



**Consortium for Research on
Educational Access,
Transitions and Equity**

**The Health and Education Benefits of Universal
Primary Education for the Next Generation:
Evidence from Tanzania**

**Ricardo Sabates
Jo Westbrook
Jimena Hernandez-Fernandez**

**CREATE PATHWAYS TO ACCESS
Research Monograph No. 62**

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**University of Sussex
Centre for International Education**



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List of Acronyms

CPD	Continuing Professional Development
CREATE	Consortium for Research on Educational Access, Transitions and Equity
DHS	Demographic Health Survey
ESR	Education for Self Reliance
GER	Gross Enrolment Rate
LOI	Language of Instruction
MOEC	Ministry of Education and Culture
SAP	Structural Adjustment Programme
SSA	Sub-Saharan Africa
TANU	Tanganyika African National Union
UPE	Universal Primary Education

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Preface

This research monograph explores the relationships between changing patterns of educational access for mothers and the effects of this on infant mortality and the access enjoyed by children of these mothers in Tanzania. This is of considerable interest because infant and child mortality remain much higher in poor countries than in rich though many of the causes are well known and preventable. It is also of concern to establish whether more educated mothers are more likely to assure access to education to their own children and thus be part of a virtuous circle of causation that can help achieve the goals of education for all.

Tanzania has experienced two large scale pushes towards universalising access to basic education over the seven year primary school cycle. The first of these in the late 1970s was driven by the commitments of the Arusha declaration and Education for Self Reliance. The gains in participation made were impressive but were compromised by the recession of the 1980s and dwindling political commitment. Since 2002 a new momentum has been unleashed and it appears that large enrolment gains over a short period of time are being sustained. These achievements have come with concerns about growing numbers of overage children and of declining quality.

This paper confirms that for the beneficiaries of the first wave of educational reform do appear to have benefitted from lower infant and child mortality though the evidence is suggestive that there was a lag effect such that those who were schooled several years after the reforms when there had been time for them to mature may have benefitted most. It also seems to be the case that mothers who were marginalised by lack of education saw their position worsen relative to those with more education over time. Evidence on gradients of child mortality is mixed and needs further study but at the very least is suggestive that what should have been happening – lowering of mortality with higher educational levels of mothers - has not necessarily occurred.

The paper is a good example of how some of the insights that can be gained from the ideas CREATE has developed in its changing patterns of access work can be applied. It remains essential to extend this kind of analysis to establish if the claims and patterns of causation linked to Education for All and achieving the Millennium Development Goals stand up to empirical analysis.

Keith Lewin
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Summary

For the past three decades, as a result of international agreements on international development and educational goals, governments in less developed countries have adopted policies to increase the participation of children in education. In particular, education has been made compulsory, at least at primary level, fees have been abolished, new school programmes have been established and initiatives to increase teacher recruitment and accelerate teacher training have been introduced. Although the intentions of such initiatives are positive, educational systems with constrained resources are not able to cope adequately and immediately with the unprecedented increase in the demand for schooling. Hence, it is uncertain whether such policies are likely to have long-term impacts on individuals and their families.

This paper focuses on whether increasing women's education as a result of Universal Primary Education in Tanzania in 1977-78 had further impact on reducing child mortality and improving children's educational access for women most likely to be affected by this reform. The paper is innovative in that we draw on two contrasting methodological approaches, the one informing the other in an interactive process. We first provide a detailed historical account from the existing literature of the educational initiatives and events leading to the first wave of UPE in Tanzania in 1977-78. This historical information in turn provides the basis for the selection of four specific cohorts of women spanning 14 years in the 2007 Demographic Health Survey (DHS) data.

The first cohort contains women aged between 45 and 49 years in 2007. This is the oldest cohort of women, who were aged between 15 and 19 during the main UPE push in 1977-78. It is unlikely that these women were affected by the UPE reform. The second cohort contains women aged between 40 and 44 in 2007. These women were aged between ten and 14 during the UPE reform of 1977-78 and hence it is likely that some of these women were affected by this reform, in particular the youngest ones. The third cohort corresponds to women aged 35 to 39 in 2007, who were aged five to nine in 1977. These women were also likely to be affected by the UPE reform and it is likely to contain the main target group of the reform, seven and eight year old children in 1977. Finally, women aged 30 to 34 in 2007, who were aged zero to four in 1977, experienced the post 1977-78 UPE reform. This last cohort started education at least three years after the 1977-78 reform.

We then asked the question: what are the potential health and educational changes observed in the children of these four cohorts of women? In particular, and given the outcomes that can be measured in the dataset, we estimate whether there are reductions in child mortality or improvements in educational outcomes for children of mothers who were more likely to be affected by the 1977-78 reform compared with children of mothers not affected by the UPE reform.

There are three key results of this paper. First, the increase in participation in schooling brought on directly by the 1977-78 UPE reform is associated with reduced child mortality and improved schooling access for the children of mothers who experienced the 1977-78 reform after its peak and who were likely to be affected by other social improvements such as better health care provision. It is possible that the potential impacts of reforms take time to settle and for this reason the potential benefits are experienced by the youngest cohort of mothers. One possible reason behind this result is as follows: if the increased school participation was only possible at the cost of overcrowded classrooms, shortage of teachers

and inadequate as well as insufficient learning institutions, then the learning experience of mothers who attended school as the result of the main push for UPE in 1977-78 would not be of adequate quality. An educational experience of this kind, one that does not produce skills, competencies and beliefs for the mothers is unlikely to result in benefits for them, their families and communities. As time passed, and the educational system was able to absorb the shock of the massive increase in participation, then the quality of the learning provision could have also improved. Therefore, the observed benefits of the mothers of the youngest cohort, the ones who experience schooling at least three years after the main reform in 1977-78.

Second, we find increasing differences in educational access for children of women with education and those without education by age cohorts of women. The UPE reform of 1977-78 did not reach 100 percent participation and those excluded were likely to be marginalised. As years progressed, and the post-UPE educational system continued to reach children, those left out became a more marginalised group. This process partially explains why we find these increasing differences in educational access.

Third, we find that the 1977-78 reform seems to be associated with a distortion of the educational gradient for child mortality for the cohort of mothers affected immediately after the introduction of the reform. In other words, children of mothers who participated in education and completed primary education as a result of UPE had a higher mortality rate than children of mothers who did not complete primary education. For the oldest cohort of women, those who were not affected by UPE, the gradient shows that higher child mortality is associated with lower education. For the cohort of mothers who experienced education after the main push for UPE, the youngest cohort, the gradient in child mortality is also inversely associated with the educational achievement of these mothers. The change in the gradient could reflect that the potential benefits of primary school completion were jeopardised by the inability of the system to provide educational quality for those most in need and with the largest educational deficit. Hence, the importance of focusing on the twin goals of increasing access to all children with greater resources given to those in need.

The Health and Education Benefits of Universal Primary Education for the Next Generation: Evidence from Tanzania

1. Introduction

Social scientists and epidemiologists have shown that education has a direct effect on health and educational outcomes, both for individuals who experienced education and those whom they care for. Individuals with higher levels of education are less likely to be obese, tend to have better physical and mental health, and live longer than individuals with low levels of education, even after controlling for income, class and ethnicity (Haveman and Wolfe, 1984; Grossman, 2005). Children of parents with high levels of education do better in standard tests of school attainment than those of parents with less education (Feinstein, Duckworth and Sabates, 2008; Bynner and Joshi, 2002; Feinstein, Robertson and Symons, 1999). Similarly, children of parents with high levels of education have children who are better nourished and healthier than children of parents with less education (Meara, 2001; Alderman, Hentschel and Sabates, 2003; Anderson, Butcher and Levine, 2003).

Most of this evidence has been fuelled by studies from developed countries, where the availability of longitudinal data has made it possible to link measures of educational attainment to different outcomes, both economic and non-economic, for individuals and their families. For example, Sabates and Duckworth (2010) used information from the 1958 British Cohort and the 1947 school leaving age reform, which increased the age of compulsory education from 14 to 15 years, to investigate whether the additional year of schooling for mothers was associated with improvements on their children's relative position on academic and behavioural assessments. Existing studies from developing countries show overall links between maternal education and children's health and educational outcomes (LeVine et al., 2001; Vavrus & Larsen, 2003). However, absent from most research in less developed countries is the potential long-term impact of educational reforms on health and educational outcomes for individuals and their children. This issue is particularly important in sub-Saharan Africa, where enrolment rates in primary education have expanded rapidly in the last three decades (Easterly, 2009).

Increasing the participation of children in education has been an international commitment since the 1990 World Conference on Education for All in Jomtien, Thailand, and the follow up 2000 World Education Forum in Dakar, Senegal. Governments in less developed countries have adopted policies to increase the participation of children in education. In particular, education has been made compulsory, at least at primary level, fees have been abolished, new school programmes have been established and initiatives to increase teacher recruitment and accelerate teacher training have been introduced. Although the intentions of such initiatives are positive, educational systems with constrained resources are not able to cope adequately and immediately with the unprecedented increase in the demand for schooling. Hence, inequalities in progress towards achieving good quality of education still remain between and within countries (Little, 2008a; Lewin and Sabates, 2011)

One important question that this raises is whether policies to universalise primary schooling can have long-term effects for individuals and societies. One may argue that overcrowded classrooms (Little, 2008b), linked to absenteeism and drop out (Hunt, 2008), and low quality educational provision (Alexander, 2008) suggests the impossibility of long-term benefits for children who experience such education. Still, we take the view that it may be possible to realise benefits from education, perhaps not immediate or accrued to the individual, but

gained for future generations. In light of this argument, this paper focuses on whether the increase in women's education, that resulted from the Universal Primary Education (UPE) reform in Tanzania in 1977 is related to reduced mortality and improved educational access for their children.

The paper is innovative on its methodological approach in that we first provide a detailed historical account of the events leading to the first wave of UPE in Tanzania in 1977-78. This information provides the basis for the selection of cohorts of women in the 2007 Demographic Health Survey (DHS) data who were likely to be affected by the UPE reform. The paper then overcomes the shortcomings of using cross-sectional data by focusing on the birth histories of women to calculate the proportion of children under the age of five who have died by the mother's 30th birthday. Unfortunately, lack of control variables and small proportions in under five mortality, severely limit the possibility of undertaking multivariate analysis. Hence, using the same sample of women, we further investigate the conditional relationship between women's education and their children's educational access.

Our operationalisation of children's educational access has strong foundations in the CREATE model developed by Lewin (2007). In particular we differentiate between children who are enrolled in education but over the appropriate age-in-grade from those who are in education at the correct age-in-grade. Hunt (2008) and Sabates et al. (2010) have shown that being overage is a precursor or sign that the child is likely to drop out from school. In addition, over age entry and progression delays primary school completion to ages where boys and girls may be subject to growing pressure to contribute to household income and to enter into marriage (Lewin, 2007). We also compare these children with those who are out of school, either because they have never enrolled or because they have dropped out.

Our starting premise is that parental education and children's educational access over time in Tanzania have shown a slow but steady increase since the 1940's in contrast to steeper but more recent increases in comparable countries (Sabates and Hernandez, 2010). Our paper provides further understanding of the impact of UPE on the cohorts of women affected by this national initiative and how it worked out over time. To achieve this, the results of this paper are discussed in the light of the historical events of UPE and other reforms that were in place in Tanzania in the late 1970s. It is also hoped that this paper casts light on the shape and potential benefits of the second wave of UPE from 2002.

The paper is organised as follows. Section 2 describes the historical background of Tanzanian educational system post independence. Section 3 introduces the data, variables and estimation methods to be used. Section 4 provides the results and finally section five presents the discussion of the findings and conclusions.

2. Historical Background

Formal and non-formal education in Tanzania was greatly expanded post-independence under Prime Minister Nyerere's socialist policy of Education for Self Reliance (ESR) in 1967. Unlike other West African countries, Tanzania went into independence with no substantial financial reserves, so Nyerere's government needed to choose priorities carefully (Williams, 2009). Therefore, creating a literate adult population was seen as having an immediate effect on rural economic development whereas the impact from increasing enrolment in primary schools would not be felt, according to Nyerere, for up to twenty years (Kinunda, 1974; Mushi, 1994; Williams, 2009). A mass mobilisation plan was therefore put in place in 1971 with the aim of eradicating illiteracy within four years (Kinunda, 1974). The spread of adult literacy classes in the rural areas was characterised by being based in primary schools reconceptualised as community learning centres, with a staged curriculum that focused on literacy and numeracy but also included political, community and agricultural education and assessed through a literacy test. Health education was incorporated into adult education and supplemented by being taught at village health centres, hospitals and dispensaries (Odokara, 1976). Learning was aided by radio broadcasts and by the growing use of Kiswahili as the Language of Instruction (LOI), once the language of rebellion used by Nyerere's Tanganyika African National Union (TANU) (Brock-Utne & Halmsdottir, 2004). Primary school teachers, volunteers and former pupils were the teachers, albeit with little formal training in andragogy. The whole system was organised through ward, district and regional committee structures with separate officials for primary and adult education. Post-literacy programmes were developed in the 1970s to maintain literacy levels (Mushi, 1994).

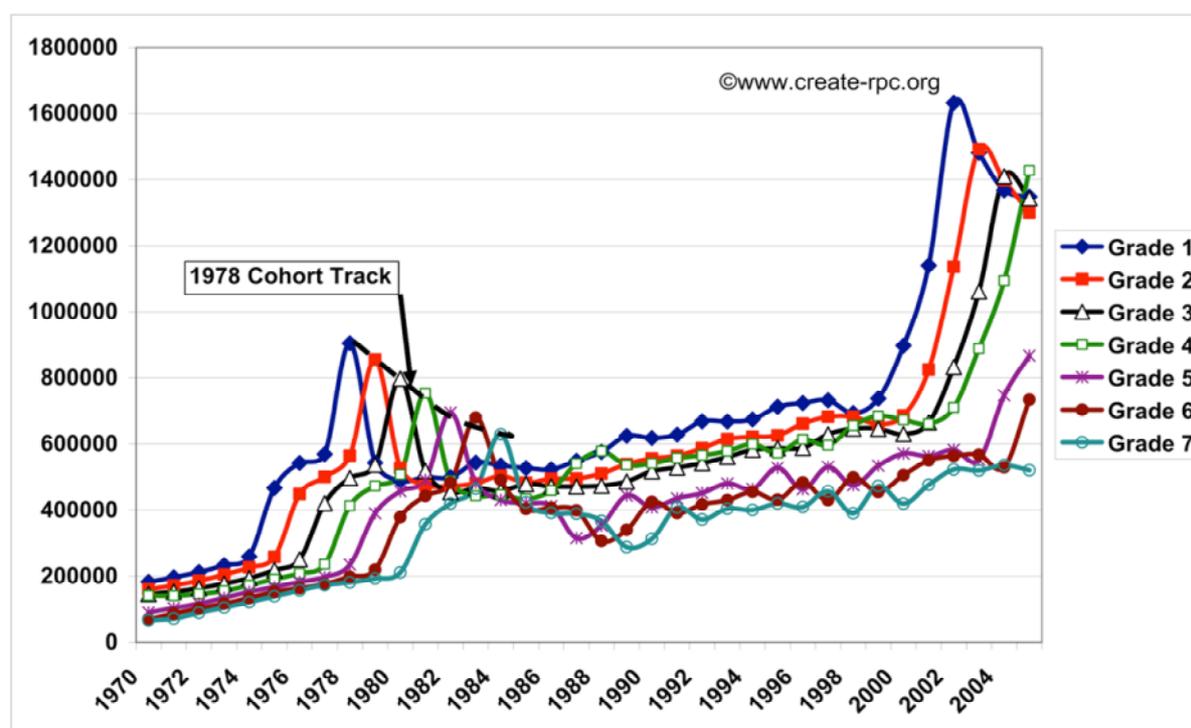
Due to ESR, illiteracy levels dropped from 69 percent in the late 60's to 9.6 percent in the mid 1980's – even when Tanzania was experiencing slow economic growth (Mushi, 1991 & 1994). An evaluation made in 1976 saw Tanzania as being 'the only country [within English-speaking Africa] which had a national policy decision on a determined political will to promote out-of-school education as an essential component of the formal school system' – and which included realistic financial support (Odokara, 1976:6). This mass literacy movement formed the backdrop to the first wave of UPE of the 1970's.

The Musoma Resolution of 1974 underpinned the goal of achieving UPE by 1977. Nyerere envisioned primary education in the same way as adult education - as providing skills for a communal, rural existence and an end in itself. As far back as 1970 the barrier of the Grade 4 examination taken at the end of the fourth year of primary school, had been removed, allowing the majority of students to progress onto Grade 5 (Kinunda, 1974). Grade 7 was seen as the 'terminal' or final stage of education rather than as a transition point to secondary school. There was a range of indigenous education systems such as community schools known as 'Kwamisi' schools in an attempt by the socialist government to avoid a north to south educational transfer (King, 1983). The curriculum put a large emphasis on teaching agriculture, health and life skills with participatory and child centred pedagogies encouraged in teacher training (Taylor and Mulhall, 1997; O-saki and Agu, 2002; Barrett, 2008). The starting age was raised from five to seven so that children would be old enough to be economically productive once they had finished primary education (King, 1983). Subsequently, only 1-2 percent of students progressed onto secondary school through regional quotas, the smallest proportion in the world with the state providing employment for the few secondary graduates (Wedgewood, 2007). Kiswahili became the LOI in primary schools, formalised later in the Education and Training Policy of 1995 (MOEC, 1995) (Brock-Utne and Halmsdottir, 2004). Even while the cognitive level of instruction may have

been low, Tanzania was unique in using what was for many students their mother tongue or indigenous language commonly spoken in the environment (Puja, 2001). English, however was the LOI in secondary school and continues to be so, leading to an impoverished learning environment at this level (Brock-Utne and Halmsdottir, 2004; Trudell, 2009).

The year 1977/78 has been described as ‘the UPE year’ by King (1984) with a massive cohort made up of 901,770 students, the majority of whom were overage and only 15 percent age 7. King calls this a ‘staggered’ form of UPE that continued in this form for a couple of years. As indicated in Figure 1, 140,000 of the first 1978 UPE bulge cohort had dropped out by 1980 (King, 1984). In fact, by 1982 only 542,418 enrolled in Grade 1 – so enrolment was already going down even while the gross enrolment rate (GER) reached 98 percent. Significantly, King argues that the full effects of UPE could not be known until that first ‘bulge’ of 1977-8 had passed through the school system and flattened out. He points to 1984 as a key year in this respect.

Figure 1: Enrolment by Year and Grade in Tanzania



Source: Lewin, (2009)

Data from Figure 1 shows a convergence and stability in those who have enrolled by 1984. All cohorts within our study were in school at this point, with the highest enrolment rates of those in Grade 5, 6 and 7. This seems to be one indicator of the ‘success’ of the 1977 UPE year, maintained for around four years. Retention of those in Grades 1 to 4 continued to rise, up until the steep increase of the second wave of UPE from the late 1990s onwards.

In order to meet the demands of higher student enrolment arising from UPE, teacher recruitment, training and deployment had to be rapidly reorganised. At independence the entry qualification for all teachers rose to two years of secondary education and in 1967 to four years with two years training. The Primary Education Reform Kwamsisi Project of 1970 was designed to further raise the competence of 10,000 teachers. The first Distance Teacher Training Programme began in 1976 for Grade 7 or 8 leavers training for two days a week in

ward-based training centres and teaching for three days a week in lower primary (Malewo, 1992). As UPE was being implemented, there was already a cadre of relatively well-trained teachers with junior secondary school qualifications in place in primary schools.

In 1977 teacher training for the basic grade of primary teachers changed to a one year 'crash' programme for those with only primary education to cover teacher shortages following the implementation of UPE. Seen as a 'golden age' by some professionals, some of these 'UPE' teachers recruited had a sense of vocationalism and stayed in teaching, with the most experienced teachers teaching the lower grades of primary then, as now. The perception of teaching as aiding national development is echoed in studies of teachers today even while the status of teaching as a career has lowered since UPE (Towse et al., 2002; Barrett, 2008). On-the-job experience and Continuing Professional Development (CPD), sometimes through regional Teacher Resource Centres, may have made up for their poor initial qualifications and proved to be as useful. But by the end of the 1970s there was still a shortage of 45,000 primary school teachers despite the considerable achievement of UPE (Malewo, 1992). The quality of education was undoubtedly declining rapidly (Towse et al., 2002).

3. Methods

3.1 Data & Sample Selection

Data for this paper came from the 2007 Tanzania Demographic Health Survey (DHS). The data are nationally representative of the population. A two-stage sample selection procedure was followed and appropriate weights were derived for the DHS data, which we use in our empirical analyses.

One of the key methodological innovations of the paper is the link between historical events and information from respondents of the DHS data, which in our case are women aged 15 to 49 who were most likely to be affected by the 1977-78 UPE reform. As described in Section 2, a large proportion of children of all ages were enrolled in schooling in response to the push for UPE. Hence, there was not a single cohort of children who was affected by the policy reform. A second issue to consider is the lack of precision about children's age in SSA. Children may be sent to school when they reach a certain height or when parents feel they are ready for school as opposed to enrolment at certain age (Lewin, 2007). This issue contributes to the difficulty of isolating children who were affected by the UPE reform in 1977 as overage and underage children could have started schooling in 1977. In addition, DHS data contain information on women aged 15 to 49 in 2007. Only women born between 1963 and 1972 could have been affected by the policy. Women born before 1963 would have been too old to return to primary schooling whereas women born after 1973 would have been too young to start primary education. For these reasons we divided the data according to four age cohorts (see Table 1).

Table 1: Women's Age Cohort

Mother's Cohorts	Age in 2007 (DHS data set)	Age during 1st wave UPE	Likely school level during UPE according to their age
1	45-49	15-19	secondary-postsecondary
2	40-44	10-14	primary-secondary
3	35-39	5-9	not in education - primary
4	30-34	0-4	not in education

The first cohort contains women aged between 45 and 49 years in 2007. This is the oldest cohort of women, who were aged between 15 and 19 during the main UPE push in 1977-78. It is unlikely that these women were affected by the UPE reform. The second cohort contains women aged between 40 and 44 in 2007. These women were aged between ten and 14 during the UPE reform of 1977-78 and hence it is likely that some of these women were affected by this reform, in particular the youngest ones. The third cohort corresponds to women aged 35 to 39 in 2007, who were aged five to nine in 1977. These women were also likely to be

affected by the UPE reform and it is likely to contain the main target group of the reform, seven and eight year old children in 1977. Finally, women aged 30 to 34 in 2007, who were aged zero to four in 1977, experienced the post 1977-78 UPE reform. This last cohort started education at least three years after the 1977-78 reform, after the peak in participation had started to flatten out (King, 1984).

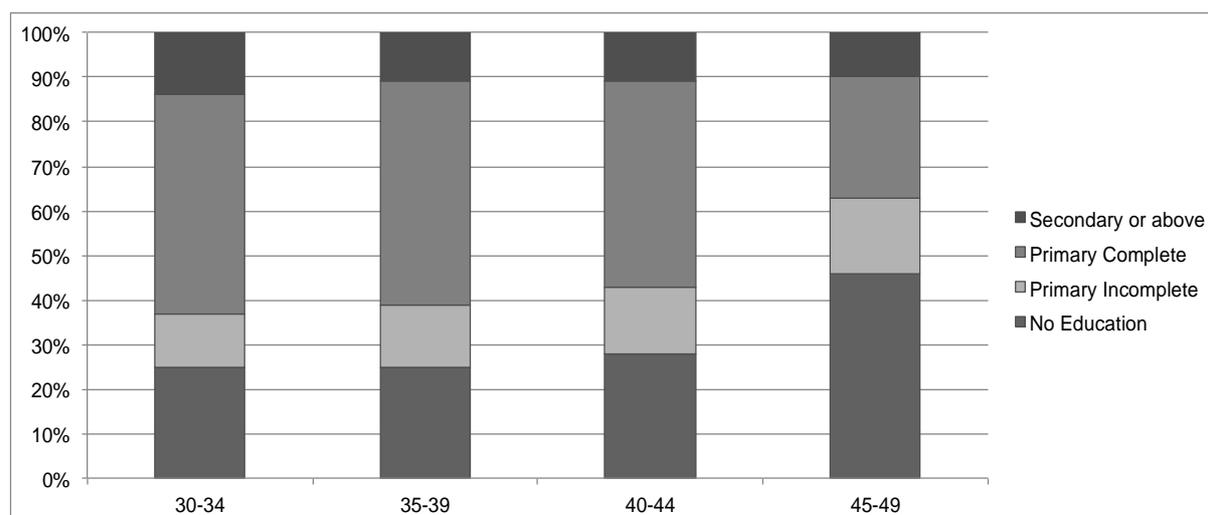
Figure 2 shows the level of education completed according to women's age cohort in the 2007 Tanzania DHS. While nearly 46 percent of women aged 45 to 49 had no education, this percentage decreased rapidly to 28 percent for women aged 40 to 44 in 2007. As we highlighted above, women aged 40 to 44 were likely to have been affected by the 1977-78 UPE reform, being ages 10-14, and this is confirmed by the substantial increase in the proportion of women who have achieved at least some education. This also confirms the staggered nature of the patterns of enrolment with the high initial enrolments of 1977-78 consisting of children and adolescents between seven and 14. For women aged 35 to 39, who would have been in the 'target' age band of 5-9 in 1977-78, we continue to see a reduction in the proportion of women who did not have education, decreasing to only one quarter of women for this third cohort. Interestingly, this proportion remains unchanged for women of the youngest generation, indicating a saturation point at which there appears to be 25 percent of children who did not benefit from the post-UPE conditions, as they did not enrol.

A second interesting observation from Figure 2 is the proportion of women who completed primary school according to age cohorts. The large increase in women's participation in education after 1977-78 was translated into completion of primary education, although a significant proportion still dropped out without completing primary school. For example, 46 percent of women aged 40 to 44 years in 2007 completed primary schooling compared with only 27 percent of women aged 45 to 49. Similarly, nearly half of women aged 35 to 39 completed primary schooling and this percentage remained almost unchanged for the youngest cohort of women (those aged 30 to 34 in 2007).

Those who were aged 10-14 in 1977-78 gained almost as much as those who appeared to be the main target for enrolment i.e. those aged 5-9 in 1977-78. Those who were 0-4 and who therefore went to school in the early 1980s and secondary school from 1986 to 1990 also benefited so that the positive effects of UPE were felt over a cohort span of 14 years. However, the youngest cohort shows a slight decline in completion and incompleteness rates of primary education, reflecting the sharp drop in enrolment rates from the early 80's as the poor quality of the UPE schools began to show poor rates of return for parents. What is very apparent, however, are the benefits that accrued between the oldest cohort of women age 45-49, who were aged 15-19 in 1977-78, and the leap in enrolment and completion rates for those just four years younger than them.

Finally, the transition into secondary schooling started to change for women of the youngest cohort. Only around 11 percent of women aged 35 and above in 2007 achieved secondary schooling or above qualifications. For the youngest cohort this percentage increased to 14 percent. While this remains low, the push for UPE increased the desire for secondary education with private secondary schools opening, especially in the Kilimanjaro region, although this increased regional and urban/rural inequality (King, 1983; Vavrus, 2002; Mbelle & Katabaro, 2003).

Figure 2: Distribution of Educational Attainment by Women’s Age Cohort



Source: Tanzania DHS 2007

3.2 Selection of Variables

3.2.1 Outcome Variables

Child mortality is an important variable to take into consideration in our study. As the literature has suggested, mother’s level of education is directly associated with child mortality (Adetunji, 1995; Uchudi, 2001) and indirectly via secure access to prenatal care (Jewell, 2009), adequate nutrition (Semali, 2010), better housing and medical services, among other channels (Adetunji, 1995, Houweling et al., 2007, Colclough, 1982, Caldwell and McDonald, 1982). Although most empirical studies point to the importance of education for reduced child mortality, there are some examples where this is not the case (Hobcraft, 1993; Macassa et al., 2003).

We used information on birth histories provided in the DHS data to generate child mortality. Since women in the sample are at different stages of their life course, we truncated child mortality by women’s age 30. For the oldest women, those age 49, only children born before 1988 were considered. We also truncated the age of the child to obtain child mortality by age five. Children who died after the age of five were not considered in the estimation of the outcome variable. The ratio of children under the age of five who have died by the time the mother is 30 relative to the number of children born by the time the mother is 30 is our indicator of child mortality.

Table 3 shows the average number of children born before women’s 30th birthday and the proportion of children who died before the age of five according to women’s age cohort. From the oldest to the youngest cohort, there has been a slight reduction on the average number of children, indicating perhaps a delay in child rearing and/or reduction in overall family size. This result is consistent with Vavrus and Larsen (2003) who investigated the drop in fertility rates in Tanzania over time. We also find a reduction in the proportion of children under five who have died by the time their mother was 30. Interestingly there is a clear reduction in the proportion of children who have died for the two youngest cohorts of women, only one of which was directly affected by the 1977-78 UPE reform. For these two youngest cohorts, the proportion of children under five who have died by the time the mother was 30 was 12.2 percent for women aged 35 to 39 in 2007 and 9.7 percent for women aged

30 to 34 in 2007. For the oldest two cohorts the proportion was around 14 percent.

Table 2: Total Number of Children and Proportion of Under Five Children Who Have Died by Women’s 30th Birthday by Women’s Age Cohort

Women's Age Cohort	# of Children by Age 30	% Under 5 Children Death
30-34	3.032	0.097
35-39	3.129	0.122
40-44	3.149	0.141
45-49	3.241	0.138

Source: Tanzania DHS 2007

The different characteristics of the health system when giving birth may also explain differences in child mortality shown in Table 3. In the late 70’s the Tanzanian health system was severely affected by the economic crisis and the subsequent government response with the Structural Adjustment Programme (SAP). The health budget had to be decreased creating many problems in terms allocations of resources. According to Lugalla (1995) the government found it difficult to maintain its priority on rural health care and preventive health care and unable to establish more health facilities and to recruit health personnel. By 1996 the health care system had to be decentralised (Semali, 2010). This reform improved health system conditions overall while the health service management was reorganised; the drug supply system was strengthened, especially with changes on the immunisation programmes. With donors’ support, immunisation campaigns were expanded vertically from the health centres, to clinics and dispensaries. Finally by 2004 the government implemented a number of reforms and integration of health programmes that improved the accessibility to health care.

It is likely that the first cohort of women gave birth before the public sector reform in the mid 90s. The second and the third cohort are the more likely to be affected by the decentralisation of the health system while the fourth cohort could have experienced the changes after the 2004 phase. One interesting conjecture that can be made here is that this fourth and youngest cohort may have reaped multiple benefits from starting school in the post-peak-UPE phase, receiving health education at school and reaching childbearing age at the introduction of the 1996 health reforms.

Although the outcome “child mortality by mother’s age 30” sets the situation of these women at a particular point in their lives (when they were 30), most cross-sectional data usually contain very limited information over the life course. Hence, cross-sectional studies do not provide data on events that happened prior to an outcome such as the one that we constructed here. For the particular case of the DHS data, women in the sample recorded their socioeconomic and demographic information at the time of the survey, which was in 2007. Hence, factors such as household wealth, social class or family structure reflect the situation of women in 2007 and not at the time of the outcome (by 30). Only time invariant information, such as child gender, mother’s place of birth, or child’s place of birth, are known to happen prior to the outcome of interest. In this respect, the role of women’s education in predicting child mortality by the mother’s 30th birthday is particularly interesting. If one assumes that the attainment of educational qualifications for women affected by the 1977-78 UPE reform happened during childhood, then maternal education can be used to predict child mortality for women under 30. Although adult education programmes were important in the

years prior and post the UPE reform, these programmes had different qualifications and tests from formal primary education. Hence, we can support the above assumption.

A second limitation for the use of under five child mortality as an outcome is the prevalence within the population of interest. In this paper our population of interest is women aged 30 to 49 divided into four age cohorts (4,015 women in total). Within each age cohort, our focus is on the relationship between women's education and child mortality. 35 percent of women in this age group had suffered the death of a child before they were 30. We are able to estimate under five child mortality by age cohort by educational attainment, but any further disaggregation significantly reduces the confidence that we can have for the estimated prevalence.

For these reasons, we propose to use children's educational access as an additional outcome to investigate the possible intergenerational benefits of the UPE reform. Following the CREATE model of educational access (Lewin, 2007), all children aged seven to 15 years, whose mothers belonged to the four age cohorts of interest, were classified according to whether they were out of education, in education but over age for the grade they were enrolled by three or more years, or in education at the appropriate age-in-grade. As mentioned before, overage is one of the precursors of school drop out (Hunt, 2008; Sabates et al., 2010; EPDC, 2009). In addition, Lewin and Sabates (2011) have shown that although the proportion of children in school has increased in Sub-Saharan Africa in the last decade, so does the proportion of children who are in school but participate with much younger children. In Tanzania, where the official age of entry into school is seven, children aged ten enrolled in Grade 1 were considered over age by three or more years. Notice, however, that the dataset only yields age in terms of whole years. It is therefore better to think of the category three years over age as "between 2.5 and 3.5 years over age".

Table 4 shows the proportion of children aged seven to 15 according to the classification of educational access by the age cohort of the mother. The oldest cohort of mothers, pre-UPE reform, has the highest proportion of children aged seven to 15 not in education (20 percent) and a slightly higher proportion of children in education over age by three or more years (13.2 percent). The educational access of children whose mothers who belonged to the middle cohorts, hence mostly affected by the 1977-78 UPE reform, are almost identical according to the proportions shown in Table 4. Finally, 18.3 percent of children whose mothers belonged to the youngest age cohort were not in education and 8.3 percent were over age. It would appear that those mothers who were in the post UPE period and who went to school in the early 1980s, past the 'golden' age of UPE, nevertheless benefitted from their primary school education through the greater decreases in the number of their children not in education and therefore a higher percentage of their children in education and not overage, in particular when compared with women not affected by UPE.

Table 3: Educational Access of Children’s Aged 7 to 15 According to Mother’s Age Cohort

	Mother's Age Cohort			
	30-34	35-39	40-44	45-49
	%	%	%	%
Children Not in Education	18.3	19.5	19.3	20.0
Children Over Age in Education	8.3	10.4	10.7	13.2
Children in Education	73.4	70.1	70.0	66.7
Total # Children	1,697	1,957	1,389	998

Source: Tanzania DHS 2007

3.2.2 Additional Control Variables:

DHS data contain socio-economic, demographic and regional information that can be used to deepen our analysis. Having identified the four age cohorts of women, their educational attainment, their child mortality by age 30 and the educational access of their seven to 15 year olds in 2007, we can also use the structure of the household, family size, family wealth and location in 2007 as important factors that can determine whether children participate in education or not.

We highlighted above that this information was recorded in 2007, hence it reflects the current situation of a household and says nothing about the contributing factors. The implication of this is that we are unable to posit a model where factors that happened prior to the achievement of educational qualifications are used to established how much of the relationship between mothers’ education and children’s outcomes is due to the inclusion of these variables. In other words, we are unable to deal with the endogeneity of women’s education that is due to observable factors. On the other hand, we may be able to suggest that the relationship between women’s education and children’s outcomes is channelled via family structure or wealth, as we can assume that the achievement of education happened during childhood and hence prior to events in adulthood. Unfortunately, DHS data contain little information about the parent-child relationships that are extremely important channels for the transmission of educational success across generations (Feinstein, Duckworth and Sabates, 2008). With DHS data we are able to establish the conditional association of women’s education and children’s educational access. This relationship is conditioned on observable factors such as family structure, location, gender and age of the child.

3.3 Estimation Method

We use bivariate analysis to estimate whether the relationship between women’s educational attainment and child mortality differs between cohorts of women. Since there is very limited information about the life course of women in the sample, we are unable to undertake multivariate analysis.

For the case of children’s educational access we use multivariate analysis to estimate the conditional relationship of women’s education with their children’s educational access. The main aim is to estimate whether there are changes in the relationship between mothers’ education and children’s educational access between the four cohorts of women. The main

emphasis of the estimation is on parameters that measure the associations not only between cohorts of women but also across the educational attainment of women.

The estimation method proposed depends on the nature of the outcome variable and the assumptions made about the error term. Our outcome variable contains three categories, children who are not in education, children who are in education but who are three years or more over age for their grade and finally children who are in education at their appropriate age in grade. Given an underlying level of educational inclusion between children who fall into each of these categories, we could treat this as an ordered outcome. Assuming that the error term is normally distributed, then an ordered probit model is the suggested method to estimate the parameters of interest. The assumption of the ordering of the outcome variable is based on the theoretical framework of an expanded vision of educational access and zones of exclusion developed by Lewin (2007).

To estimate parameters of the model, we include the full interaction between mother's age cohorts and mothers' educational attainment. With four age cohorts and four levels of education, the interaction between these variables results in 15 parameters to be estimated and one used as reference category. Using women from the oldest cohort without education as reference category, the estimated parameters measure whether children of the rest of the women have higher or lower probability of educational inclusion relative to children of mothers in the reference group. We use these estimated parameters to further test whether the difference in the likelihood of educational access between children of mothers with some educational credentials and those without education are greater or smaller in the oldest cohort relative to the rest of the cohorts. These are the parameters of interest of this paper.

4. Results

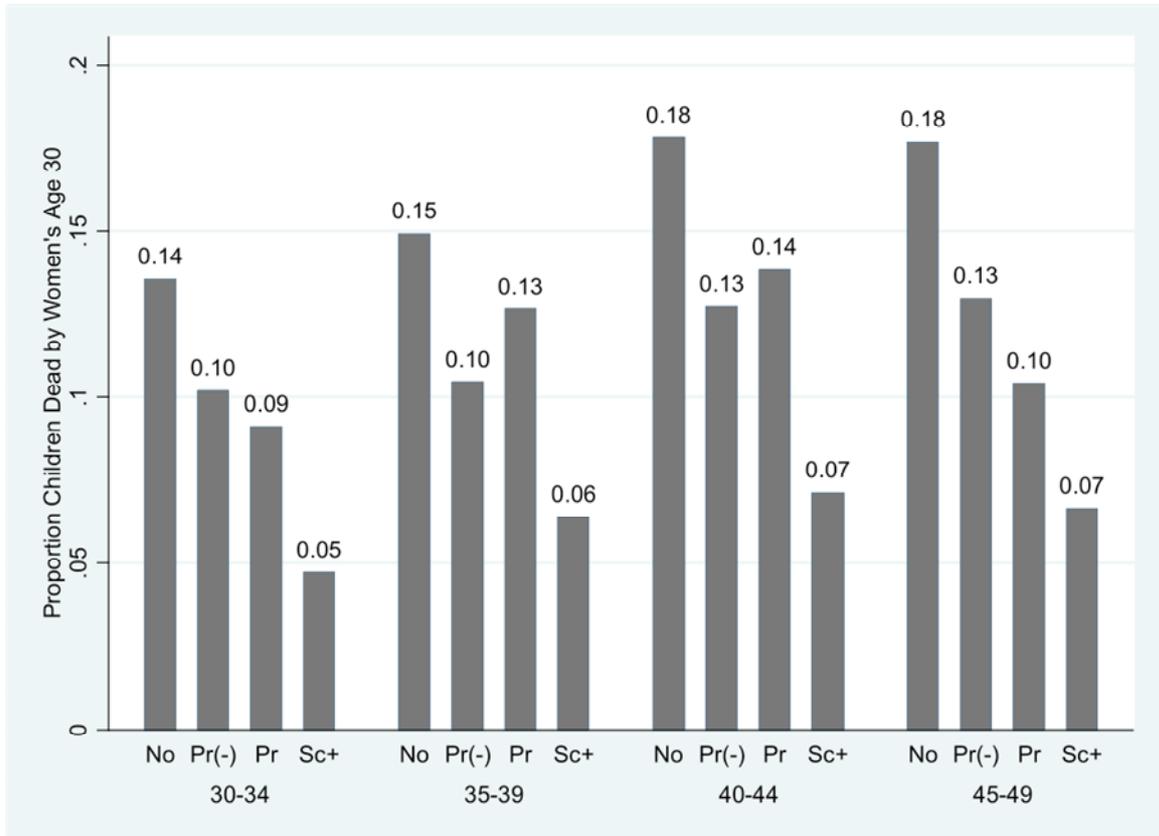
4.1 Women's Education and Child Mortality

Our first result indicating the binary relationship between women's education, mother's age cohort and the proportion of children who have died by women's' 30th birthdays is shown in Figure 1. Over time, under five child mortality has decreased regardless of the educational qualifications of mothers. Mothers in the youngest cohort, who were giving birth in the late 1990s and early 2000s, have lower chances of suffering the death of a child than women in the oldest cohort, who were having children in the mid 1980s. This can be related with changes in the access to health care and immunisation after the 1996 reform as other studies have posited (Semali, 2010).

The interesting finding from Figure 2 is the distortion to the educational gradient in under five child mortality that is related to the cohort of women mainly affected by the 1977-78 UPE reform. Obviously, the existence of the educational gradient is not something that we see as a positive outcome in this study. Quite the opposite, it will be desirable to eliminate such a gradient. Still, our results show that for women aged 45 to 49 in 2007, there is a clear educational gradient with respect to under five child mortality. We found that 18 percent of children of women with no education died before the age of five; 13 percent of children of women with incomplete primary, ten percent of children of women with complete primary and seven percent of children of women with secondary or higher educational qualifications died before the age of five. However, for women aged 40 to 44, who were tangentially affected by the 1977-78 UPE reform, the educational gradient in under five child mortality was distorted. In particular, women in this age cohort who had completed primary schooling had a higher proportion of children who died before the age of five (14 percent) than women of the same age cohort who did not complete primary education (13 percent). This is a small and non statistically significant result. Nonetheless, for the previous cohort, the one not affected by the UPE reform, the difference in mortality for children whose mothers had completed primary schooling (10 percent) was lower and statistically significant than for those whose mothers had incomplete primary schooling (13 percent).

Looking into the results for women aged 35 to 39 in 2007, who were also affected by the 1977-78 UPE reform, we also found a distorted educational gradient with respect to under five child mortality. Although child mortality for this cohort has reduced compared with the older cohort, mostly due to improvements in provision of health services, the proportion of children of mothers with completed primary schooling who died before the age of five was still relatively high (13 percent). Child mortality for women of this age cohort with primary education is higher than for women with incomplete primary education (13 percent versus ten percent, respectively). The distortion in the gradients for the middle two cohorts of women is interesting in that they may have been disadvantaged by the initial impact of mass enrolment and new teachers necessitated by UPE and so a completed primary education may not at that historical point in time have given positive rates of return. As LeVine et al (2001) point out, years of attendance in school do not correlate with skill acquisition so that attending a few years of low quality education may not produce long lasting, positive effects.

Figure 3: Proportion of Children who have Died by Women’s Age 30, by Women’s Age Cohort and Women’s Education



The post-UPE cohort, those aged 30 to 34, show a clear educational gradient with respect to child mortality. This gradient has an overall reduction for all educational levels compared with the gradient of women from the pre-UPE cohort. The interesting result here is that the gradient for the youngest cohort is flatter than for the oldest cohort. The reduction of the gradient can be linked, as discussed before, to the fact that the youngest cohort experienced both educational and health reforms a few years after their introduction.

4.2 Women’s Education and Children’s Educational Access

Figure 3 shows results from the model estimating the likelihood of children’s educational access focusing on the association of mothers’ educational attainment by mothers’ age cohorts. The estimation of these parameters is conditional on age of the child, gender of the child, region of residence, wealth of the household, household structure, household size and number of children under the age of five living in the household.

As mentioned above, the estimated parameters from a full interacted model of mothers’ educational attainment and their age cohort were used to construct the results shown in Figure 3. The first panel shows all women who had secondary schooling qualifications or above. The estimated parameters are the difference in educational access for children whose mothers had secondary schooling and those whose mothers had no education (by women’s age cohorts). The second panel is for all women who had completed primary education and parameters are measured relative to women who had no education and by women’s age cohorts. The third panel is for women with incomplete primary schooling and parameters are

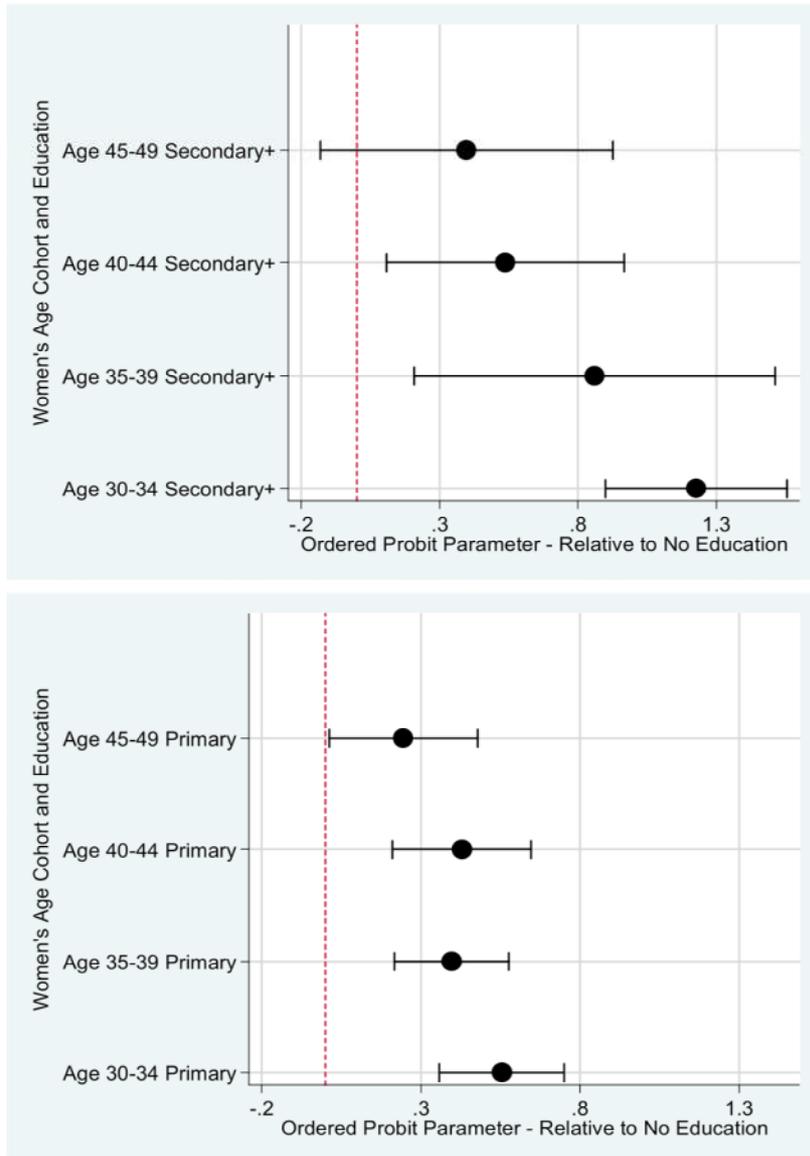
measured as before.

Taking the first point of the top panel, children whose mothers belonged to the pre-UPE cohort and whose mothers had secondary education were more likely to have educational access than children of mothers of the same cohort but who did not have educational qualifications (estimated difference 0.39). The second point is the difference in educational access for children whose mothers were aged 40 to 44 and had secondary education relative to children whose mothers belonged to the same age cohort but had no educational qualifications (estimated difference 0.54). The relative difference between these cohorts is not statistically significant, as shown by the overlapping of the confidence intervals. As we moved to the youngest cohort, we see that the estimated difference in children's access to schooling between children of women who had secondary schooling and children whose mothers had no education is relatively large (1.23). This difference is larger (and statistically significant) than the estimated difference for children of women of the oldest cohort.

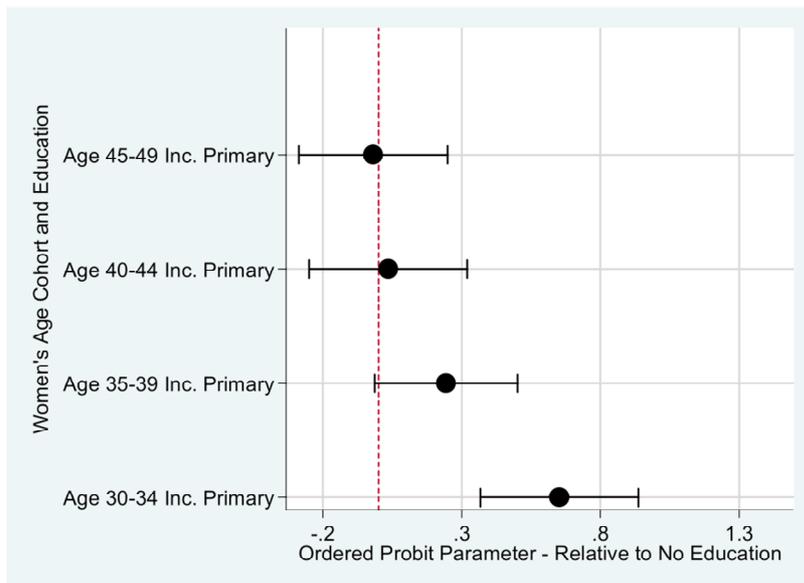
One general pattern described in the top panel of Figure 3 is the increasing differences in the educational access of children whose mothers' had educational qualifications and those whose mothers do not have educational qualifications in each of the four age cohorts. In particular, the difference is greatest for children of the youngest cohort of women, and as we explained above, these women experienced education after the peak of the 1977-78 UPE reform.

Second, we find a relative difference in educational access for children whose mothers had incomplete primary between the youngest and the oldest cohort of women. There is almost no difference in educational access between children whose mothers belonged to the oldest cohort (aged 45 to 49) and who had incomplete primary education and children of the same age cohort whose mothers had no educational qualifications. Contrary to this, children from the youngest cohort whose mothers had some primary education are more likely to have educational access than those whose mothers do not have any education. For children of women who experienced UPE and who achieved some primary education there is no difference in access relative to children of women who belonged to the pre-UPE cohort and who achieved some primary education.

Figure 4: Parameter Estimates of Women's Education Relative to No Education for Each of the Four Age Cohorts



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5. Discussion

This paper set out to investigate the association of maternal education and children's outcomes in Tanzania. In doing so, the paper relies on historical information from the 1977-78 UPE reform in Tanzania, which increased the rate of participation of children in education significantly. This paper is driven by the possibility that the educational experience back in the late 1970s can lead to future benefits in terms of reduced mortality or improved educational access for the next generation (Hummel-Rossi and Ashdown, 2002). We are also driven by the possibility that the benefits of UPE reform can be maximised once the reform has been in place and the system can cope with the massive increase in number of students enrolled. That is, the first cohort of children directly affected by UPE reform may not all receive quality education, complete primary schooling or transit into secondary, but as educational institutions are built, teachers trained, and families encouraged to support their children's education, then potential benefits may be gained.

Influenced by the ideas of educational benefits for improved productivity (Becker, 2006), education for endogenous economic growth (Lucas, 1988) and the social returns to investment in education, in particular at primary schooling levels (Psacharopoulos and Woodhall, 1985) governments in less developed countries have adopted policies to increase the participation of children in education. The Tanzanian case is unique in the sense that efforts were directed not only to reach UPE, but at the same time achieve universal adult literacy (Bown, 2009). The attempt to reach UPE in some extent was successful in the first campaign due to two main factors. First the political and civil society enthusiastic mobilisation that pushed the programme forward; and second, the short term results that the emergency plans such as the recruitment and training of new teachers and the construction of 'temporary' schools produced (Williams, 2009). In particular, education has been made compulsory, at least at primary level, fees have been abolished, and new school programmes have been established. Although the intentions of such initiatives are positive, educational systems with constrained resources are not able to cope adequately and immediately with the unprecedented increase in the demand for schooling, such as the one experienced in Tanzania in 1977-78.

Our results showed that the increase in participation in schooling brought on directly by the 1977-78 UPE reform is associated with reduced child mortality and improved schooling access for the children of mothers who experienced the 1977-78 reform after its peak and who were likely to be affected by other social improvements such as better health care provision. It is possible that the potential impacts of reforms take time to settle and for this reason the potential benefits are experienced by the youngest cohort, as suggested by King (1984).

In addition, UPE reform did not reach 100 percent participation and those excluded were likely to be marginalised. As years progressed, and the post-UPE educational system continued to reach children, those left out became a more marginalised group. This process partially explains why we found increasing differences in educational access for children of women with education and those without education by age cohorts of women. The close link between education and earnings may mean that during a time of slow economic growth in the late 1990s, those with social and economic resources to avoid falling behind may have the capacity to benefit from their education while those without it fall behind.

For both outcomes, our results show a clear gradient based on the educational level of

mothers. The 1977-78 reform seems to be associated with a distortion on the educational gradient for child mortality for the cohort of mothers affected immediately after the introduction of the reform. In addition, we did not find differences in educational access for children of women who went to school during the peak of the UPE reform and those who were too old in 1977 to be affected by the reform.

Perhaps this latter result is not surprising. The increased school participation was only possible at the cost of overcrowded classrooms, shortage of teachers and inadequate as well as insufficient learning institutions (King, 1983; Williams, 2009). An educational experience that does not produce skills, competencies and beliefs for individuals is unlikely to result in wider benefits. A positive learning experience should produce a wide range of social and communication skills as well as improve individuals' perceptions of themselves, such as of their own abilities, worth and identities (Schuller et al. 2004). It is likely that overcrowded classrooms, irregular teachers' attendance, lack of teaching materials and inadaptability of teaching methods to deal with over age and mixed ability groups, made it impossible for teachers to deliver a positive learning experience for children (Alexander, 2008; Little, 2008b). This, combined with the problems faced by children at home in terms of household responsibilities, lack of parental support, financial difficulties, which cause irregular school attendance, severely limits the development of skills and competencies (Lewin, 2009).

It is important also, that children who now have access to school actually stay. Rates of enrolment in Tanzania continued to rise in parallel with completion rates over the period from 1984 to 1998 before the second wave of UPE. One can conjecture that despite the abrupt falls immediately after the first wave of UPE, the mass enrolment, coming on the back of the adult education initiatives, was accompanied by a change in Tanzania whereby parents expected their children to go to primary school and to stay there, providing a broader societal base for the second wave in 2002.

Several initiatives in 2002 reflect a development of approaches taken in the 1977 UPE. Compulsory enrolment of all children including overage children, a community approach to primary schooling, the adoption of the Child-Friendly Schools strategy, alternative approaches to schooling for marginalised children and their parents and increased academic requirements for teachers have contributed to unusually high primary enrolment and completion rates in the region (Mrutu et al, 2005; Hakielimu, 2007). The Secondary Education Development Plan of 2004 was planned to meet the new demands for secondary education and avoid the regional inequalities and privatisation of secondary schools associated with the 1980's. But it is yet to be seen if it does. Even so, the statistics indicate a similar pattern of high initial enrolment in the year of the reform and then a steep decline in both the 1977 and 2002 UPE initiatives. Learning from history, this pattern need not be seen as an indictment of these policies.

Maintaining current and future UPE on track imply some challenges. Bown and colleagues (2009) suggest that dropouts and push-outs of school have to be monitored by the government. Especially, policy makers ought to have access to sources of information to identify social characteristics that provoke dropout to promptly select a course of action and design an efficient and realistic planning. Also, further public support is needed to maintain the abolition of fees; which means more negotiation with international donors, civil society organisations, local communities and the private sector (Bown, 2009). In addition, the numbers of how many students are enrolled do not say anything about the quality of education they are receiving. The expansion poses in danger quality and in spite in a suitable

learning environment, with appropriate curricula and learning materials and well-trained teachers (Bown, 2009). Finally, another important challenge is reaching the most marginalised (Williams, 2009). For that reason categories of children left-out have to be considered, as gender parity, handicapped, children living in rural and isolated areas, nomadic populations and refugees to provide the appropriate kind of education that encourage them and their families to enrol but at the same time stay at school.

Beyond the scope of the paper are the potential benefits that the educational experience that resulted from the 1977-78 UPE expansion may bring to other areas of individuals' lives and to the society as a whole. It is possible that the entire society gains from what economists refer to as the "public good" aspects of schooling – the gains that all citizens experience because they live in a society where individuals are not able to read and write, and where the educational experience may be enough to raise awareness and promote civic participation (Preston, 2003; McMahon, 2009). We believe these benefits remain largely unexplored and their potential returns may be large. Hence, in the face of limited resources and willingness to provide education for all, policymakers still face the same dilemma: the trade-off between the direct and indirect benefits of policies and the balance between expected and unexpected consequences. Unfortunately, secondary sources of data, which were not designed to respond to policy concerns, will only provide a partial and incomplete answer to future policy planning.

Our results indicate that the investment in education in 1977-78 was not all in vain. We know from historical accounts that the system was not able to cope with such an increase in demand for education and that, for the outcomes analysed here, there is limited evidence that the educational experience is linked to benefits for those who experienced the initial peak of UPE. There are, however, possible benefits to those who experienced education years after the reform. The cautious pace of educational reform in Tanzania was a positive approach to constrained resources during a historical period characterised by slow economic growth but also political stability (Vavrus & Larsen, 2003). Planned as a community-based national initiative in parallel with adult literacy programmes and health reforms, UPE shows accumulated benefits over 40 years for a broad section of its population over successive cohorts of women.

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Report summary:

This research focuses on the importance of increasing women's education as a result of Universal Primary Education and its further impact on improving children's health and educational access in Tanzania. The study uses data from the 2007 Demographic Health Survey for empirical analysis and it is informed by the historical accounts of the Universal Primary Education reform in 1977-78. Empirically, we analyse differences in under 5 mortality and educational access for children of different cohorts of women. Our results show clear gains in reducing child mortality and improving educational access for children of mothers who experienced education a few years after the peak of the 1977-78 UPE reform, that is, once the system could cope with the massive increase in participation and the potential tradeoff between quality and quantity of education.

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Dr Ricardo Sabates is a Senior Lecturer International Education & Development within the Centre for International Education, University of Sussex. His research focuses on the links between education and the uptake of preventative health care and on parents' education and children's outcomes. He has academic publications on issues of child nutrition and on education and crime and the intergenerational transmission of education. He has also contributed to research reports for the UK Department of Education and Skills.

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