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Abstract

This study analyses the status, determinants and strategies for expanding access to secondary education in Kenya. A logit model is used to analyse the factors influencing access to secondary education schooling in Kenya. The main data sources was the 1997 Welfare Monitoring Survey (WMS) III data and selected district level education statistics. Though a bit dated, it is the most recent comprehensive data available. An education policy simulation model provides the framework for evaluating feasible strategies for secondary education expansion. The main determinants of access to secondary education at household level include social and economic characteristics such as income levels, household head's education level, household location (rural-urban), sex and age of child, and accessibility to schools. Strategies for expanding secondary education include: a) physical infrastructure expansion; b) increasing internal efficiency starting with primary education level; c) enhancing efficiency in use of human and capital resources including available teachers and class rooms; d) household economic empowerment; e) adult education and household awareness on importance of secondary education; f) enhancing partnerships in secondary education provision and financing and g) addressing gender and regional disparities. The study argues favourably for expansion of secondary education infrastructure within the Education for All (EFA) framework in order to respond to the increasing demand, and to increase the number of youth with basic skills relevant to the labour market. Quality secondary education should be characterized by strong linkages with the labour market skills requirements and global challenges. The value of the paper is in its innovativeness to empirically estimate factors that determine access to secondary education and simulate resource requirements for secondary school education with the aim of coming up with strategies for improving access.

Abbreviations and acronyms

ASALs	Arid and Semi Arid Lands
EFA	Education for All
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
ESR	Education Sector Review
ESSP	Education Sector Strategic Plan
CBS	Central Bureau of Statistics
GER	Gross Enrolment Rate
GOK	Government of Kenya
GPI	Gender Parity Index
KCSE	Kenya Certificate of Secondary Education
KCPE	Kenya Certificate of Primary Education
KESSP	Kenya Education Sector Support Programme
KIPPRA	Kenya Institute for Public Policy Research and Analysis
MDG	Millennium Development Goals
NER	Net Enrolment Rate
OVC	Orphaned and Vulnerable Children
PRSP	Poverty Reduction Strategy Paper
PTR	Pupil Teacher ratio
UPE	Universal Primary Education
UNESCO	United Nations Educational, Scientific and Cultural Organization
WMS	Welfare Monitoring Survey

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1. Introduction

Secondary education is a critical level in any education system. As a transitional stage to higher education, it is important for economic growth, and helps in socialization and empowerment of youth, who are at risk of unemployment (UNESCO, 2005). It facilitates acquisition of attitudes, skills, and competencies needed in the labour market, and which promote greater civil participation and support further self-development. Studies on poverty analysis and education returns show that although primary education has the highest social returns, the incidence of poverty falls and level of private returns increases with the increase in education level (Oiro, Mwabu and Manda, 2004; Mwabu *et al.*, 2000; Manda, Kimenyi and Mwabu, 2001; Lewin and Caillods 2001; UNESCO, 2005).

Globally, Gross Enrolment Rate (GER)[1] for developed countries is close to 100 percent while those for developing economies, especially in Africa is lower than 50 percent. In 2002/3, for instance, the GER for Europe and South America was 100 percent, and in North America, East Asia and Oceania, the GER exceeded 90 percent (UNESCO, 2005). In those parts of the world, lower secondary school education is universally accessible. In West Asia, lower secondary school GER was recorded at 69 percent in the same period. Africa recorded the lowest participation of less than 45 percent. The situation is even worse in individual developing countries. Kenya, for instance, recorded a low of 29.5 percent GER and 17 percent NER in 2004 (Government of Kenya, undated). In 2003 and 2004 the transition rate from primary to secondary school level was recorded at 42.6 percent and 50.6 percent, respectively. This implies that close to 83 percent of youth aged 14-17 years have no access to secondary education and close to 50 percent of pupils who complete primary education do not

[1] Gross Enrolment Rate refers to total enrolment in secondary education as a percentage of total population aged 14-17 years, while Net Enrolment Rate is secondary enrolment aged 14-17 years as a proportion of population aged 14-17 years at any point in time.

progress to secondary education. This indicates that the efficiency of the schooling system in Kenya is likely to be low due to the high wastage levels.

The low GER and regional and gender disparities in access and participation in secondary school in Kenya can be attributed to the cost sharing policy in financing secondary education in the country (Njeru and Orodho, 2003). This has resulted in high fees and other related levies in addition to the high poverty rates. A study carried out in Sri Lanka established that demand side factors including poverty, direct and indirect costs of schooling, and cultural factors as well as supply side factors such as quality of education affect schooling behaviour of children in the country (Arunatilake, 2004). Whereas it may be assumed that some factors such as number of children of school going age would compete for resources and hence reduce the likelihood oof participating in schooling, Gebreselassie (1998) observed that demand for both primary and secondary schooling in Ethiopia increases with increase in household size and number of secondary school age children (14-18 years). Location of residence (rural/ urban), community characteristics, children's characteristics and marriage systems influence access to schooling differently (Bedi *et al.*, 2004; Holmes, 1999; Brock and Cammish, 1997). Establishment of the influence of such factors in access to secondary education in Kenya is important for policy formulation and identification of areas of focus in interventions. This is one of the objectives of this study, especially as the Kenyan government undertakes initiatives to meet Millennium Development Goals and Education For All.

The focus of education development should look beyond primary education as lack of opportunities at secondary education level is likely to undermine Universal Primary Education (UPE) goals (UNESCO, 2005). In the medium term, the Government's strategic targets for secondary education include increasing transition rate to 70 percent by 2008;

increasing teacher-student ratio from 1:19 in 2003 to 1:35 by 2008; and increasing GER from 29 percent to 45 percent (Government of Kenya, 2003).[2]

The aims of this study are to: (i) analyse the status of secondary education provision; (ii) establish factors influencing access to secondary education; and (iii) identify strategies and policy refroms for expanding secondarry school education.

A number of studies on access to secondary school education have been carried out, the main one being Njeru and Orodho (2003). However, this study is based on descriptive analysis and does not provide information on the impact of each variable on access to secondary school education. This study provides empirical evidence on the determinants of access to secondary education in Kenya using a logit regression analysis and simulates various policy options in order to identify strategies that can improve access to secondary school education in Kenya.

[2] Like other levels of education, set targets for secondary education are articulated in the ERSW&EC, PRSP, ESSP ESR, Sessional Paper No. 1 of 2005, KESSP and international commitments such as EFA and MDGs.

2. Status of Secondary Education in Kenya

The provision of secondary education has changed markedly since independence with the number of schools and students increasing from 151 and 30,000 in 1963 to 4,111 and 926,149 in 2004, respectively (see annex Tables 1, 2 and 3). The growth has not improved participation ratios due to faster growth in number of school age population.

2.1 Gross enrolment rates by province and gender

Annex Table 2 shows the number of learning institutions in Kenya. Secondary schools increased by 49 percent from 2,678 secondary schools in 1990 to 4,111 secondary schools in 2004. Out of the 3,621 public secondary schools in 2004, 0.5 percent were national boarding; 27.2 percent were other boarding; 45.3 percent day schools; and 26.9 percent mixed (day and boarding) schools. This implies that although boarding schooling is popular, most students (approximately 58 percent) in secondary schools enrolled in day schools (Onsomu *et al.*, 2006a). Although the absolute number of schools increased by an annual average of 4 percent, the increase was inadequate to cater for the high number of secondary school age population. In 2004, the aggregate secondary school enrolment was 926,149 students compared with 3.12 million youth of secondary school age.

Table 1 presents trend data on secondary school GER for the period 1999-2004 by province and gender. Overall, secondary GER was estimated at 29.5 percent in 2004 having risen from 26.6 percent in 1991 (Annex Table 4). In general, secondary enrolment rate grew at approximately 1 percent per annum compared with 2 percent average annual secondary school-age (age 14-17) population growth (Government of Kenya, 2002). The regional data indicate a low GER of 4.6 percent in North Eastern Province and a high GER of 44.9 percent in Central Province in 2004, having risen from 40.8 percent in 1999 in Central Province. This implies that only

Table 1: Secondary gross enrolment Rate by province and gender, 1999-2004

Province	1999			2000			2001			2002			2003			2004			2004
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	GPI
Coast	20.3	17.5	18.9	20.0	17.3	18.7	20.0	17.4	18.7	19.3	16.4	17.8	22.7	18.3	18.3	25.8	19.3	22.5	0.79
Central	38.5	43.2	40.8	40.7	42.0	41.3	42.5	44.4	43.5	43.2	45.1	44.2	42.4	46.4	44.4	44.7	45.1	44.9	1.04
Eastern	28.5	27.4	28.0	26.9	26.5	26.7	28.7	27.8	28.3	29.4	28.5	28.9	33.4	32.9	33.1	34.9	32.7	33.7	0.98
Nairobi	23.2	13.6	17.6	19.2	12.7	15.4	15.8	9.7	12.2	13.1	8.1	10.1	16.4	8.7	11.8	27.5	16.3	21.7	0.65
Rift Valley	24.9	19.7	22.3	24.5	19.5	22.1	25.7	21.2	23.5	25.1	20.7	22.9	27.6	24.4	26.0	29.3	24.3	26.8	0.85
Western	28.3	26.4	27.4	27.4	24.9	26.1	25.2	24.9	25.0	26.6	26.2	26.4	28.3	29.5	28.9	31.7	28.8	30.3	0.96
Nyanza	28.8	22.6	25.7	29.7	22.9	26.3	29.2	22.2	25.7	30.0	22.6	26.3	32.4	28.6	30.5	31.9	23.2	27.5	0.75
North Eastern	6.2	2.9	4.7	5.7	3.0	4.5	5.2	3.0	4.3	4.9	2.9	4.0	14.1	2.6	9.0	5.9	2.9	4.6	0.42
Total	27.2	24.3	25.7	26.8	23.6	25.2	27.1	24.2	25.6	27.2	24.2	25.7	29.7	27.4	28.6	31.7	27.3	29.5	0.89

Source: Government of Kenya (undated)

about 5 children out of every 100 school going age youth were enrolled in North Eastern Province. This presents a real challenge in trying to tackle the regional disparities. The Government's aim of raising the GER to 45 percent by 2008 in all provinces requires a well thought out strategy that will not hold back the provinces with higher participation levels.

Gender disparity is evident in access to secondary education and more widespread in transition to secondary school level. In 1990, the Gender Parity Index (GPI) was 0.75, implying that for every 100 boys only 75 girls enrolled in secondary schools (Annex Table 1). This improved to 93 girls for every 100 boys in 2003, before declining to 89 girls for every 100 boys in 2004. Table 1 shows that North Eastern province recorded the highest gender disparities (0.42) in gross enrolments in 2004. However, it should be noted that in Central Province, gender disparity was in favour of girls as the GPI for the year 2004 stood at 1.04. As with GER, it will be important to investigate and draw experience from the provinces where gender parities are in favour of girls, who were initially marginalized, without losing sight of what is happening to the boy-child.

2.2 Transition rate

Transition rate refers to the proportion of a cohort of pupils completing the last grade of primary school cycle and progressing to the first year of secondary school education. It is dependent on favourable assessment in final primary cycle examination that acts as a screening tool because of limited places in secondary schools.

Table 2 shows that in 2004, Central Province recorded the highest transition rate of 59.6 percent and Nairobi the lowest rate of 34.5 percent. The national transition rate in 2004 was 50.6 percent, having increased from 42.6 percent in 2003 and 44.5 percent in 1990. This implies that on average about 49.4 percent of pupils who completed Standard 8 in the year 2003

Table 2: Primary to secondary school transition rates by province, 1990-2004

Province	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Nairobi	79.3	72.7	71.0	28.0	59.6	59.6	38.9	37.0	38.3	29.0	29.6	27.0	32.5	33.5	34.5
Coast	39.7	41.8	48.0	28.0	37.1	35.3	40.7	40.5	35.6	32.6	31.0	33.4	30.4	31.0	52.1
North Eastern	55.6	55.8	49.0	16.0	33.6	39.4	67.4	47.9	48.5	43.2	46.4	52.8	42.9	43.8	44.9
Eastern	44.0	47.5	47.0	35.0	41.3	43.1	40.2	42.2	41.9	38.7	36.3	38.2	47.5	48.9	51.2
Central	46.3	49.8	51.0	44.0	46.8	52.8	51.2	51.9	52.2	46.3	48.6	46.9	57.3	58.5	59.6
Rift Valley	39.3	40.7	40.0	34.0	37.4	40.4	43.2	42.9	39.3	32.9	34.2	37.2	21.1	21.6	41.7
Nyanza	53.8	38.6	40.0	33.0	41.3	43.5	46.6	43.7	46.4	39.4	42.4	50.0	35.4	36.1	47.3
Western	42.0	41.9	49.0	36.0	42.3	45.1	48.8	48.2	54.9	53.2	49.4	51.0	52.6	53.7	55.8
Total	44.5	44.6	46.0	35.0	41.9	50.5	45.2	44.9	45.0	39.9	40.1	40.9	41.7	42.6	50.6

Source: Statistical Abstract (various)

could not access secondary education after the primary school cycle.[3] The fact that only a limited number of students join secondary education indicates poor vertical survival levels in Kenya's education system.

The option for the youth not progressing to formal secondary education is to join Youth Polytechnics, etc. However, most of such institutions are inadequately resourced, poorly managed, and underutilized (Mburugu, 2003). In the long term, low participation in post-primary schooling is bound to affect supply of skilled labour force in the economy, which is critical for sustainable development.

2.3 Pupil-teacher ratio

The pupil teacher ratio (PTR) is an indicative measure of the utilization levels of teachers in schools. The national average and regional PTRs are relatively low, with systematic variations over the review period. Overall, the PTRs at secondary school level averaged 19:1 in 2004 having rose from 17:1 in 1991, though with frequent fluctuations (Annex Table 5). This has implications on ensuring cost effectiveness in provision of secondary education, since a lower PTR implies under utilization of human resource. The low PTR can be attributed to the curriculum establishments and total number of periods per week of learning time. Most teachers in secondary education teach relatively fewer number of hours per week compared to the national norm of 27 periods (18 hours) per week. On average, secondary school teachers teach for 15 hours per week due to the large number of optional subjects (Government of Kenya, 2005c)

[3] Primary schools completion rate was 76.2 percent in 2004 (Government of Kenya, undated). This rate represents the proportion of students successfully completing or graduating from the last grade of primary education cycle to the total number of children of official graduation age (13 years).

2.4 Internal efficiency

One way of measuring internal efficiency of an education system is by considering the maximum number of pupils who were enrolled in Form 1 and graduate in Form 4. A near or 100 percent progression to the next grade and/or survival rate implies an efficient system that has no wastage. Other internal efficiency indicators include survival rates, completion rates and droppout and repetition rates.

Survival rates

Survival rate refers to the percentage of a cohort of pupils enrolled in the first grade of a given level or cycle of education in given school year who are expected to reach successive grades (Government of Kenya, 2006a). Grade 1 (primary level) to Form 4 (secondary level) survival rate shows the proportion of pupils enrolled in primary grade one who remain in school until they complete secondary level. Survival rate to secondary Form 1 measures the proportion of a cohort of pupils that survives from primary grade one to firstgrade in secondary education. High repetition rates may be linked with high dropout rates and low survival levels.

There are declining levels of enrolment as pupils progress from Standard 1 to Standard 8, and Form 1 (Table 3). On average only 19.9 percent (20.4 percent for boys and 19.4 percent of girls) of students who were enrolled in Standard 1 in 1989 survived to Form 1 in 1997. Completion rates at secondary school level are encouraging, at 99 percent (100 percent for boys and 97 percent for girls) implying low cumulative dropout levels at this level of education. However the proportion surviving from Standard 1 to Form 4 is only 19.7 percent (20.6 percent and 18.8 percent for boys and girls, respectively) while only 1.2 percent of pupils enrolled in Standard 1 survive to enter university (1.6 percent boys and 0.7 percent girls) (Government of Kenya, 2000a).

Table 3: Survival levels of pupils (by cohort) from primary to secondary school level

Details	1987-1998			1989-2000		
	Boys	Girls	Total	Boys	Girls	Total
Survival (completion) rate from Std 1-8 (%)	44.64	43.03	43.86	45.06	43.52	44.31
Survival (transition) rate from Std 8 to Form 1 (%)	45.36	43.93	44.69	45.32	44.53	44.94
Survival rate from Std 1 to Form 1 (%)	20.25	18.90	19.60	20.42	19.38	19.91
Survival (Completion) rate from Form 1-4(%)	85.68	83.13	84.50	100.83	96.92	98.98
Survival rate from Std 1 to Form 4 (%)	17.35	15.71	16.56	20.59	18.78	19.71

Source: Government of Kenya, 2000a; Economic Survey (various); and authors' computations

In general, survival rates for boys are higher than for girls. According to the third Welfare Monitoring Survey report (Government of Kenya, 2000b), early marriages, adolescent pregnancies and the opportunity cost of schooling were provided as the main factors contributing to dropout levels among girls.

Completion rates

Completion rates in secondary schools are relatively high, an indication of low drop out and repetition rates. Annex table 7 shows that about 89.6 percent of students joining secondary school in the year 2001 completed their secondary education in 2004. The completion rates are higher for boys (91.5 percent) than they are for girls (87.5 percent), reflecting a minimal increase in completion rate of about 3 percent from 86.4 percent in 1990. The rates were relatively low in 1993 (68.9 percent) with female students recording a lower completion rate of 66.6 percent compared to the male students (70.7 percent). High completion rates imply efficiency in the

system in terms of progression from Form 1 to 4 and that survival is assured if students manage to enter first grade of secondary education.

Dropout and repetition rates

Dropout and repetition rates are other indicators of internal efficiency of the education system. Table 4 shows that on average, the repetition rate decreased from 1.6 percent in 1999 to 1.3 percent in 2003, while dropout rate deteriorated from 5.5 percent in 1999 to 6.6 percent in 2003. Repetition rate was highest in Form 4, both in 1999 (3%) and 2003 (4.72 percent), while the dropout rate was highest in Form 2 at 6.4 percent in 1999 and 5.36 percent in 2003, reflecting the diversity of factors contributing to the two efficiency indicators.

Table 4: Dropout and repetition rates (%) by grade, 1999 and 2003

	Repetition Rate		Dropout rate	
	1999	2003	1999	2003
Form 1	0.8	0.54	4.1	4.40
Form 2	1.1	0.97	6.4	5.36
Form 3	1.7	1.87	5.7	4.97
Form 4	3.0	4.72	2.7	1.23
National	1.6	1.30	5.5	6.60

Source: Ministry of Education, Statistics Section; Government of Kenya (undated)

High repetition rates at Form 4 can be attributed to higher incidence of students willing to repeat final grade in order to improve their academic performance and achieve better grades that could enable them proceed to tertiary education. The high dropout rates in Form 2 and Form 3 indicate high wastage rates during the middle of the cycle, partly due to non-affordability and early marriages, among other factors. Repetition and drop out rates negate any efficiency gains in the system.

We can conclude that the performance of the secondary education sub-sector in Kenya is low but can be improved by increasing transition and hence enrolment rates. The high survival and completion rates in secondary schools imply that the main challenge is to increase access and participation in secondary education.

3. Theoretical and Empirical Literature

The theoretical underpinnings of the empirical analyses on access to and investment in education borrow heavily from the work of Becker (1964), who observed that the choice of schooling is influenced by expected benefits spread over a lifetime, and costs of education. Investment in secondary school education contributes to human capital accumulation, which is essential for development (Harbison and Myers, 1964; and Manda *et al.*, 2003). Concepts related to access to education have further been explored by Psachoropoulos (1995) who emphasizes private and social returns to education in trying to justify household and public choice to create more opportunities of access to education.

Otero and McCoshan (2005), in their study on access to education and training in Europe, summarized the conceptualization of 'access' in three ways based on the International Standards Classification of Education: learning provided outside formal education institutions (for instance, in the household and when interacting with the wider community); learning that takes place in both formal and non-formal learning environments (such as adult education, non-formal education and lifelong learning programmes); and 'participation' in any of the cycles or levels of an education system where an individual has a chance to experience an education or training opportunity within formal systems, with emphasis on completion of an education cycle or level.

Individuals choose education and training (as an investment of the future) to build capital in the form of enhanced skills and competencies that they believe will bring them future rewards in the form of higher earnings after completion of education and training. Indeed, this is one of the main underlying factors that parents consider when deciding whether or not to commit their money and their children's time to education.

The costs incurred by an individual child or family when a child goes to school may be considered upfront "investments".[4] In this respect, parents decide whether their children go to school, or otherwise. What is not obvious is whether in making this decision parents always do what is best for their children because they may consider the upfront costs to the family, but the benefits may accrue only to the children and the households they live in as adults. If the parents expect to live with, or be supported by their adult children, they may anticipate sharing in the benefits of their children's education when they reach old age. However, this may not be the case. Adult children may not support their parents in old age. In such instances, if parents consider only the interests of their current household, and ignore the interests of their children, they may decide not to send their children to school even though it would be in the interests of the children to do so (US Department of Labour, 2000).

Studies have found that despite substantial government spending on education in Sri Lanka, a significant portion of private spending, such as private tuition, was the main factor constraining access to schooling in the country. This portion of spending disadvantages children from poorer families, who could not afford that cost. Other areas of spending included books, stationery, and uniforms.

Individual (student) characteristics such as gender and age group have profound effects on household schooling choices. In theory, ability and educational attainment of a child affects school participation in various ways. Arunatilake (2004) shows that being a male in poorer households has a statistically significant negative effect on schooling for Sri Lanka due to the opportunity costs of schooling, particularly among low-income families who need them for their labour.

[4] Direct education costs include out of pocket expenses for such items as tuition, books, uniforms, boarding and transport, among others.

In countries where patrilineal marriages are prevalent, parents prefer to invest in boys' education. Brock and Cammish (1997) notes that because of the patriarchal predominance, investment in a girl's schooling is viewed as wasteful since it benefits the family into which the girl is married. However, for the more privileged households, investment in the education of girls is viewed as an advantage in 'marrying well' (Brock et al, 1997). All these factors tend to further increase the gender gap.

Gertler and Glewwe's (1989) findings in Peru indicate that children from households located far away from schools have higher probability of not being enrolled in school. Consistently, level of parental education, presence of other children of secondary school going age in a household, sex, school quality and cost of schooling were major determinants of schooling.

Regional disparities have also been found to be significant in determining participation in schools. Brock and Cammish (1997) found that in countries like Bangladesh, Cameroon, Sierra Leone and India, there are considerable disparities in spatial pattern of school provision. There is a stark rural/urban dichotomy in these countries, which affects participation in schools. In India, for example, the massive rural/urban dichotomy resulted into problems of isolation and opening up, with some places facing extreme isolation. The opportunity costs are high in rural farming areas than urban areas mostly due to farm employment opportunities or child labour needs at home.

In terms of empirical analysis, Maglad (1994) used a multiple regression model to establish the determinants of school demand in Sudan. The dependent variable was net enrolment rate and the explanatory variables were age, sex of child, parents' educational level, land holding per adult (land ownership), distance to school (primary and secondary)-proxy for price of schooling, and residence of school and household (rural and urban). The study established that the longer the distance between residence and school, the higher the cost of schooling (in terms of time

spent in travelling to and from school) thus negatively impacting on schooling. Land holding also had significantly negative effect on schooling, implying that a child had to stay out of school during harvest or planting or tilling period. Some of these findings are corroborated by Gebreselassie (1998), who estimated a logit multivariate analysis regression model to assess the role of households, community and regional factors in determining household demand for schooling in Ethiopia. Distance to school had negative effect on both primary and secondary school demand.

Hazans and Trapeznikova (2006) used Living Standards Measurement Survey (LSMS) 2002-2003 in Albania to investigate the determinants of secondary school enrollment. Absence of a secondary school in the community and the distance to the closest school had a strong negative effect on enrolment, even when family background was controlled. Using the Albanian LSMS, Hazans and Trapeznikova (2006) showed the importance of supply-side factors in promoting access to secondary education.

Studies done in Kenya, Malawi and Mali (Bedi *et al.*, 2004; Tan, Lee and Mingat, 1998; and Birdsall, 1987) show that parents' education level, cost of schooling (both direct and indirect), the proportion of girls among children in a household, distance to school (both distance to primary and secondary), and location of residence (urban and rural) are the most important determinants of household demand for schooling. In another study by Singh (1992) in Brazil, household size was found to be an additional factor affecting household decisions on schooling.

Njeru and Orodho (2003) associate the decline in secondary school gross enrolment ratio (GER) with wide and severe regional and gender disparities in access to secondary education in Kenya, poverty and financing constraints.

4. Methodology

This study has two main objectives that are analysed using two different methodologies. The first objective of establishing the factors that influence access to secondary education is analysed using a quantitative method (logit regression model) of data analysis. A logit model is a maximum-likelihood estimator, recording the odds ratio of the probability that an event is likely to occur under given conditions (Gujarati, 2003). In this case, the estimated logit model predicts factors that influence the probability of a household enrolling a child in secondary school (both public and private). This methodology is outlined in sections 4.1, 4.2 and 4.3. The second objective of identifying strategies for secondary school expansion is analysed using a simulation model. The model considers different scenarios of expanded secondary education and the implications.

4.1 Data sources

The data used in empirical estimations was constructed from national representative Welfare Monitoring Survey (III) conducted in 1997 supplemented with 1997 district-level data provided by the Ministry of education. The WMS III was carried out in 50 districts drawn from all the eight provinces in Kenya with a sample size of 11,180 households, 1,500 clusters and 55,586 observations. Since this study focuses on only households with secondary school age children (14-18 years old),[5] the restricted sample consisted of 1,377 clusters and 258 households (80% rural) with a maximum of 7,221 observations. The dataset contains detailed information on relevant variables including education levels for both household heads and members including children of various ages; households' social and economic characteristics such as household income, expenditures and employment status; gender of all household

[5] The model is estimated using the 14-18 age group to cater for average students.

members; school variables such as time taken to school; status of school attendance, including number of various age cohorts either in school or not in school at the time of the study; and whether attending public or private school and reasons for non-attendance. A child was defined as enrolled if s/he was attending a secondary school during the survey period.

4.2 Model specification

To determine the factors that influence access to secondary education, it is important to consider the discrete schooling choice decision faced by households. Enrolment in secondary school depends on such factors as school fees, outlays for textbooks, transport and boarding costs, household income, household size, gender of both children and opportunity costs of schooling. The opportunity cost of a child's time includes both differences in work time lost due to school attendance and variations in child wage rates across geographic areas.

Thus, for a household h to send a child to secondary school, other factors constant, the direct costs c_1 associated with school attendance must be lower than the opportunity cost of schooling (Bedi *et al.*, 2004). This decision can be expressed as a utility conditional function, specified as:

$$U_1 = U(b, c_1) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where U_1 represents household utility derived from enrolling a child in a secondary school within budget constraint of,

$$y = c_1 + p \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where y denotes household income, and p stands for total cost of secondary schooling.

The converse holds true,

$$U_0 = U(c_0) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where $y=c_0$ represents household budget constraint. Given the utility associated with both decisions, a household chooses an option that yields the highest utility. Thus, the solution to the unconditional utility maximizing function is

$$U^*=max\,(U_1,U_0) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where U^* is the maximum utility. Alternatively, school participation may be defined in terms of a dichotomous variable, a, where $a=1$ if a child was enrolled in secondary school and $a=0$ if a child was not enrolled in any secondary school. In other words, $a=1$ if $U_1>U_0$

The objective being to determine factors that influence household decision on secondary education attendance, a linear conditional schooling utility function is specified as follows:

$$U_1 = \beta_1 b + \beta_1 c + \varepsilon_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where the β_1 denotes coefficients for respective variables to be estimated and ε_1 is the error term assumed to be normally distributed, with mean zero and positive variance. Since from equation 2, $c=y-p$, equation (5) can be rewritten as

$$\beta_1 + (y - p)\beta_2 + \beta_1 b = U_1 \quad (6)$$

On the other hand the utility function for non-schooling can be specified as

$$U_0 = \beta_2 y + \varepsilon_0 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

In other words a household decides to send a child to school (a=1) if $\beta_1 - \beta_2 p + \varepsilon_1 - \varepsilon_a > 0$; assuming the composite error term ε_a is normally distributed. In linear form, the probability equation is given as

$$Pr\,[a=1]=Pr[\beta_1 b - \beta_2 p + \varepsilon_a > 0] \quad \ldots\ldots\ldots\ldots \quad (8)$$

Thus the probability that any alternative is chosen equals the probability that this decision yields the highest utility among all other alternatives.

The functional form of the probability function depends on that of the conditional utility function and on the distribution of stochastic variables.

In most cases, the assumption that a probability model is linear in the independent variable is unrealistic, implying that if the model is specified as linear, the statistical properties derived under the linear assumption may not hold. Thus, as in Gebresellasie (1998) a generalized non-linear probability or logistic regression model is specified as:

$$Logit\ [(Y)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ... + \beta_k X_k \quad \text{..... (9)}$$

Where X_i denotes a set of predictors (student, household, school and community characteristics; affordability, among others) for a binary response Y and the probability that $Y=1$. The factors that influence household decision are categorized into two: a) those with positive influence on schooling decision; and b) those with negative influence.

To test for the significance of the effect of X_i on the binary response, the null hypothesis is set as $H_0=0$, that is, the probability of success is independent of X. Like Gebresellasie (1998), a Likelihood Ratio (LR) test is carried out, which compares well with Maximum Likelihood function since the latter is normally distributed in large sample size. To avoid the problem of multicolinearity or strong correlations among predictors, a stepwise variable selection procedure is employed, starting with a complex model and successfully eliminating variables with largest p value. The test of the null hypothesis that the model holds compares the fitted and observed counts using a Pearson Chi-Square (χ^2) test statistic. A large (χ^2) statistic provides evidence of lack of fit. Predictors are interpreted at 1 percent degree of significance, unless stated otherwise.

4.3 Definitions and Measurement of Variables

The dependent variable is based on the fact that a household sending at least one child to secondary school (public or private) has demand for

secondary schooling. Thus, the dependent variable (*childenrsec*) is a dummy, which takes the value of 1 if in a given household there is at least one secondary school age child (age between 14 and 18 years) enrolled in a secondary school, and 0 if the child is not enrolled. Explanatory variables are categorized into child characteristics; household characteristics; community and school variables; supply; affordability and cost variables.

Household income refers to non-labour income plus sum of the value of all family members' time spent in work. However, due to information asymmetry, household expenditure is conventionally used as proxy for income (Gertler and Glewwe, 1989). Aggregate value of household expenditure under the current schooling decision is observed and annual expenditures converted into five income quintiles (low income, lower middle income, middle, upper middle and high income levels) in order to capture effects of poverty incidence and income levels. If the child is not in school, the household expenditure is constructed from aggregate value of consumption; while if the child is in school-from aggregate value of consumption plus the schooling costs. All daily and monthly observations were converted to annual observations.

Total expenditure on secondary schooling is constructed from mean household expenditures on school fees, transport costs, boarding, contributions towards development projects and books. The schooling price and income are then used to calculate household consumption for each alternative.

Parents' level of education may be positively correlated with student ability, which may in turn result into higher education attainment for the child.

Effects of household composition are captured through impact of household size, especially number of household members aged between 14 and 18 years. The children in a household of secondary school age cohort are expected to compete for the same resources either in secondary

schooling, or equivalent education programmes. Another important factor is school accessibility (a proxy for distance to the nearest school). The Welfare Monitoring Survey (WMS) III dataset has various limitations including inadequate data on land size owned by household, time taken to nearest secondary school and indirect costs to schooling.

4.4 Secondary education enrolment projection model

The simulation model provides a framework for evaluating some of the strategies emanating from empirical results and after considering public policy targets in order to identify feasible options for expanding access to secondary education in Kenya.

It was based on various parameters including school age population growth rate, pupil-teacher ratio, and repetition, dropout and transition rates from primary to secondary by grade. The assumptions for the projection model are: the government is fully committed to recognizing secondary education as part of basic education; completion rate in primary schools is expected to improve; there is commitment in the government with support from stakeholders to increase the primary to secondary transition rate to 70 percent by 2008; teaching load in secondary school will be increased to ensure maximum efficient use of the current number of teaching staff from the current curriculum-based establishment norm of 18 hours (27 periods) per week to 20 hours per week in the short-term and thereafter 23 hours and 25 hours. The student-teacher ratio is targeted at 35:1 by 2008. The secondary school class size norm is assumed to be between 40 and 45 students to ensure efficient use of available classrooms.

5. Study Findings

In this section, empirical results on factors influencing access to secondary schooling in Kenya are preented. These include level of education and gender of household head; school accessibility; number of secondary or equivalent school going age in a household; household level of income relative to school cost and affordability; opportunity cost of schooling; location of household residence (rural or urban); age and gender of student; among others.

5.1 Summary statistics

Summary statistics are presented in Annex table 6. The mean household size was 7 with an average of 2 children of secondary school going age. The size of the household implies the level of household burden and competition for the available resources. More household members engaged in income generating activities implies an accumulation of resources in the household. Total mean household per capita expenditure (proxy for income) was Ksh 17,862 per annum with a standard deviation of Ksh 21,154.[6] These figures reflect a considerable level of income inequality as depicted by the standard deviation.

The mean household expenditure of secondary school fees was Ksh 3,691 with a standard deviation of Ksh 10,408. School fees recorded a minimum value of zero amongst some households, which could be the result of bursary either from the government, individuals or private organizations. The large standard deviation reflects the disparity in fees charged in private and public schools and also the different fees charged by district, provincial, and national schools. This difference is even reflected by the maximum fees of Ksh 156,000, which could be a private school. This

[6] Total mean household per capita expenditure is computed based on only households with secondary school going age children.

constitutes means of 2.6 percent and 3.6 percent of total household expenditures. Most of the household heads had primary level of education with a mean of 1.2 years. Annex table 6 presents more descriptive details on the variables.

5.2 Logit model results

Equation 9 in section 4.2 was estimated and results on estimated coefficients and standard error statistics for variables that influence secondary schooling choices in Kenya are shown in Table 5. The dependent variable is the households with at least one child of secondary school age population, either enrolled in school (y=1) or not enrolled in school (y=0) during the survey period. The goodness of fit tests showed that the fits are satisfactory as confirmed by the low chi^2 (0.000) in the equation. Most of the variables are significant at 1 percent level of significance, except school fees, which was significant at 10 percent level of significance.

Level of education of household heads

The level of education of the household head, especially male household head's level of education increases the odds for a household decision on enrolling a child in secondary school education. This can be associated with the positive relationship between earnings and educational attainment, which increases the probability of schooling, while reducing the opportunity cost for schooling. Further, low parental education is associated with low family incomes, which in effect can be a barrier to participation in secondary school education. Some less educated parents have the perception that education may not be beneficial.

It can be argued that male household heads with high levels of schooling may be having more economic power within the household than those

Table 5: Logit regression results on factors influencing access to secondary education

Variable category	Explanatory Variable	†Logit Coefficients
Student characteristics	Student age	-.777*** (.000)
	Student sex	.344***(.000)
Household characteristics	Household head sex_education	.409***(.000)
	Number of children in a household aged 14-18 years	.153***(.000)
School & community characteristics	Number of secondary schools per square kilometre	3.285***(.000)
	Urban-rural location	-.932***(.000)
Affordability	Income level	.107***(000)
	Secondary school fees	-4.222* (.0.099)
	Total secondary expenditure as proportion of household expenditure	10.991*(.000)
Constant	Not applicable	12.432*(.000)
No. of cases	Not applicable	6159
Prob>Chi2	Not applicable	.000
R^2	Not applicable	.21
Notes: † Dependent Variable: Childrenrsec=1 if child is enrolled; 0 if otherwise p values appear in parenthesis; *** Significant at 1% level, * Significant at 10% level		

with low levels, hence more ability to allocate more household resources to education. Other arguments are that male household heads are the main decision makers on resource allocation at household level and are therefore more likely to enrol their children in school when financial resources are available.

Thus, any strategies aimed at secondary education expansion should consider measures of improving household heads' level of education either through awareness, or adult literacy.

Number of children aged 14-18 years in a household

Contrary to the null hypothesis on impact of number of secondary school age children in the household, the results show that the number of children in a household within the secondary education age cohort increases the odds of accessing secondary education. The effect is significant at 1 percent level of significance. Intuitively, it can be concluded that existence of another child in household imply release of the other child to attend school as the other stays back to offer labour. This is consistent with other studies (Gebraselassie, 1998).

Household income level

Poverty in many households comes in the form of lack of resources and opportunities. However, the overall effect of these forms of poverty is limiting the capacity of households to take their children to school. The level of household income increases the odds of household decision to enroll a child for secondary school education. This is because income provides the much needed resources that a household can share among the unlimited needs. With higher income level, a household will be able to invest more in the children's education. Considering the opportunity costs for any long term investments in education, low income households are likely to have their children engage in paid employment.

Secondary education costs

Education costs at this level take the form of tuition fees, boarding, payments for school supplies, uniforms, books, transport and contributions for development projects and activities. School fees has a negative impact on access to secondary education, significant at 10 percent level of significance. School fees decreases the odds of secondary education demand, implying that any strategies aimed at lowering the cost of secondary education on households will lead to more households taking their children to school. Descriptive analysis of factors for school non-attendance indicate that majority of the school age students were not in school due to the cost burden (33.15% could not afford the fees charged). Other factors were as shown in Table 6.

Effects of inequitable structure of public financing of education can also explain the impact of secondary education costs on access. The secondary education system has highly selective and specialized teaching and curriculum content. On the other hand, the boarding delivery systems are well established and often preferred mode of delivery despite the

Table 6: Reasons for school non-attendance

Reason	Frequency	Percent	Cummulative
Too old	25	1.56	1.56
Got married	85	5.31	6.87
Too far	17	1.06	7.93
Too expensive/cannot afford	531	33.15	41.07
Found paid employment	28	1.75	42.82
Became an apprentice	23	1.44	44.26
Must work in the home/field	40	2.50	46.75
School useless/uninteresting	274	17.50	63.86
Cultural rituals	14	0.87	64.73
Illness	52	3.25	67.98
Pregnancy	87	5.43	73.41
Failed exams	168	10.49	83.90
Other	199	12.42	96.32
Not stated	59	3.68	100.00
Total	1,602	100.00	

Source: Authors' computations based on WMS III, 1997 data

associated high cost implications. Although the level of budgetary allocations to secondary education rose to 27.36 percent in 2004/05 from 21.18 percent in 1997/98 (Ministry of Education, 2005), 95 percent of these resources were allocated to personnel emoluments for teachers while capital allocation for the sector was below 1 percent between 1997/98 and 2002/3.

The low capital investment could be an indication of high demand for capital financing by parents, which further increases the cost burden on households. If the government in collaboration with development partners contributes to secondary education capital expenditures, the cost burden on households could be reduced. The government should ensure schools do not charge high user charges on the part of households, above the expected lower levels, by supporting capital development projects.

Secondary school non-attendance was also associated with poor performance in primary education national examinations. Table 6 shows that 10.49 percent of the respondents indicated that children were not in secondary school due to failed examinations. There is need to address issues on internal efficiency and quality of education offered at primary school levels, given the direct implication on transition to secondary school level. About 17.50 percent of the respondents indicated that school was either irrelevant or uninteresting. These descriptive results are consistent with Manda *et al.* (2003) who observes that if schools are perceived to be of low quality, parents do not see the benefit of enrolling their children in school. Thus, there is little incentive for families to forgo income that could be generated from their children's labour.

Location of household residence

Residing in rural areas significantly increase the odds of participating in secondary schooling while residing in urban areas decreases the odds. Most of the population in urban areas are concentrated in informal settlements, where school infrastructure is either not adequate or not

existing. This leads to youth vulnerability to either paid, unpaid and/or informal employment. To a large extent, child labour is a critical factor that interferes with schooling in most urban areas in Kenya as children opt to engage in employment in order to supplement household incomes.

Student gender

Being male increases the odd of secondary education participation. It is probable that parents value education of male children more than that of girls. However, studies done in patriarchal family systems (see Holmes, 1999) conclude that culturally, the expected future returns from educating female children are lower than for boys. Other factors include retrogressive socio-economic and cultural traditions, and religious values and practices, including early marriages for the girl-child. For instance, in ASAL areas, there is evidence of girls being married off to "wealthy" elderly men at tender ages. Further, lack of access to amenities such as water and firewood; absence of energy saving devices and other daily household requirements raises the opportunity cost of children going to school especially girls. This is more pronounced in ASALs where water, firewood and grazing land are scarce but important commodities for the survival of the communities. Although the law provides for equal opportunities for girls and boys, there are cases where socio-cultural factors, which are biased against girls prevail. Thus, strategies focusing on parents' awareness campaigns on the expected long-term returns for education regardless of student gender should be developed and implemented.

Student age

Student age has a highly significant negative effect on participation in secondary schooling. This is because as a child's age advances, especially more than that of his/her classmates, the likelihood of dropping out of a secondary school is higher. In other community set ups, a child of between

the secondary schooling going age is considered ripe for marriage; more so for girls who are 'married off'.

Availability of secondary schools

Availability of secondary schools proxied by number of secondary schools per square kilometer in a given district was the main supply factor in the estimation. The descriptive results (Annex Table 6) shows that on average there were 0.05 secondary schools per square kilometre in a district with a minimum of 0.00009 and a maximum of 0.3 schools per square kilometre. This variable captures the effects of distance between the nearest school and the household residence on access to secondary education. The empirical results show a significantly positive effect as a result of high concentration of secondary school in a neighborhood.

On the other hand, the low capital investment (by both public and private sectors) can be an indication of limited capacity at secondary school level in terms of physical infrastructure to accommodate the apparent demand. In 2004, private secondary schools constituted 11.0 percent of total number of schools and 8.0 percent of total secondary school enrolment (Annex Table 2 & 8). All these structural financing features have had direct implications on access to secondary education, particularly the costs and financing of secondary education.

In summary, the empirical results provide insights into the different factors that influence access to secondary education and the direction of that influence. The results also show the important role played by both the demand variables and supply variables (e.g. accessibility of schools) in influencing access to secondary school education in Kenya. Hence, the effects of these factors inform the strategies to be used in any expected expansion of secondary education.

5.3 Projected secondary education demand (2003-2015)

Secondary access and participation levels largely depend on what happens or is happening in primary education. Any policy aimed at expansion of primary education must be accompanied with strategies to expand secondary education given expected future implications. In absolute terms, secondary school going age population is expected to rise from 3 million in 2003 to 3.6 million in 2015 (Annex Table 8). In 2003, 17 percent of the youth eligible for secondary schooling were in school. The government policy is geared towards rapid expansion to 70 percent transition from Standard 8 to Form I by 2008, implying doubling in secondary enrolment in about five years.

Annex Table 8 shows that if transition rate grows at about 6 percent annually to 70 percent in 2008, other factors constant, demand for secondary education in terms of enrolment in absolute numbers will increase from 845,428 in 2003 to 1.8 million in 2008 and close to 2.8 million in 2015. This translates into an annual growth rate of 10 percent and cumulative growth rate of 200 percent over the twelve years. This would require additional resources in terms of classrooms, schools and personnel among others.

Projected-teacher requirements

Assuming an average teaching load of 23 hours per week, the number of teachers was expected to decline gradually from 46,721 in 2003 to 39,742 in 2005 before increasing to 43,077 in 2008. Close to 54,324 teachers are required in 2010. The number of teachers required is higher in the case of lower teaching loads. Thus, cost saving initiatives could include retraining of under-utilized teachers and ensuring all teachers meet set norm on teaching load, either within the school or by being facilitated to teach in the neighbourhood schools.

Classroom projections

In 2003, there were 22,914 classrooms in secondary schools, projected to increase to 33,026 in 2008; 41,649 in 2010 and 56,313 in 2015 assuming a class size of 45 students. This is driven by the projected gross enrolment rate increase from 27 percent to 60 percent and assuming that primary GER remained relatively high at above 100 percent and increased in ASAL districts from 22 percent to at least 45 percent by 2008.

The model shows that if dropout and repetition rates at primary school are reduced to less than 1 percent and 5 percent, respectively, completion will increase to 80 percent. On the same note, if adequate physical infrastructure exist at secondary school level, transition will increase to between 65 and 70 percent over the next 5 to 10 years. The model shows need for 10,112 additional classrooms by 2008 if the policy of at least 45:1 class size is effectively implemented.

However, access to secondary education cannot grow this fast without putting in place relevant strategies aimed at making secondary education more accessible and affordable, such as increasing budget provisions, classrooms, among other.

6. Strategies for Improving Access to Secondary Education

The model illustrates how policy initiatives can be simulated to establish envisaged expansion of basic education in Kenya. While current policies on free primary education would improve access and internal efficiency in primary education, they require consistent focus due to their direct implications on progression in secondary education. For instance, to improve transition from primary to secondary school level, internal efficiency at primary school level must be addressed to reduce dropout and repetition rates. On the other hand, policies aimed at secondary education expansion should address affordability and accessibility challenges. The strategies for increasing access to secondary education include: Expansion of school infrastructure; reducing costs of secondary education especially among households; improving efficiency in teacher utilization; improving efficiency and effectiveness in poverty mitigation measures such as bursary schemes; enhancing sub-sector partnerships, and local and public resource mobilization; increasing pupil-teacher ratio and class size; increasing internal efficiency; enhancing community awareness campaigns on importance of secondary education; and bridging the gender and regional gap in secondary schooling.

6.1 Expansion of secondary school infrastructure

Transition from primary to secondary schools is usually pegged on the number of available spaces in public secondary schools. Besides the shortage of schools, there is uneven distribution of the same, which increases accessibility difficulties in some areas. From our analysis, supply of secondary education captured through number of secondary schools per square kilometer has a positive impact on access to secondary education, but the schools are under-provided. As articulated in the Education Sector Strategic Plan 2003, the government should target day

schools for the expansion of secondary education. However, the situation in ASAL areas would require expansion of boarding and mobile schools, which should be subsidized by the government. Expansion and building of additional schools will ensure that accessibility is improved, as the distance would be reduced if the schools were positioned within a reasonable radius. To meet the 70 percent transition rate by 2008 as envisaged by the government, about 10,112 additional classrooms should have been built by 2008 (Annex Table 8). The strategy could be accompanied with expansion of schools to at least three streams per school, which would ensure better utilization of teachers. In 2003, 47 percent of the students were enroled in 1-stream schools, 33 percent in 2-stream schools and about 20 percent in 3-streamed schools.

6.2 Reducing costs of secondary education

Secondary education attracts various categories of costs, including tuition and boarding fees shouldered by the households, and teachers' remuneration shouldered by the government. School fees are one of the deterrent factors in access to secondary education, while teachers' remuneration takes a higher component of the sector's education budget. One of the mechanisms of reducing costs related to secondary education is to build more days schools.[7] Given that more than 56 percent of households in Kenya are poor, cost reduction strategies will promote enrolments, as households' burden would be low.

The government could also improve access to secondary education by improving teacher utilization by increasing pupil-teacher ratio from the current 1:17 to 1:35 without any requirement of extra teachers. The

[7] However, a lot of awareness will need to be provided to the parents, teachers and students with an aim of eliminating the attitude that day schools are of low quality despite that teachers for all schools are centrally trained.

recommended class size is 40-45 students. This would boost enrolment in secondary schools at minimal costs. Other cost effective modes of secondary education that can be explored include distance learning and reforming the curriculum to reduce the number of optional subjects to enable rational specialization for higher rates of teacher utilization. Reforming the curriculum would even reduce costs related to textbooks that households have to bear. Implementation of the fees schedule revised in 2002 may have to be closely monitored to ensure adequate compliance.

6.3 Improving teacher utilization

Teaching loads vary widely between schools partly due to specialization and mastery in particular subjects. Other contributing factors for under utilization include school under-enrolment. Strategies should be put in place to increase teaching load for the already specialized teachers.

It is worthy noting that somewhat paradoxically, in most education systems, a more qualified specialist teacher in secondary school teaches fewer subjects with less workload but higher remunerations. It should also be established whether the quality of education of a diploma teacher, who is less costly is lower than that of a degree teacher who is more costly.[8] On the other hand, socio-economic factors constrain automatic transfers leading into under staffing of some schools coexisting with overstaffed ones.

One of the available options is thus for secondary school teachers to train and be retrained to teach more than two specialist subjects, coupled with gradually increasing secondary teaching load from 18 to 20 hours and then 23 hours per week. In the short-term, this policy option is likely to lead to lower demand for teachers (43,077 in 2008) and later gradually increase to 57,734 by 2011 owing to projected enrolment increase. The

[8] This can be considered as a future research agenda.

strategy is sustainable in the medium term and will ensure better use of teachers.

6.4 Improving efficiency and effectiveness of bursary schemes

A bursary scheme was introduced in early 1980s with a view to enabling students from poor households gain access to secondary education. However, low participation rates due to low household incomes indicate that either the policies and initiatives have had minimal impact on enhancing access or the partial bursary allocation has limited impact. Consequently, decentralizing and review of bursary funds management to constituency level should be closely monitored as a measure to increase access to secondary education. It is, for instance, not clear how many students benefit from bursary awards. Policies for the needy students should be developed targeting vulnerable groups such as students from marginal communities, students with special needs, students from ASAL and slum areas, and Orphaned and Vulnerable Children (OVCs).

6.5 Partnerships and resource mobilization

Sustainable secondary education expansion requires building of partnerships and mobilizing of local resources. In part, regional disparities in access to secondary education could be addressed through collaboration between local communities, central and local government organs, and other stakeholders such as civil society, private sector and development partners.

Other strategies could include channeling part of the constituency development funds to education, in addition to strong partnerships with government providing clear guidelines on future plans and strengthening partnerships for efficient resource utilization. Local communities should

be encouraged to develop revolving funds for education at district level in order to raise funds from civil society, community organizations and civil society for targeted students covering full scholarship. The government should explore the possibility of introducing an education fund whose contributions should come from companies and individuals, with tax incentives being offered to contributors.

6.6 Increasing pupil-teacher ratio and class size

The overall pupil-teacher ratio at all levels of education is a major determinant of recurrent costs, partly due to the associated teacher wage bill. The pupil-teacher ratio depends on the distribution, curriculum and staffing norms of teachers, number of students and number of schools. In 2003, pupil-teacher ratio was 1:17 at national level with the lowest ratio of 1:5 recorded in North Eastern Province and a high of 1:23 recorded in Western Province. Closely related in the learning process is the class size. What is most important is thus the ability to manage learning in larger class sizes, availability of learning materials, physical class size and furniture and curriculum organization and management. Raising the secondary pupil-teacher ratio while maintaining the teaching staff at the same or lower levels by implementing measures aimed at increasing school enrolment is an option.

According to the projections, increasing the pupil-teacher ratio by 106 percent from 1:17 to 1:35 would allow for an increase in participation of 10 percent at feasible extra cost. Other measures that encourage low enrolments and internal inefficiencies should be addressed, even at regional levels.

6.7 Strengthen poverty mitigation measures

The study shows a strong negative relationship between poverty and access to secondary education. Thus strategies aimed at secondary education expansion should first address factors that make secondary education unaffordable. Any contributions by stakeholders should constitute an secondary education fund after putting in place effective management systems.

6.8 Increase awareness campaigns

High levels of unemployment and limited linkages between education graduates and employment contribute negatively to access to secondary education in Kenya. There are few programmes targeting individual community empowerment. There is need for community mobilization on effective utilization of decentralized poverty mitigation funds such as Constituency Development Fund and Anti-Poverty fund. Lifelong learning especially for adults should also be supported.

6.9 Bridging the gender and regional gap

Gender disparities in education are associated with the apparent discrimination and cultural factors on opportunity cost of girls. Female students enrolled in Standard 8 in 2004 transiting to secondary education represented 48.6 percent of students. The national gender parity index was 0.97 during the same period. Empirical findings indicate that most households prefer taking the boy child to secondary school compared to girl child given household budget constraints. The situation is worsened by poverty. Public policy initiatives towards addressing gender disparity in education include expansion and improvement of the learning environment through provision of boarding, and sanitation facilities that create a gender responsive environment (Government of Kenya, 2005a).

There is need for education managers to strengthen their activities on community awareness campaigns and affirmative action for gender equity in accessing secondary education. Enforcement of 'back to school policy' would enable vulnerable female students access to secondary education after dropping out due to either pregnancy and/or early marriages.

7. Conclusion

Secondary education plays an important role in any country's development through reinforcement of key competences and development of new work-related and social skills that cannot be developed at lower levels of education. Participation rates are notably low since more than three quarters of secondary school going age population have no access to secondary education. Regional and gender disparities also exist. For instance, the GER for North Eastern Province was 4.6 percent in 2004 implying that more than 95 percent of the school going age population had no access to secondary education in the province. Various factors determine access to secondary education, e.g. income levels, household head's highest education level, sex of child, availability of schools, student age and cost of secondary education. All these factors have to be considered when designing secondary expansion strategies.

Over the next ten years, population of children of secondary schools going age population is projected to increase from 3 million in 2003 to 3.6 million in 2015 (Annex Table 8). Secondary enrolment is expected to increase from 0.845 million in 2003 to about 2 million in 2008 and 2.7 million by 2015, assuming high efficiency gains (reduced repetition and dropout rates) in both primary and secondary education and improved transition rate. The envisaged expansion indicates increased human and capital resource requirement estimated at 54,324 teachers (23 hours of average teaching load) and 41,649 classrooms, assuming a class size of 45 students by 2010. Expansion in private sector provision is also critical.

Identified strategies for secondary education expansion include poverty mitigation and targeting measures, reduction in cost of secondary schooling, expansion of physical infrastructure, adult education, household awareness campaigns, and improving human and capital resource utilization. A comprehensive plan for expanding secondary education linking resource inputs like teaching and non-teaching staff

resources, funding and physical infrastructure expansion to overall resource availability on one hand, and secondary education outputs and outcomes to the overall labour marked needs is required.

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Annexes

Annex Table 1: Secondary schools gross enrolment by gender, 1963-2004

Year	Male	Female	Total	GPI	Year	Male	Female	Total	GPI
1963	20,553	9,567	30,120	0.47	1984	301,504	209,439	510,943	0.69
1964	25,211	10,710	35,921	0.42	1985	270,033	167,174	437,207	0.62
1965	34,720	13,256	47,976	0.38	1986	269,318	189,394	458,712	0.70
1966	46,802	16,391	63,193	0.35	1987	308,044	214,217	522,261	0.70
1967	66,392	22,387	88,779	0.34	1988	318,001	222,191	540,192	0.70
1968	75,202	26,159	101,361	0.35	1989	383,135	257,600	640,735	0.67
1969	83,086	32,160	115,246	0.39	1990	353,695	264,766	618,461	0.75
1970	89,327	37,528	126,855	0.42	1991	345,788	268,373	614,161	0.78
1971	97,979	42,743	140,722	0.44	1992	353,372	275,690	629,062	0.78
1972	111,295	50,615	161,910	0.45	1993	295,196	236,146	531,342	0.80
1973	117,224	57,543	174,767	0.49	1994	336,439	283,400	619,839	0.84
1974	128,721	67,111	195,832	0.52	1995	341,807	290,581	632,388	0.85
1975	145,306	81,529	226,835	0.56	1996	352,926	305,327	658,253	0.87
1976	176,723	103,665	280,388	0.59	1997	363,848	323,625	687,473	0.89
1977	197,472	122,838	320,310	0.62	1998	373,440	327,098	700,538	0.88
1978	216,895	144,727	361,622	0.67	1999	390,741	348,177	738,918	0.89
1979	227,734	156,655	384,389	0.69	2000	392,968	345,118	738,086	0.88
1980	237,018	162,889	399,907	0.69	2001	398,120	355,405	753,525	0.89
1981	242,315	167,535	409,850	0.69	2002	406,407	362,288	768,695	0.89
1982	260,739	177,685	438,424	0.68	2003	449,991	418,632	868,623	0.93
1983	294,327	199,383	493,710	0.68	2004	489,953	436,196	926,149	0.89

Sources: Economic Survey (various; and Government of Kenya (undated)

Annex Table 2: Number of educational institutions

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Pre-primary	16,329	17,650	17,327	18,487	19,083	20,186	21,261	23,344	23,977	25,429	26,294	27,573	28,279	29,455	31,879
Primary public									16,971	17,054	17,381	17,544	17,589	17,697	17,804
Primary private									385	569	1,236	1,357	1,441	1,857	1,909
Total	14,864	15,196	15,465	15,804	15,906	16,115	16,552	17,080	17,356	17,623	18,617	18,901	19,030	19,554	19,713
Secondary public									2,762	2,785	2,888	3,241	3,247	3,583	3,621
Secondary private									319	412	357	416	437	488	490
Total	2,678	2,647	2,632	2,639	2,834	2,878	3,004	3,028	3,081	3,197	3,245	3,657	3,684	4,071	4,111
Primary training colleges	17	22	25	25	25	25	26	27	28	29	29	29	29	29	30
Secondary training colleges	7	4	4	3	3	3	3	3	3	3	3	3	3	3	3
Total	24	26	29	28	28	28	29	30	31	32	32	32	32	32	33
Public universities	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7
Private universities	*	*	*	*	*	*	*	*	*	8	9	11	13	17	17
Total	6	6	6	6	6	6	6	6	6	14	15	17	19	23	24
	33,901	35,525	35,459	36,964	37,857	39,213	40,852	43,488	44,451	46,295	48,203	50,180	51,044	53,135	55,760

Source: Economic Survey (various)

* Data not available

Annex Table 3: Enrolment in secondary schools by province, 1990-2004 ('000)

Province	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Nairobi	35.9	33.9	34.0	15.0	31.7	30.3	22.5	22.5	24.2	42.08	42.35	43.28	42.14	49.36	55.37
Coast	41.5	39.5	40.0	30.0	37.0	35.4	37.4	37.1	34.5	153.77	156.62	165.71	169.4	171.3	187.39
North Eastern	3.4	3.5	12.0	1.0	3.6	4.0	3.9	4.3	5.1	136.09	131.01	140.23	144.8	166.9	177.1
Eastern	113.4	121.0	125.0	104.0	112.9	114.6	116.5	121.5	124.5	26.004	23.63	19.429	16.7	20.21	29.71
Central	124.7	125.3	122.0	118.0	129.7	132.6	142.8	150.8	154.8	153.69	155.56	159.6	159.4	183.3	204.37
Rift Valley	119.8	122.2	95.0	111.0	121.9	124.0	138.9	143.4	137.6	96.72	94.01	91.67	98.23	109.5	118.23
Nyanza	90.9	95.0	89.0	81.0	105.2	112.7	115.8	119.8	126.2	125.42	129.68	128.35	132.7	155.7	148.47
Western	88.9	73.8	62.9	71.0	77.9	78.9	80.5	87.9	93.6	5.16	5.24	5.26	5.22	12.45	5.51
Total	618.5	614.2	579.9	531.0	619.9	632.5	658.3	687.3	700.5	738.92	738.09	753.53	768.7	868.6	926.15

Source: Economic Survey (Various), Statistical Abstract (Various) and Government of Kenya, 2006

Annex Table 4: Secondary school gross enrolment rates (%) by gender: 1991-2004

Year	Male	Female	Total	Year	Male	Female	Total
1991	29.9	23.2	26.6	1998	24.6	21.7	23.2
1992	28.9	22.6	25.8	1999	27.2	24.3	25.7
1993	22.9	18.4	20.6	2000	26.8	23.6	25.2
1994	24.8	21	22.9	2001	27.1	24.2	25.6
1995	24	20.5	22.2	2002	27.2	24.2	25.7
1996	24.2	21.1	22.7	2003	29.7	27.4	28.6
1997	24.5	21.9	23.2	2004	31.7	27.3	29.5

Source: Government of Kenya (undated)

Annex Table 5: Percentage of secondary school teachers-trained or untrained and pupil-teacher ration, 1990-2004

Year	% trained	% untrained	PTR Secondary	Year	% trained	% untrained	PTR Secondary
1990	63	37	20	1998	93	7	16
1991	70	30	17	1999	96	4	18
1992	75	25	17	2000	97	3	19
1993	73	27	16	2001	96	4	17
1994	82	18	16	2002	96	4	17
1995	81	19	15	2003	95	5	19
1996	85	15	16	2004	98	2	19
1997	87	13	15				

Source: Economic Survey (various)

Annex Table 6: Summary statistics

Variable	No. of observations	Mean	Standard Deviation	Minimum	Maximum
Children enrolled in secondary schools	5,291	1	0	1	1
Children in household enrolled and not enrolled in secondary school (Childrensec: 1=Enrolled; 0=not enrolled)	6,895	.8	.4	0	1
Children not enrolled in a secondary school (female)	1,604	0	0	0	0
Education	6,839	1.18	.04	0	4
Female children of secondary school age	3,541	1	0	1	1
Female household heads	2,108	1	0	1	1
Household head sex_education	6,839	.8	.6	0	4
Household income per capita	6,455	17,862	21,154	2713	593,782
Household residence (Urban=1 and Rural=0)	7,221	.1	.3	0	1
Household size	7,221	7	2	1	24
Income level (1=low income quintile, 2= lower middle income quintile, 3= middle income quintile, 4=upper income quintile, 5= high income quintile)	6,478	3	1.4	1	5
Male children of secondary school age	3,680	1	0	1	1
Male household heads	5,113	1	0	1	1
Number of children in a household aged between 14 and18 years	7,221	2	1.1	1	7
Number of secondary school per square kilometer	7,220	.05	.064	.00009	.3
Secondary school fees	6,479	3,691	10,408	0	156,000
Student age	7,221	15.8	1.4	14	18
Student Sex	7,221	.5	.5	0	1
Total secondary expenditure as proportion of household expenditure	6,455	.036	.077	0	.639

Annex Table 7: Secondary education completion rate (%) by gender: 1990-2004

Year F1	Year F4	Enrolment Form 1			Enrolment Form 4			Completion Rate Form 4		
		Male	Female	Total	Male	Female	Total	Male (%)	Female (%)	Total (%)
1987	1990	95,528	69,719	165,247	82,800	59,987	142,787	86.7	86.0	86.4
1988	1991	99,822	73,783	173,605	78,347	57,457	135,804	78.5	77.9	78.2
1989	1992	97,725	69,023	166,748	80,467	58,646	139,113	82.3	85.0	83.4
1990	1993	96,079	74,992	171,071	67,881	49,961	117,842	70.7	66.6	68.9
1991	1994	95,511	76,126	171,637	78,605	62,383	140,988	82.3	81.9	82.1
1992	1995	97,267	78,081	175,348	74,087	61,094	135,181	76.2	78.2	77.1
1993	1996	81,543	69,560	151,103	78,104	66,042	144,146	95.8	94.9	95.4
1994	1997	90,774	78,140	168,914	80,457	68,659	149,116	88.6	87.9	88.3
1995	1998	96,360	83,650	180,010	82,632	69,492	152,124	85.8	83.1	84.5
1996	1999	96,302	84,235	180,537	84,233	72,232	156,465	87.5	85.8	86.7
1997	2000	98,487	88,614	187,101	91,700	78,371	170,071	93.1	88.4	90.9
1998	2001	102,449	92,813	195,262	98,920	86,987	185,907	96.6	93.7	95.2
1999	2002	105,231	95,773	201,004	99,303	85,881	185,184	94.4	89.7	92.1
2000	2003	108,116	97,196	205,312	97,541	86,121	183,662	90.2	88.6	89.5
2001	2004	112,174	103,425	215,599	102,635	90,452	193,087	91.5	87.5	89.6

Source: Government of Kenya 9undated) and Economic Survey (various)

Annex Table 8: Enrolment, teacher and classroom projections (2003-2015)

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Std 8 public enrolment	528,626	608,639	684,200	689,536	695,649	726,478	748,790	834,591	914,859	914,979	890,347	858,476	851,103
Std 8 private enrolment	27,448	28,820	30,261	31,774	33,363	35,031	36,783	38,622	40,553	42,581	44,710	46,945	49,293
Total Std 8 enrolment	556,074	637,459	714,461	721,310	729,012	761,509	785,573	873,213	955,413	957,560	935,056	905,422	900,396
Projected transition rate (%)	47	52	56	61	65	70	70	70	70	70	70	70	70
Form 1	209,649	288,010	359,652	436,043	473,621	512,226	534,993	551,779	613,037	670,610	672,102	656,354	635,567
Total public secondary enrolment	775,564	867,083	1,019,722	1,237,821	1,486,149	1,702,790	1,874,191	1,991,836	2,133,177	2,294,630	2,433,005	2,534,087	2,556.047
Total private secondary enrolment	69,864	76,850	84,535	92,989	102,288	112,517	123,768	136,145	149,760	164,736	181,209	199,330	219,263
Total public & private secondary enrolment	845,428	943,933	1,104,258	1,330,810	1,588,437	1,815,306	1,997,959	2,127,981	2,282,937	2,459,366	2,614,214	2,733,417	2,775.310
Projected 14-17 age population	3,082,292	3,134,075	3,182,653	3,228,801	3,272,390	3,313,295	3,351,398	3,389,939	3,428,923	3,468,356	3,508,242	3,548,587	3,589,395
Teachers needed -25 Hrs	46,721	38,653	27,414	27,193	33,009	39,631	45,408	49,978	53,116	56,885	61,190	64,880	67,576
Implied PTR	17	22	37	46	45	43	41	40	40	40	40	39	38
Teachers needed-23 Hrs	46,721	39,742	28,981	29,557	35,879	43,077	49,356	54,324	57,734	61,831	66,511	70,522	73,452
Implied PTR	17	22	35	42	41	40	38	37	37	37	37	36	35
Teachers needed- 20 hrs	46,721	41,638	31,812	33,991	41,261	49,538	56,760	62,473	66,395	71,106	76,488	81,100	84,470
Implied PTR	17	21	32	36	36	34	33	32	32	32	32	31	30
Teachers needed-18 Hrs	46,721	43,126	34,126	37,767	45,845	55,043	63,066	69,414	73,772	79,007	84,986	90,111	93,855
Implied PTR	17	20	30	33	32	31	30	29	29	29	29	28	27
Classrooms needed	22,914	22,914	19,269	22,660	27,507	33,026	37,840	41,649	44,263	47,404	50,992	54,067	56,313
Gross enrolment rate (%)-Public)	25	28	32	38	45	51	56	59	62	66	69	71	71
Gross enrolment rate (%)-Public and private)	27	30	35	41	49	55	60	63	67	71	75	77	77

Source: Generated from the Education Simulation and Financial Projection Model, 2005