of recent analyses depend on the mortality experiences of the household rather than perceptions of mortality risk. Although a significant literature examines the relationship between HIV and fertility (e.g. Gregson, Zaba and Hunter 2003; Rutenberg, Biddlecom, and Kaona 2000; Setel 1995), the majority of literature on the effect of HIV on children's education is restricted to the outcomes of orphans. Recent research utilizing longitudinal data and fixed effects models finds that parental death has a significant effect on educational attainment (Case and Ardington 2006; Case, Paxton and Ableidinger 2004; Yamano, Shimamura and Sserunkuuma 2006), although effects are most commonly found for older children. Furthermore, longitudinal studies in Tanzania and Kenya found that school dropout often occurred *prior* to the death of the parent (Ainsworth, Beegle, and Koda 2005; Evans and Miguel 2004), most likely due to changes in the household income, increased expenditures on health, and shifts in labor demands following the onset of the parent's illness. Young (2005) notes that in South Africa school enrollment among 7 to 15 year olds remained constant throughout the 1990s, despite the rise of the epidemic. From his models, he

concludes that increased mortality due to HIV/AIDS leads to a scarcity of adult labor, which may increase the wages of those who survive the epidemic. Therefore lower educational attainment of orphaned children will be offset at the population level by economic conditions that encourage investments in child quality. While the evidence shows that parental deaths have a significant effect on educational outcomes, all of these studies focus on a comparison of orphans and non-orphans. None of these studies empirically evaluate whether variations in parents' perceptions of the epidemic may be associated with differences in educational outcomes among the population of non-orphaned children, even though some of these studies (e.g. Ainsworth, Beegle, and Koda 2005) acknowledge that such a relationship may exist..

Parents' health perceptions and the direction of influence on human capital investments take on profound importance when parents misestimate their risk of HIV infection or mortality. Social learning models theorize that individuals and families deal with uncertainty by collecting information about the mortality experiences of friends, family, and other members of their community (Montgomery and Casterline 1996). During mortality transitions, there may be a lag between the onset of mortality change in a community and the recognition of improved (or worsened) survival amongst community members, given that information collected from social network partners may be inaccurate and imprecise (Montgomery 2000). Information about community HIV prevalence and personal risk of infection is particularly subject to social network influences. Several studies have shown quantitatively and qualitatively that individuals' assessments of their own risk of HIV infection are strongly influenced by the risk perceptions and levels of worry among social network partners (Kohler, Behrman, and Watkins 2007; Smith and Watkins 2005; Helleringer and Kohler 2005; Anglewicz 2006).

In Malawi, knowledge about the transmission of HIV/AIDS is nearly universal (Watkins 2004), but it is precisely this knowledge of risk factors that leads individuals to overestimate their own likelihood of infection. Despite the fact that HIV testing services are increasingly available in Malawi, individuals estimate their likelihood of infection by their understanding of their own risk behavior. Recent work has shown that men base perceptions of their HIV-seroprevalence on knowledge of their own sexual behavior and on their perception of community HIV prevalence, whereas women make an assessment of their husbands' fidelity and the degree of worry about AIDS among their social network partners (Anglewicz 2006); these personal judgments lead to an overestimation of HIV prevalence. Furthermore, Kaler (2004) identifies two main perspectives on individual efficacy and AIDS risk among adult men in rural Malawi: an agency perspective, where individuals believe that it is possible to lower one's risk of HIV, and an inevitability perspective, such that individual actions are pointless and one's chances of becoming infected with HIV are out of one's control. The "inevitability perspective" is of particular concern, because it is precisely what may influence parents when they are making decisions that affect their families' future, such as their children's education.

Using a mixed methods approach, this paper will examine whether a relationship exists between parental health expectations and perceptions of community HIV prevalence and the educational outcomes of children in rural Malawi. Multivariate analysis of longitudinal data from the MDICP will provide the direction and significance of the relationship and the qualitative data will be used to illustrate the heuristics that parents use to think about the future.

Data and Methods

This paper will draw from two sources of data: the 2004 and 2006 survey rounds of the Malawi Diffusion and Ideational Change Project (MDICP) and qualitative interviews collected

by the author in Mchinji district, Malawi, during the summer of 2006. The MDICP is a longitudinal survey, collecting data in three rural districts in Malawi: Rumphi in the north, Mchinji in the central part of the country, and Balaka in the south. The sample includes approximately 1,500 women and their husbands who have been followed since the first survey round in 1998, although this analysis focuses exclusively on the 1,037 women who were interviewed in both 2004 and 2006 and who reported a child aged 6 to 16 years old in 2006. Data from men is omitted from the present analysis in order to simplify the analysis and because men may be less reliable in reporting about their children (Grant and Yeatman, n.d.). Cases are also omitted when the respondent, or spouse of the respondent, is age 18 or younger. Although children, especially older adolescents, are likely to exert significant agency in decisions about when to leave school, this analysis focuses on the role of parental perceptions of the HIV epidemic (For a detailed examination of adolescent agency and educational decision-making in Malawi, see Poulin 2006.).

The analysis focuses on the 2,480 children aged 6 to 16 years old who were identified in the 2006 MDICP family roster. Respondents were instructed to list all household members plus any biological children who were not regular household members. In most cases, these are adult children of the respondent who have migrated for work or marriage. However, 12 per cent of biological children aged 18 and younger are not regular household members. While some of these children may have also migrated for work or marriage, it is also possible that they migrated for education. Many secondary schools in Malawi have boarding facilities where students stay during the academic year or during examination periods. There is also a pattern of child fostering in sub-Saharan Africa related to sending children to stay with distant relatives in order to take advantage of better educational opportunities (Lloyd and Blanc 1996). Therefore, the

family roster collected in 2006 provides an opportunity to examine factors associated with school participation for a wider sample of school aged children than is traditionally possible.

Dependent Variable

Logistic regression models will examine the factors associated with whether or not a child was enrolled in school at the time of the survey in 2006. School participation in the MDICP sample does not differ substantially for boys and girls through age 14, at which point more boys than girls remain enrolled in school (Figure 1). However, from age 8 through age 16, girls have a higher mean number of grades completed than do boys [data not shown], indicating that to a large part the gender pattern of school enrollment observed in Figure 1 may be an artifact of girls' more rapid and successful progression through school. Delayed school entry is common, and a substantial number of children do not begin their education until age eight or nine. School participation is relatively high throughout adolescence, such that 85 per cent of 14 year olds were enrolled in school at the time of the survey. However, measurements of current school enrollment may not accurately reflect children's exposure to education. Irregular school attendance is pervasive in Malawi, and a large proportion of adolescents in Malawi are substantially behind the proper grade for age (Davidson and Kanyuka 1992; Hewett 2006).

Recognizing that parental perceptions of the HIV epidemic may have different effects on the processes of school entry and school exit, the regression models are divided by age, examining 6-10 year olds separately from 11-16 year olds. Although the transition from primary to secondary school presents a different set of social and economic challenges, notably the introduction of school fees, this is not a significant issue for this sample; of those 16 year olds who are still enrolled in school, 87 per cent are enrolled at the primary level.

Parental Perceptions of the HIV Epidemic

The regressions focus on three dimensions of health perceptions as measured in 2004: the respondent's HIV testing and infection status at the time of the 2004 survey, the respondent's subjective estimation of her own likelihood of being infected with HIV, and her perception of whether the epidemic will improve or get worse in the future. Table 1 shows the distribution of these variables among the analytic sample comprised of women who were reinterviewed in 2006 and listed at least one 6-16 year old child in the family roster.

The key independent variable records the HIV infection status of respondents in 2004. Following the survey, all respondents were given the opportunity to take a saliva-based HIV test. Results were made available several weeks later at temporary counseling centers distributed across the sample communities. To overcome the endogeneity of result-seeking behavior, the location of counseling centers was randomized and respondents were given a randomized financial incentive assigned at the time of testing that was awarded after HIV test results were received.[1] In the analytic sample of women with a child aged 6-16 years old, 54 per cent of respondents learned that they were HIV-negative and 4 per cent learned that they were HIV-positive. An additional 18 per cent of respondents were HIV-negative and 2 per cent were HIV-positive, but did not return to receive their test results. The remaining respondents were not tested in 2004. According to our first hypothesis, we would expect that the uncertainty of not knowing one's HIV status would be associated with lower school enrolment rates.

The subjective probability of infection is the respondent's perceived likelihood that she is currently infected with HIV. In the analytic sample, 50 per cent of respondents believed that they had no risk of being infected, whereas only 9 per cent of respondents believed that they were at high risk of being HIV positive and 15 per cent were unable to estimate their likelihood of infection. If household decisions are based on inaccurate estimations of their HIV risk and future

[1] For a detailed description of the experimental design and findings, see Thornton 2005.

health, households might prematurely disinvest in children's schooling. According to our hypotheses, uncertainty of one's risk of infection may be associated with lower school participation rates, regardless of the respondent's actual health status, whereas being at high perceived risk should not be associated with a lower school participation rates relative to the children of women with no perceived risk.

Individuals were also asked about whether they thought the HIV epidemic in Malawi would improve or get worse in the future. The majority of respondents, 72 per cent, believed that the epidemic would get worse. Pessimistic attitudes about the future of the epidemic have been associated with greater sexual risk behavior than would have occurred in the absence of a negative outlook (Auld 2003). It is possible that negative or fatalistic impressions about the future of the epidemic in Malawi might influence decisions about children's school enrollment, particularly if parents believe that their children might be at risk of future infection, potentially reducing the returns on current schooling.

Both the subjective probability of infection and the perception of the future of the HIV epidemic in Malawi were measured in the main 2004 MDICP women's survey. Only after the survey was completed were the HIV test administered and the results distributed. Therefore these last two independent variables are unbiased by knowledge of one's actual infection status. Analysis of the data has shown that these measures are uncorrelated with whether or not the respondent received their HIV test results (Bignami et al 2006).

Household and Child Characteristics

In addition to the independent variables related to the hypotheses to be tested, the multivariate analysis also controls for household and child characteristics measured in 2006 that might influence school participation [see Table 2]. The age, squared age, and sex of each child

are included in each of the regressions. The models also measure whether or not the child is a regular household member and whether or not the respondent is the child's mother. Child's health status at the time of the survey was included as a continuous variable ranging from 1, excellent health, to 5, very poor health. Household socio-economic status was controlled by three variables: roof construction material, whether or not the household owns a bicycle, and the respondent's level of education. Finally, the models also control for the district in which the respondent lives.

Model Specification

The multivariate analysis focuses on whether adult perceptions of the HIV epidemic are associated with current school participation. Nested logistic regression models (Tables 3 and 4) are used to evaluate the association between children's school participation and the three uncorrelated measures of parental perceptions of the HIV epidemic, controlling for household and child characteristics. These models allow us to take advantage of the full sample, with standard errors adjusted for household clusters of children. As discussed earlier, the results are presented separately by child's age, with the results for 6-10 year olds presented in Table 3 and the results for 11-16 year olds presented in Table 4.

Qualitative Data

Findings from the multivariate analysis are supplemented by qualitative interviews collected in Mchinji district from a sub-sample of MDICP respondents in 2006. Qualitative interviews were collected from 60 adults aged 25-50 who were the parent of at least one child aged 6 to 18 years old at the time of the 2006 MDICP.[2] The respondents were randomly sampled from MDICP respondents who had completed the 2006 survey until a sufficient number of eligible respondents had been identified. All interviews were collected in Chichewa, the local

[2] At the time of this draft, 20 interviews have been fully coded and analyzed using NVivo software.

language, by trained interviewers who also translated and transcribed the interviews in the field. The average interview lasted for 40 minutes. Interviewers were instructed to ask parents about (1) the educational history for each child in the household (e.g. current school enrollment status, age at school entry, grade progression, age and grade at school exit), (2) how they decided how much education each child should receive, (3) their own health expectations, and (4) the health expectations that they had for their families. The interviews vary in the extent to which each of these themes was explored. In order to avoid the possibility of leading questions, the interviewers were not told that I was interested in whether risk perceptions of HIV/AIDS were considered by parents as part of the education decision-making process. However, a substantial number of respondents made the connection spontaneously during the course of the interview. These qualitative data cast light on how parents think about the HIV epidemic and future health uncertainty. They will provide insight into how uncertainty about the future and perceptions about risk may factor in to the statistical associations found in the models discussed above. Furthermore, they help us understand the value that parents place on education in rural Malawi.

Results

Table 3 presents the multivariate models of the likelihood of current school enrollment among 6-10 year olds. The addition of the key independent variables to the model had only negligible effects on the significance or odds ratios of the control variables; therefore the baseline model restricted to only household and child variables is not shown. As would be expected, age has the strongest effect on school participation, with older children much more likely to be enrolled in school. The respondent's education has the strongest significant positive effect, such that the odds of being enrolled in school among children who lived with a woman who attended primary were 2.3 times greater than the odds of being enrolled for children who

live with a woman who had never attended school. The child's health status also had a significant effect, such that the likelihood of being enrolled declined with deteriorating health. Finally, children in Mchinji district were significantly less likely to be enrolled. This is consistent with the qualitative data collected in Mchinji, where parents frequently stated that children don't need to be enrolled in school until age 10. These findings are consistent across all three models.

In addition to the household and child variables, each model also includes the respondent's HIV testing and infection status. This variable is not significantly associated with the school enrollment of 6-10 year old children. Model 2 introduces the respondent's subjective probability that she was infected with HIV at the time of the 2004 survey. Children living with women who expressed a high or uncertain likelihood of infection had significantly lower odds of being enrolled in school as compared to children living with women who thought they were at no risk of being infected. Although we expected that uncertainty about one's infection status would be associated with lower levels of school enrollment, we hypothesized that high perceived probability of infection would have no effect. Our finding to the contrary suggests a need to rethink what high subjective probabilities of infection mean. Rather than assuming that individual reporting high probabilities are able to concretely estimate their risk of infection, it may be fruitful to consider high subjective probabilities of infection as a type of uncertainty. If individuals base this estimate on an appraisal of their or their spouse's behavior, this variable may reflect an ongoing health concern, even if the respondent learned that she was HIV negative in 2004. One case from the qualitative data illustrates this relationship:

> I: What is giving you worry?
> R: What is giving me worry is that we're two, and you can't know how your husband is moving [i.e. sexual behavior] and your group of Let's Chat comes with counselors. So when they came to test us, my [husband] refuses. I only go for testing myself, so I have worry, why does he refuse, it means he has such ways. It's where I get worried…This worry will come to an end if I will go for

> testing for almost three or four times, being not found as one of the victims then I can't have worry, but now am worried a lot; I have big worry, because I have just gone for testing, maybe I am in the window period. (Female, 29 years old, 2 children)

It is possible that households where adults have greater uncertainty about the future may be more hesitant to send children to school at younger ages. If the age of school entry is seen as being somewhat flexible, families who are uncertain what the future will bring may want to postpone the expenses associated with school, such as textbooks and uniforms, as long as possible or until a point where they have more information about future conditions. Model 3 add a measure of the respondent's perception of the future of the HIV epidemic in Malawi. Like the variable for HIV testing and infection status, this variable had no statistical significance.

Table 4 presents the multivariate models of the likelihood of current school enrollment among 11-16 year olds. Although it is possible that these models are capturing periods of temporary withdrawal from school, for the most part they can be read as models of school dropout. Other than living in Rumphi district, the largest positive association with school enrollment among older children is being a household member. This indicates that the biological children of the respondent who live elsewhere are less likely to be enrolled in school than children currently living within the household. Although many children do migrate for education, in general living away from home leads to lower school participation for adolescents and youth. There was also a positive association between school enrollment and being the child of the respondent. Amongst children who are not the child of the respondent, the most common relationship is to be the respondent's grandchild. Unfortunately, the family roster does not allow us to tease out whether a child's mother lives in the household or is alive elsewhere if the respondent is not the child's mother. Therefore, it is impossible to know whether we are observing a schooling disadvantage among orphaned or foster children, whether there are confounding effects of living in an extended family household, or whether there is reporting bias

among respondents who are not the child's mother. As with the models for younger children, poorer health is also associated with a lower likelihood of school enrollment.

In these models, respondents who had received their HIV test results in 2004 had children who were significantly more likely to be enrolled in school. Due to the rural nature of the sample, HIV prevalence as measured by the MDICP is slightly lower than national estimates, and amongst the respondents in this analytic sample prevalence is 6.5 per cent. Therefore, the majority of respondents who received their HIV test results learned that they were HIV-negative. Many scholars believe that knowing that one is HIV-negative will lead to changes in sexual behavior because individuals will want to act in order to remain negative (Boozer and Philipson 2000; Coates et al. 2000). Knowing that one is HIV-negative also provides a sense of security about the future and may encourage individuals to consider more long term investments, such as extending the duration of children's school enrollment.

Surprisingly, older children living with a respondent who learned that she was HIV-positive had the highest odds of being enrolled in school relative to those who were not tested. This unexpected finding is consistent with our second hypothesis that individuals with poor health expectations would be motivated to invest in their children's education. We also find support for this hypothesis in the qualitative data. Respondents frequently cited the role of education in helping children become self-sufficient in the event that either parent should die.

> If a child is educated we say s/he has found his/her parents there, her mother, her father, are there…Even if you die, you don't even worry. (Female, 35 years old, 4 children)

> I saw it is wise for this child to start school so that s/he should not meet the problems that I have met myself. I want this child to get educated…while I am still healthy and also when I am still finding money so that this child should not face difficulties but should finish well in school. (Male, 39 years old, 3 children)

> If a person is attacked by this disease, HIV, and you have children who are still at school, you have to encourage them to continue with their schooling, so that in the future if their father is dead, they have to stand on their own (Female, 40 years old, 8 children)

In addition, parents often mentioned the possibility that an educated child could find paid employment and therefore be able to provide more resources for an ailing parent.

> This [father] has HIV/AIDS, his sons should finish school so that they can help their father who is sick and help themselves in their own life…They will find a job after finishing school and they will send money to their father who is sick, and they will also be able to buy things for their own daily life. (Female, 40 years old, 8 children)

> There is no point for children to not continue with school because their parents have got HIV and also the parents are still alive and maybe the children will drop out of school when the parents are all dead, they will drop out because of lack of support; but if the parents are alive and although they are sick there is need for the children to continue with school because if the parents die they will leave the children and not that the children will die with them (Female, 40 years old, 4 children)

> I: Don't you think that this child will be a little bit disrupted in his education just because his father is HIV positive?
> R: Yes, uh, but not that much, because the father will put much effort on his child now that he is near to die, uh, and that child, he will make sure that he goes up to form four, uh, so that in the future he stands on his own after his father is dead, uh, and if his father is still alive then he will help him in buying food and other things for him…the father has AIDS, uh, and when he dies he will leave his son behind, maybe to his relative who will not treat him well. So he must finish school and be able to stand on his own. (Female, 32 years old, 3 children)

These last responses also reveal parents' fears that other relatives would be unable to provide adequate care for their children. These concerns reinforced their own commitment to ensuring their child's enrollment in school while such matters were still under their control. Parents who recently learned that they were HIV positive may be most motivated of all to ensure that their children stay in school as long as possible, particularly older children who might be able to complete primary or begin secondary school while their parents are still living and before the respondent becomes sick.

Model 2 introduces the indicator of the respondent's subjective probability of being infected with HIV. Amongst older children, those who live with a respondent who does not know the likelihood that they are infected are significantly less likely to be enrolled in school than when the respondent reports that she is not at risk of being HIV positive. Although some

individuals who are unable to estimate their likelihood of infection may choose not to report their perceived status out of embarrassment or fear, it is likely that many of these individuals may actually be too uncertain about their status to make any report at the time of the survey. An inability to assess the present may preclude their ability to make decisions about the future. Model 3 examines the respondent's perception of the future of the epidemic. As with younger children, this indicator was not significant.

Discussion

For both older and younger children, respondents with greater uncertainty were associated with a lower likelihood that their children would be enrolled in school. HIV testing removes a considerable amount of health uncertainty from people's lives, and for those older children whose mother had received her HIV test results in 2004, it was significantly associated with a greater likelihood of being currently enrolled in school. The fact that there was no significant association between HIV testing and school participation among younger children suggests that learning about one's HIV infection status may have a more important role in determining the duration of schooling, rather than whether or not a child will enter school. In Malawi, almost all children attend school, even if only for one or two years. For both older and younger children, our analyses found that uncertainty as measured by one's subjective likelihood of infection was associated with lower levels of school participation, controlling for knowledge of one's HIV infection status. This indicates that an ability to interpret one's HIV risk profile may have important implications for making decisions about education and other investments with significantly delayed returns.

Our findings also support our second hypothesis, which proposed that individuals respond to information about their infection status by increasing their commitment to educating

their children. This association only appears to be the case amongst older children, with the greatest association found amongst children who lived with a woman who learned that she was HIV positive. A high subjective probability of infection was actually associated with lower levels of school participation amongst younger children and was not significant for older children. In this case it was not high perceptions of risk but actual concrete knowledge of infection status that was associated with greater investments in schooling. The qualitative data supports this interpretation, that women who could anticipate future health shocks had rational motivations for insuring that their children attended school for as long as possible. In contrast, women with high levels of uncertainty about the future were less likely to have children enrolled in school. While the qualitative data consistently point to parents using education as a form of insurance for themselves and their families, parents who do not have concrete information about their future health prospects may not have the incentive to make this investment. When parents learn that they are HIV negative, they know that their investment in their children's education is secure, while parents who learn that they are HIV positive are motivated by concern for their children's future well-being. Parents who did not learn their HIV status have neither the perceived security of receiving the returns on their children's education nor the sense of immediacy motivated by knowledge that they may soon become incapacitated by AIDS.

Nonetheless, it is not clear whether the association between women's perceptions of their HIV risk and children's school enrollment is causal. Although the independent variables were measured two years prior to children's school enrollment, these measures may still be endogenous. In this analysis, health uncertainty was significant, controlling for household socio-economic indicators and the respondent's level of education. However, this may not control for

unmeasured characteristics of the respondent or the household that may lead to both an inability to estimate subjective probabilities of infection and lower school participation rates.

It is unclear whether receiving one's HIV test results is also endogenous to children's school enrollment. The test results were disseminated within an experimental design that was intended to remove the endogeneity of result-seeking behavior. This analysis does not instrument for receiving test results, which may bias the regression analysis. Furthermore, a much higher percentage of women in the analytic sample received their HIV test results than did the MDICP sample as a whole (63 and 39 per cent, respectively). It is possible that knowing (or not knowing) one's HIV status may influence sample attrition in ways that have not yet been explored in this dataset. Furthermore, it is possible that living in a household with dependent children may have made respondents more likely to have sought their HIV test results, a relationship that was not considered in the experimental evaluation (Thornton 2005).

Despite these caveats, this analysis has important implications for HIV policy and prevention strategies. These findings support recent policy discourse that encourages HIV testing as a prevention strategy. Although testing is normally encouraged because of assumptions that individuals will modify their sexual behavior in order to preserve their HIV-negative status or to protect their sexual partners if they are HIV-positive, this analysis points to other social consequences of knowing one's HIV status. In countries affected by the epidemic, campaigns to learn one's HIV status may have implications for school participation rates, particularly in light of recent international campaigns for universal primary school enrollment.

Furthermore, this analysis indicates an important indirect effect of the HIV epidemic on children's school participation. Analyses that focus exclusively on the educational outcomes of orphans will underestimate the true consequences of the epidemic. Given that it was uncertainty

about HIV infection status that was negatively associated with school participation, school enrollment may also be enhanced by public education programs that reinforce HIV transmission modes and prevention strategies. Exposure to public health campaigns may help individuals understand their own risk profile, providing better information when making decisions about the future.

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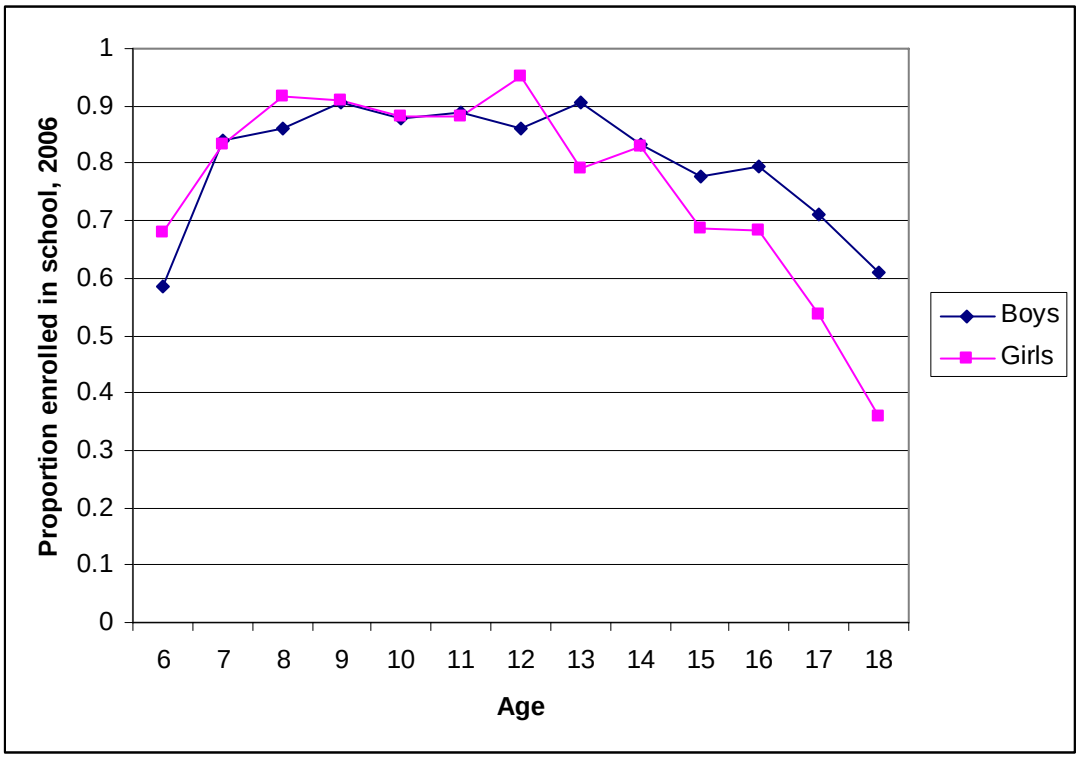
Figure 1. Current school enrollment, 6-18 year olds, 2006



Source: Malawi Diffusion and Ideational Change Project

Table 1. Perceptions of the HIV epidemic, women, analytic sample, Malawi Diffusion and Ideational Change Project, 2004

Independent Variable	**Per cent**
HIV testing results	
Not tested *	14.6
Did not receive results – Negative	19.6
Did not receive results – Positive	2.2
Received results – Negative	59.3
Received results – Positive	4.3
Subjective probability of infection	
None *	50.1
Low	18.6
Medium	7.5
High	9.8
DK	14.0
Perceived future of HIV epidemic	
Better*	13.6
Same	6.4
Worse	74.1
DK	6.0
N	1037

* Indicates omitted variable in multivariate analysis

Table 2. Descriptive characteristics of children aged 6-16 years old, Malawi Diffusion and Ideational Change Project, 2006

Variables	6-10 year olds	11-16 year olds	Total sample
Dependent variable			
Enrolled in school (%)	83.0	82.7	82.8
Child characteristics			
Female (%)	52.7	51.1	51.9
Age (mean)	8.0	13.4	10.7
Child regular household member (%)	94.0	85.0	89.5
Child's health status (range 1-5, mean)	2.0	1.9	2.0
Respondent and household characteristics			
Roof material (%)			
Metal sheet/sisal tile *	16.3	18.1	17.2
Thatch	83.5	81.7	82.6
Other	0.2	0.2	0.2
Household owns bicycle (%)	58.2	63.6	60.9
District (%)			
Balaka *	35.1	32.8	33.9
Mchinji	33.2	31.9	32.5
Rumphi	31.7	35.3	33.6
Respondent is child's mother (%)	88.7	84.4	86.5
Respondent's education (%)			
None *	33.5	35.1	34.3
Primary	60.8	60.2	60.5
Secondary	5.4	4.7	5.0
Higher	0.2	0.1	0.2
N	1,180	1,286	2,466

* Indicates omitted variable in multivariate analysis

Table 3. Logistic regression (odds ratios), current school enrollment, 6-10 year olds, Malawi Diffusion and Ideational Change Project, 2006

Variable	Model 1	Model 2	Model 3
Female	1.19	1.17	1.16
Age	51.20***	56.61***	58.33***
Age Squared	0.80***	0.79***	0.79***
Child is regular household member	1.25	1.25	1.25
Child's health status	0.70***	0.69***	0.69***
Roof material (ref. Metal sheet/sisal tile)[1]			
Thatch	0.85	0.88	0.88
Household owns bicycle	0.93	0.94	0.95
District (ref. Balaka)			
Mchinji	0.49***	0.50**	0.50***
Rumphi	1.48	1.49	1.52
Respondent is child's mother	1.32	1.37	1.37
Respondent's education (ref. None)[2]			
Primary	2.34***	2.30***	2.31***
Secondary	2.02	1.93	1.95
HIV testing results (ref. Not tested)			
Did not receive results - Negative	1.18	1.18	1.19
Did not receive results - Positive	1.15	1.27	1.26
Received results – Negative	0.82	0.81	0.81
Received results – Positive	1.01	1.13	1.16
Subjective probability of infection (ref. None)			
Low		0.79	0.78
Medium		1.03	1.03
High		0.60*	0.59*
Don't Know		0.63*	0.63*
Perceived future of HIV epidemic (ref. Better)			
Same			0.80
Worse			1.04
Better			1.27
Number of obs	1,180	1,180	1,180
Pseudo R2	0.1406	0.1465	0.1520

* p<0.10 ** p<0.05 *** p<0.01

[1]The category "Roof material-other" predicts failure perfectly and is dropped from the model.

[2]The category "Respondent's education-higher" predicts failure perfectly and is dropped from the model.

Note: Standard errors are adjusted for 783 household clusters of children.

Table 4. Logistic regression (odds ratios), current school enrollment, 11-18 year olds, Malawi Diffusion and Ideational Change Project, 2006

Variable	Model 1	Model 2	Model 3
Female	0.81	0.80	0.80
Age	1.68	1.61	1.68
Age Squared	0.97	0.97	0.97
Child is regular household member	2.39***	2.45***	2.44***
Child's health status	0.82*	0.81**	0.81*
Roof material (ref. Metal sheet/sisal tile)			
Thatch	1.45	1.45	1.47
Other	0.39**	0.26**	0.27**
Household owns bicycle	1.62**	1.58**	1.56**
District (ref. Balaka)			
Mchinji	1.01	0.95	0.96
Rumphi	2.78**	2.59**	2.62**
Mother is respondent	1.54*	1.55*	1.54*
Female respondent's education (ref. None)[1]			
Primary	1.88**	1.82**	1.81**
Secondary	1.34	1.16	1.14
HIV testing results (ref. Not tested)			
Did not receive results - Negative	1.64	1.56	1.54
Did not receive results - Positive	1.27	1.36	1.35
Received results - Negative	2.43***	2.32***	2.28***
Received results - Positive	4.23**	4.48**	4.31**
Subjective probability of infection (ref. None)			
Low		0.95	0.95
Medium		1.48	1.46
High		0.94	0.95
Don't Know		0.59**	0.60*
Perceived future of HIV epidemic (ref. Better)			
Same			1.16
Worse			0.89
Better			0.66
Number of obs	1,286	1,286	1,286
Pseudo R2	0.143	0.1493	0.1507

* p<0.10 ** p<0.05 *** p<0.01

[1]The category "Female respondent's education-higher" predicts failure perfectly and is dropped from the model.

Note: Standard errors are adjusted for 730 household clusters of children.