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Abstract

Human capital accumulation through education is important for sustainable development. However, access to education is dependent on several household factors, including presence of a school, children's health and nutrition, among other inputs. The study sought to assess the effect of school feeding programmes on school enrolment while controlling for various households, learner and school level factors. The study used the Kenya Integrated Household Budget Survey (KIHBS) 2015/16 data, which is a national household dataset with household and community-level information. A probit model was used to undertake the analysis at three basic levels of education, namely: pre-primary, primary and secondary levels. The results show mixed effects of the school feeding programme on enrolment, which differ according to the level of education and type of school. In the pooled sample, there was no significant effect of school feeding programme on enrolment at pre-primary school level, while substantive effects were observed in primary and secondary school levels. The effect of school feeding programmes in public schools is negative whereas it is positive in private schools. The presence of school feeding programmes in pre-primary and primary school levels in arid and semi-arid lands (ASALs) leads to increased enrolment in both the pooled and ASAL sub-sample, whereas access to government bursaries has immense positive outcomes on secondary school enrolment. It is recommended that targeting of school feeding programmes be improved to select schools among low income communities in the ASALs and informal settlements in urban areas. There is need to ensure timely disbursement of funds towards public school feeding programmes at all levels of education. There is also need for increased investment towards bursaries in secondary schools. Finally, county governments need to provide financial support to public pre-primary schools towards school feeding programmes.

Keywords: *Social assistance; school feeding programmes; enrolment; attendance*

1. Introduction

Worldwide, social assistance programmes and policies have been found to have impact on health, education, and overall household poverty (Sulaiman, 2012). Social assistance includes various policies and programmes aimed at reducing poverty and minimising the vulnerability of poor populations. The main objective of social assistance programmes is to enhance human capital accumulation through increased school enrolment, school attendance and completion (White, 2016; Carter et al., 2019). Social assistance can be provided in kind or in cash through cash transfers, school feeding, food vouchers, and fee waivers through bursaries and scholarships (White, 2016).

Social assistance is defined as non-contributory interventions designed to help individuals and households cope with socio-economic deprivations, poverty, destitution, and vulnerability. Social assistance can be provided through transfers in cash, vouchers, or in-kind, including school feeding programmes to individuals or households in need; public works programmes; fee waivers for basic health and education services; and subsidies for food and fuel, among others (White, 2016). These programmes target the poor and vulnerable. Some are targeted based on categories of vulnerability, and some are targeted to low income households. They are usually provided by the State and financed by national taxes (Barrientos et al., 2010).

In low income countries, donor support is an important contribution towards social assistance, and it is the most common source of assistance provided in developing countries. Social assistance programmes can be conditional or unconditional. Social assistance interventions in the education sector include universal benefits school feeding programmes (UNICEF, 2017), fee waivers through provision of bursaries (OECD, 2015) and public scholarships that encourage education attainment and reduce school dropout rates (TÁRKI Social Research Institute, 2014). These programmes strengthen human capital development by providing protection from negative shocks and promoting more sustainable opportunities. These programmes have significant and positive effects on school enrolment at different levels of basic education across various economies.

When faced with shocks, households respond in different ways. Most of the households tend to reduce expenditure, including school expenditure, which accounts for a substantial share of household incomes (Ferguson et al., 2007; Pedro, 2013). The outcome of such coping strategies is low enrolment, which affects overall educational years of children within the household.

To enhance investment in human capital development, governments across the

world have implemented various social assistance initiatives as part of social protection programmes. There has been an increase in the number of countries implementing social assistance programmes, and a steady rise of these initiatives. In 2018, the World Bank estimated that 80% of countries across the world were implementing school feeding programmes, and 43% were providing conditional cash transfers. Conditional cash transfer is the least form of social assistance provided (ASPIRE, 2018).[1]

The Government of Kenya is committed to ensuring that no child is left behind in terms of access to quality education. The Constitution of Kenya (2010) recognises the need for basic education for all children under the Bill of Rights. Articles 43(f) and 53(1) (b) of the Constitution provide for the right to education and the right to free and compulsory basic education, respectively. The Basic Education Act (2013) guarantees the right of every child to free and compulsory basic education. To honor the above commitments, the government has consistently invested resources and undertaken reforms to deliver this right and achieve all educational objectives, in line with the Kenya Vision 2030.

Among the instituted reforms is the shift from 8-4-4 to the 2-6-3-3-3 education system, and devolution of Early Childhood Development Education (ECDE) and vocational training. Other key initiatives the government has implemented include introduction of Free Primary Education since 2003; Free Day Secondary Education from 2008; implementation of 100% transition from primary to secondary; streamlining examination management; revitalising technical vocational education and training; and expanding university education. These efforts led to an increase in primary school enrolment rates from 7 million to 11 million between 2003 and 2020. At secondary education level, enrolment rates increased from 1.18 million students enrolled in 6,484 secondary schools in 2007 to 3.4 million in 2020 (Kenya National Bureau of Statistics – KNBS, Economic Survey, various issues).

Access to basic education provides children with a firm foundation in learning and prepares them for other levels of studying and the labour market. While there has been increase in school enrolment over the years, net enrolment rate is 92.5% for primary school level, which implies that close to 612,018 children out of the 7.65 million children of primary school age were not enrolled in school in 2020 (KNBS Revised Population projections; Economic Survey various issues). According to the Ministry of Education statistics, there are regional disparities in enrolment, with North-eastern counties having the lowest primary net enrolment rates. Because of low enrolment rates, attendance levels vary considerably among schools and are often low in rural areas and marginalised communities (UNESCO, 2021).

The net attendance ratio for secondary schools in Kenya is 32.6%, while the gross attendance ratio is 54.3%. Children from families living on low incomes in Kenya are less likely to attend school. The net attendance ratio of secondary schools in the lowest wealth quintile is only 17.6%, whereas it is 61.3% in the highest quintile. In primary school, children from the poorest quintile are significantly less likely to be in education (UNICEF, 2017). Moreover, a report by UWEZO in 2015 found that during the survey, about 15% of the pupils were absent from school on the day of the visit. A higher proportion of children from rural areas (16%) were absent from school than those from urban areas (12%) (UWEZO, 2016).

In poor households, the decision to enroll a child in school is tied to availability of resources necessary to cover school-related costs, such as tuition and purchase of books, and nutritional needs of the household. Thus, households make decisions as to whether to prefer to send boys or girls to school when resources are limited. In some instances, older siblings forego schooling or limit attendance to support their younger ones. Therefore, children from poor households tend to lag their peers from higher income households. Consequently, access to formal education is dependent on several household factors, including presence of school meals/school feeding programmes. Empirical evidence shows that school feeding programmes have a positive effect on school enrolment and attendance, and the effects are larger in contexts of high food insecurity and low school participation (WACIE, 2020[2]; Wang and Fawzi 2020).

School feeding programmes are therefore necessary for sustainable human capital accumulation while averting deprivations and inequalities (education included), and addressing concerns of social equity and exclusion. Kenya has been implementing school feeding programmes since the early 1980s. In 2018, 1.6 million children in 4,048 schools were receiving a hot lunch under the school meals programme, financed by the Government (WFP, 2018). Moreover, the Home-Grown School Meals Programme was initiated in 2009 with a goal of increasing food production in food insecure regions and promoting school enrolment and attendance. These programmes are used as an incentive for poor families to send their children to school. Policy frameworks have also been put in place, such as the National School Meals and Nutrition Strategy (2017-2022), which aims to ensure that all children in pre-primary and primary schools receive at least one nutritious meal per school day.

Evidence on the influence of school feeding programmes on school enrolment is scarce in Kenya. Available studies assess the effect of school feeding programmes at a school level and, or county level analysis, with a focus on ECDE. Okwaro (2013) estimated the factors influencing school attendance and participation in Kenya. The findings show that availability of food in school, pupil's health condition, level of household income and availability of parent support play a significant role on enrolment and participation. The study, however, was descriptive and did not estimate the correlation between variables and school attendance and participation. Using the Kenya Integrated Household Budget Survey (KIHBS) 2015/16 household data, this study seeks to assess the effect of school feeding programmes on school enrolment. The key research questions are: What is the role of school feeding programmes in enhancing school enrolment across the different levels of education? What is the role of school feeding programmes in enhancing school enrolment across the different levels of education in ASAL counties? Specifically, the study will:

(i) Determine the effects of school feeding programmes on school enrolment in pre-primary, primary and secondary schools.

(ii) Determine the effect of school feeding programmes on school enrolment in pre-primary, primary and secondary schools in ASAL counties.

(iii) Draw recommendations for policy implications.

2. Literature review

This section presents a detailed review of theoretical and empirical literature on social assistance, school feeding programmes, and school enrolment, across various economies.

Theoretical literature review

Human capital accumulation raises the productivity of both labour and physical capital. The human capital theory states that there is a positive relationship between education and economic growth (Schultz, 1961; Denison, 1962). Thus, various empirical studies have found a positive correlation between the rate of human capital accumulation and economic growth, where a 10% increase in school enrolment increases growth rate by 0.2% per year (Lucas, 1988; Barro, 1991). Education for All is used as a policy tool to ensure universal access to education across world economies. To ensure enrolment and attendance among low income households, policy makers advocate for Food for Education (FFE) programmes as appropriate to improving school enrolment. Thus, School Feeding Programmes (SFPs) are intended to alleviate short-term hunger, improve the nutrition and cognition of children and transfer income to families (Walker et al., 1998; Jomaa et al., 2011).

School feeding programmes are one of the largest safety nets put in place in primary schools in most developing countries to boost human capital. In-kind support and food transfers, and feeding programmes enable enrolment and retention of children in school. SFPs contribute to human capital accumulation through three key pathways. The programmes are meant to make significant contributions to human development, incentivising parents and caregivers to send children to school and encourage attendance (Bundy et al., 2009; Kazianga et al., 2009). School feeding programmes are forms of direct transfer programmes that help address chronic weaknesses related to food and nutrition insecurity in poor areas and help to keep learners in school. Secondly, the interventions have the potential of contributing to human capital accumulation, and feeding learners in school has the potential of reducing poverty by boosting households' income and consumption levels through income generation transmission mechanisms. Thirdly, SFPs improve cognitive functions among learners and academic performance through reduced

absenteeism and increased attention and concentration due to improved nutritional status and alleviating malnutrition (Taras, 2005). Thus, encouraging enrolment at school is vital in helping children achieve and get the best possible start in life. Children who attend school regularly are more likely to achieve better results at school and are more likely to complete their schooling.

Empirical literature

Poverty, inequality, and school enrolment

Poverty and inequality have both direct and indirect effects on children's educational outcomes. Directly, children from low income households are more likely to miss school, and less likely to enroll and complete their studies (Sosu et al., 2021). Indirectly, these children have impaired working memory, short attention spans, high levels of distractibility, difficulty monitoring the quality of their work, and difficulty generating new solutions to problems (Evans and Schamberg, 2009). In contrast, children living in high income households have higher levels of human capital development (Cooper and Stewart, 2021). Thus, at the household level, educational attainment and school attendance are consistently associated with increases in household wealth (Kazeem et al., 2010).

Empirical evidence shows that chronic absenteeism is highly associated with the socio-economic status of the household, and it is more detrimental to educational outcomes and achievements in low-income households (Ready, 2010; Gershenson et al., 2017; Smerillo et al., 2018.) Compared to children from high income households, poor households have fewer financial, social and educational resources to support their children in catching up with missed school lessons (Ready, 2010; Yeung et al., 2002; Cooper and Stewart, 2021).

In Kenya, addressing poverty is a key development agenda, which is in line with the country's Vision 2030. Thus, overall headcount poverty in rural areas decreased from 52.5% in 2005/06 to 40.1% in 2015/16 while it reduced modestly in urban areas by 2.7% from 32.1% to 29.4%, respectively. With a reduction in the overall poverty rate, there has been an increase in access to basic education supported by policy reforms in the education sector. As an example, since devolution, access to Early Childhood Development Education (ECDE) has improved, with an increase in net enrolment rate from 71.8% to 77.2% in 2013 and 2018, respectively.

This notwithstanding, poverty is a hindrance in access to basic education in Kenya. Research suggests that household wealth is a key determinant of school attendance. A study by Dreibelbis et al. (2013) found that household wealth reduced the risk of school absenteeism by four percentage points for Kenyan girls. Similar findings are reported by Ireri (2015), who found that poverty increases child labour, thus negatively affecting school attendance in Kiambu County while Moyi (2006) found that high levels of poverty make it difficult for parents to invest in their children's education, thus less emphasis is paid to school attendance patterns in low-income households.

Social assistance and educational outcomes

Provision of social protection has been lauded as a major achievement of the 20th century because it is used to enhance human capital and productivity, reduce inequalities, reduce deprivations, and enhance decent life (Bonilla-Garcia and Gruat, 2003; Walker et al., 2012). Social protection has been used as a tool to help the poor and most vulnerable mitigate economic and fiscal shocks and provide opportunity by giving them a chance to get out of poverty and become productive members of the society. Moreover, apart from being a source of income to economically impoverished households, social protection programmes and interventions increase access to information and services, improve productivity, and support the elderly and the general population when not in employment (World Bank, 2024). Well-designed social protection programmes are cost-effective, and taking up about 1.5% of GDP (ibid). Provision of social protection services aligns to the Sustainable Development Goal 1.3, which advocates for the implementation of "nationally appropriate social protection systems and measures for all, and by 2030 achieve substantial coverage of the poor and vulnerable" (ibid). Universal social protection coverage includes providing social assistance, social insurance, social care services, and labour market programmes.

In Sub-Saharan Africa, the poor and most vulnerable people are yet to fully benefit from social safety net programmes. According to the World Bank report on "Realising the Full Potential of Social Safety Nets in Africa", most of Africa's poor and vulnerable people still lack coverage. It is estimated that just 10% of all Africans are covered, and poverty rates are higher than coverage rates in most areas. The Human Capital Project also finds that, on average, Sub-Saharan Africa realises only 40% of its human capital potential, the lowest score among all regions and that 25 of the bottom 30 countries in the Index are in Sub-Saharan-Africa.[3]

In Malawi, Kilburn et al. (2017) estimate the effects of the Social Cash Transfer Programme (SCTP) on schooling among children of 6-17 years. The intervention was found to have positive effects on enrolment and dropout rates. Specifically, school-age children (aged 6-17) in treatment households are 12 percentage points more likely to be enrolled in school and 4 percentage points less likely to drop out. However, the study did not find differential effects on age and gender. Further analysis on household expenditure of cash transfer received from the programme shows that a large proportion was spent on books and school uniforms. Thus, individually, this partly explains the direct treatment effects on enrolment and dropout.

Empirical studies suggest that conditionalities may have played a role in explaining the positive results found in school enrolment. Conditional cash transfers (CCT) provide cash transfers mostly to poor households on condition of some specified investments such as school enrolment or health of their children. CCT programmes are the most popular social assistance programmes. A review by Fiszbein and Schady (2009) found that the CCTs were implemented in at least 29 developing countries and accounted for at least 25% of the respective countries' GDP. There is overwhelming

evidence from varied countries that CCTs have a significant and positive effect on school enrolment. Studies by Schultz (2004), Attanasio et al. (2005), Maluccio and Flores (2005), Schady and Araujo (2008), De Janvry et al. (2006), Chaudhury and Parajuli (2008), and Filmer and Schady (2008), all found significant positive effects on school enrolment. The magnitude of the effects on enrolment differed, with Filmer and Schady (2008) finding very large effects of up to 20 to 30 percentage points on the enrolment rates of teenage girls in Cambodia.

Despite the popularity of CCTs, there is little that is known about what features of the programmes cause the positive effects on school enrolment. Filmer and Schady (2011) analysed the effects of the magnitude of cash transfer of a programme in Cambodia. The study found a diminishing marginal effect of the magnitude of CCTs on school enrolment. Cash transfers of US$ 45 had large effects on school attendance of up to 25 percentage points. However, the US$ 60 scholarship did not raise attendance above 25 percentage points. Given that the amount of cash transfers in other developing countries is larger than in Cambodia, Filmer and Schady (2010) argue that CCTs could increase school attendance at a lower cost. However, they recommend more research on the effects of a broad range of scholarship sizes on school attendance.

School feeding programmes and school enrolment

Several studies have been undertaken to establish the link between school feeding programmes and school enrolment. The studies show that in most cases, school feeding programmes have positive outcomes on enrolment, educational attainment, and dropout rates (IEG, 2011; Fiszbein and Schady, 2009; Rawlings and Rubio, 2005). School feeding programmes can improve school enrolment and attendance (Thompson & Amoroso, 2014). Although they may be considered expensive, the programme benefits could be achieved more cheaply. Food attracts children to school and reduces hunger while they learn. Thus, it has an overall positive impact on school participation. The design of the feeding programmes may matter in influencing school enrolment and attendance at different levels of education.

At pre-primary school, offering meals at school is an effective way to encourage chronically hungry children to enrol and attend classes. Vermeerch and Kremer (2005) affirm that the average school participation is higher in pre-schools with school feeding programmes than those without. An evaluation done in Jamaica and Tamil Nadu (India) further showed that SFPs increase attendance and retention. A randomised control study carried out in western Kenya demonstrated that children's school participation was 30% higher among children attending school with SFP (Vermeerch, 2005). Further, Mbunje (2018) undertook a study assessing the impact of SFP on pre-schoolers' educational outcomes. The findings from the study show that there was inconsistent school attendance in schools that did not have a school feeding programme compared to those that have one. At the pre-primary level, availability of school meals is one of the factors that incentivises parents to take their children

to school. This is prevalent in the arid and semi-arid lands and informal settlements in urban areas.

Introduction of universal school breakfast programmes improves enrolment rates and rates of attendance and punctuality, and decreases rates of psychosocial symptoms (Duggan, Watkins and Walker, 2016). In Bangladesh, Ahmed and Ninno (2002) showed that SFP increased school attendance by a large percentage. In the study they carried out, the overall rate of attendance in school with feeding programmes was 70% compared to 58% in non-programme schools. The use of take-home rations also increases attendance significantly, since it acts as an incentive to attend school. This therefore suggests that there is need for school feeding programmes in pre-schools.

In primary schools, the effect of school meals is equally significant. India's Nutritional Support to Primary Education was launched in 1995 and provides food to 120 million primary school students, making it among the largest school feeding programme worldwide. Afridi (2011) examined the impact of the programme's transitioning from providing monthly food grains to poor families in rural India to provision of free cooked meals to primary school children on enrolment and attendance rates. Afridi (2011) found that the transition to providing cooked meals did not improve enrolment rates over and above the effects of providing raw food grains. However, the transition led to an increase in attendance rates among grade one girls by 12.4 percentage points. The impact on boys, though positive, was not significant.

Using panel data collected from 24,000 households in Mexico, Skoufias et al. (2001) conducted an impact evaluation of the Progresa programme using both treatment and control groups. Mean school enrolment rates in villages receiving conditional cash transfers increased for both boys and girls. Specifically, Progresa increased enrolment rates for primary school boys by 1.4 to 1.9 percentage points within one year.

The Bangladesh government introduced a food for education programme in 1993 by providing free rations of rice or wheat to poor families who had children in primary school. The programme aimed to increase enrolment rates at primary school, increase attendance, reduce dropout rates, and enhance the quality of education. Ahmed and Del Ninno (2002) report that the programme increased enrolment, attendance, and reduced dropout rates. Increase in enrolment was higher among girls than among boys. Due to the increased enrolment and attendance, the quality of education in schools that benefitted from the programme deteriorated, as seen in lower test scores than in schools that did not benefit from the programme. Ahmed and Del Ninno (2002) recommend that social assistance programmes such as food assistance should be implemented together with financial investment to improve school infrastructure, hire more qualified teachers, and provide monetary incentives to ensure that quality of learning is not eroded.

In Burkina Faso, the operation of school canteens increased school enrolments, regular attendance and consistently lowered repeater and dropout rates in disadvantaged areas, at primary school. Higher success rates on national exams were recorded in this area. The closure of school canteens in the area was followed by high absenteeism. School years only commence with arrival of food stocks in school canteens (Reiser and Commonwealth Secretariat, 2012). In addition, a three-month

evaluation of SFP in Ghana recorded a 5% increase in enrolment and 36% increase in attendance (Yendaw and Dayour, 2015).

A review of the effect of school feeding programmes in lower secondary schools finds that non-attendance is higher in students who are not on any meal programme (Muktarbek, 2019). Moreover, the research suggests that students who are in meal programmes at the primary school levels are likely to continue with better attendance rates even in secondary schools. Similarly, Brazil's Progresa programme increased the likelihood of school attendance for both boys and girls, and overall amount of time spent in school activities in secondary schools.

Enrolment is influenced by other factors such as household cash transfers; size of the households; level of income of the household; gender of the child; distance to school, which is a key determinant in sparsely populated geographies and younger children; area of residence; and food poverty level.

Cash transfers to households has been used as a tool to increase household income, thus improving household nutrition, health, and overall investment in education. In some cases, conditional cash transfers are given to households with school-age-going children or children under the age of five years (Attanasio et al., 2005). In Columbia, an assessment of their CT programmes found that the programme increased school enrolment in children between 8 and 11 years, both in urban and rural areas. Research shows that location of the school has significant effects on school attendance. Al-Samarrai and Reilly (2000) found that enrolment rates between urban and rural areas ranged from about 10 percentage points. Similarly, in Columbia, school enrolment and attendance are much low in children between 12 and 17 years, especially for those living in rural areas, as low as 50% (Attanasio et al., 2005). On gender, Afridi (2011) found that girls' attendance increased by 10.5% in schools that implemented the SFP in grade 1 in India. In Burkina Faso, an evaluation of the Take Home Ration (THR) programme shows that school enrolment rates were higher in boys by 8.4 percentage points compared to 6 percentage points in girls (Nikiema, 2019).

Other important factors include level of income, household size and distance to school. Glick and Sahn (2000) found that increase in household income has a greater impact on school enrolment. Household composition, specifically the number of school-aged children in a household, has been shown to have a mixed effect on school enrolment and attendance. Some studies have identified higher rates of school enrolment among larger families, while others have identified an increased likelihood of attendance associated with larger family size and/or increases in the number of siblings (Huisman and Smits, 2009; Eloundou and Williams, 2006). School characteristics associated with a decline in school attendance include distance to primary school (Kazeem et al., 2010; Baschieri and Falkingham, 2007). Similar findings in Tanzania show that an additional kilometre from the nearest government-run

primary school reduces the attendance rate by 4% (Al-Samarrai and Reilly, 2000).

Methodology

Theoretical framework

Using a human capital approach, investment in education and training leads to an increase in the productive capacity of the labour force. Human capital development is dependent on goods consumed, such as school fees, books, and private tutoring (James-Burdumy, 2005). Therefore, family income is considered a key input. Social assistance is used as a tool to reach poor households and enable them to invest in human capital development through increased access to education and health services. Moreover, social assistance cushions poor households against shocks on human capital. Socio-economic status of the household is closely linked to various educational outcomes, including school attendance. The effects and consequences of low-income manifest in various ways, and enrolment is one of them. Low income affects enrolment by "*disrupting family routines, creating higher risk for illness through stress or material hardships, affecting parents' ability to pay for basic materials and preparation for school, such as clothes, transportation, and after-school care, or, putting higher demands on children to contribute to household tasks or to family earnings at the possible risk of school attendance*" (Gennetian et al., 2018, pg.2). Consequently, this low enrolment and attendance has dire implications for human capital development, including poor academic performance, high dropout rates and a low likelihood for college enrolment.

Learners who attend school regularly learn more and are more successful in school than those who do not. School attendance patterns are formed early in life. Children who develop good attendance habits in the early grades will be more likely to continue with them throughout their schooling period. When learners miss school sessions, they are more likely to fall behind and thus more likely to drop out. School feeding programmes aim to, among other goals, develop human capital by increasing children's school attendance. The remainder of this section is structured as follows. The next sub-section describes the datasets and empirical modelling approach. This is followed by a description and measurement of both the dependent variables and regressors that will be used in the study.

Empirical estimation

The study estimates the effect of school feeding programmes on school attendance at pre-primary, primary, and secondary school levels. School attendance is measured using the current grade of a child in the household. Thus, the dependent variable is a binary variable where the child is currently attending a specific grade (1) or not (0). The independent variable of interest is presence of a school feeding programme in the school in which the child is currently attending. Even though the variable of interest is school feeding programme, the study controls for other variables that might influence school attendance. These include regressors such as overall household poverty, distance to school, gender of the learner, type of school, age of the learner, area of residence, government assistance and household size.

In the first step, the study estimates three multiple regressions (3): at pre-primary, primary and secondary school levels. Thus, school attendance is modelled as a function of whether there is a school feeding programme in the school in which the learner is enrolled, overall household poverty, distance to school, gender of the learner, type of school, age of the learner, area of residence, government assistance and household size. We estimate the general probit using an empirical function as described below:

$$y_i R_i = \beta_0 + \beta_1 X_1 + \beta_2 x X_2 + \beta_3 X_3 + \cdots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \beta_n X_n + \varepsilon_i \quad (1)$$

Where:

$y_i R_i = School\ enrolment\ at\ pre-primary, primary, and\ secondary\ school\ levels$

$\beta_0 = Constant$

$\beta_n X_n = Regressors$ Where $X_1 = Presence\ of\ a\ school\ feeding\ programme, X_2 = Household\ access\ to\ government\ educational\ assistance, X_3 = Household\ size, X_4 = Gender\ of\ the\ learner, X_5 = Age\ of\ the\ laerner, X_6 = Type\ of\ school, X_7 = Distance\ to\ school, X_8 = Area\ of\ residence,\ X_9 = Overall\ poverty$

The probit model is estimated as outlined in equation 2 below.

$$Pr(y_{it} = 1 | x_{it}, \beta, \mu_i) = \Phi(\mu_i + x_{it}^{'} \beta) \quad (2)$$

Where:

$Pr(y_{it} = 1 | x_{it}, \beta, \mu_i)$: conditional probability that the outcome variable is one given a vector of covariates.

y_{it}: School enrolment within unit *(i)* at time *(t)*

$x_{it}^{'}$: A vector of explanatory variables within each unit *(i)* at time *(t)* described in equation 1 above.

β: Estimated parameters.

μ_i: The idiosyncratic error term for each unit *(i)*.

Φ: A standard normal cumulative distribution function.

Equation 1 is estimated at three levels of education: pre-primary, primary, and secondary levels. The Maximum Likelihood Estimation (MLE) is used to estimate parameters (β) and the variance of specific effects (σ_μ^2). The MLE maximises the log-likelihood $\sum_{i=1}^{N} ln\, f(y_i \,|X_i, \beta, \sigma_\mu^2)$

Where:

$$\mathrm{f}\left(y_i \middle| X_i, \beta, \sigma_\mu^2\right) = \int \mathrm{f}(y_i|X_i, \beta,) \frac{1}{\sqrt{2\pi\sigma_\mu^2}} \exp(\frac{-\mu_i}{2\sigma_\mu^2}) d\mu_i \tag{3}$$

Where $f(y_i|X_i, \beta,)$ is a standard normal cumulative distribution function. A quadrature method numerically calculates the MLE estimates. The model assumes that the variables are time invariant.

In the next step, we undertake a school enrolment analysis by type of school to bring out differences in private and public schools. These differences are important in explaining how the various factors influence attendance, either in private or public schools and the variability on the effect of SFP between private and public levels of education. Finally, we created a sub-sample of the ten low-income counties in Kenya, which are: Turkana, Mandera, Garissa, Wajir, Samburu, Tana River, Busia, Marsabit, Isiolo, and West Pokot. These counties have an average poverty rate of 66% compared to the national poverty rate of 36%. Furthermore, they also have the lowest enrolment rates in the country, which consequently affect school attendance. For instance, the average primary gross enrolment rate in 2019 was 66.98% against the national average of 99.63%. The main aim was to bring out differences in attendance in these ASALs and marginalised regions and assess the relevance of SFP in enhancing access to education.

Table 3.1: Description of variables included in the regression

Name	Measurement	Type of Variable
Pre-primary school enrolment	Age-specific pre-primary enrolment in current school term. (1 if a 3-5-year-old child attends school, 0 otherwise)	Dependent Variable (DV)
Primary school enrolment	Age-specific primary school enrolment in current school term. (1 if a 6-13-year-old child attends school, 0 otherwise)	DV
Secondary school enrolment	Age-specific secondary school enrolment in current school term. (1 if a 14-18-year-old student attends school, 0 otherwise)	DV
School feeding programme	Availability of a school feeding programme (Binary)	Independent Variable (IV)
Government assistance	Whether the household received bursaries in the last 12 months from the government (Binary)	IV
Household size	Total number of individuals living in the household (Continuous)	IV
Gender of the learner	Sex of the child (Binary)	IV
Age of the learner	Years (Continuous)	IV
Type of school	Whether the school the learner is enrolled in is public or private (Binary)	IV
Distance to school	Distance from home to school (kilometres) (Categorical variable)	IV
Area of residence	Rural vs urban (Binary)	IV
Overall poverty	Whether a household is poor or not (Binary)	IV

Source: Author's conceptualisation

Data and sample design

The main source of data for this study is the Kenya Integrated Household Budget Survey (KIHBS 2015/2016) undertaken by the Kenya National Bureau of Statistics (KNBS). The KIHBS data is a nationwide study with data collected from 47 counties using individual, household and community questionnaires. Stratification was achieved by separating each county into urban and rural areas. In total, 92 sampling strata were created. Samples were selected independently in each sampling stratum by a two-stage selection method. In this regard, 2,400 clusters were sampled, where the clusters served as primary sampling units for the selection of ten households per cluster, translating to 24,000 households. Response rate for rural households was 93.6% while that for urban areas was 88.0%. The challenges faced during data collection include non-response due to insecurity, and unavailability of households due to nomadism in some parts of the country.

The data captures different forms of social assistance, including presence of school feeding programmes, and households. The total sample was 92,846 observations, of

which 37,159 are between the age of 3-17, which are the official age of school-going children between pre-primary and secondary levels. The study excludes students who are enrolled in special schools, mainly because this group differs from the majority population on school attendance and enrolment patterns. The sample also excludes missing data or non-response in selected variables.

Descriptive statistics

Table 3.1 presents summary statistics of the variables included in the model. At school level, on average, an estimated 68%, 82% and 24% of learners between 3 and 17 years are enrolled in pre-primary, primary and secondary schools, respectively. Further, most learners are enrolled in public schools (78%) and 24% of these schools (both private and public) are implementing a feeding programme financed either by government, non-governmental organisation, or individuals (households). The distance travelled by learners to school is a categorical variable, and the average distance travelled by learners is 1.7km, whereas the average age of a learner is 9 years, which means that from the dataset, most learners are in primary school.

Table 3.1: Summary statistics of variables included in the model

Variable	Obs	Mean	Std. Dev.	Min	Max
Pre-primary enrolment	10,605	0.6833	0.4652	0	1
Primary enrolment	26,355	0.8209	0.3834	0	1
Secondary enrolment	7,648	0.2364	0.4249	0	1
Distance to school	30,896	1.6727	0.7611	1	4
Age of the learner	37,159	9.4576	4.1185	3	17
Gender of the learner	37,159	0.5087	0.4999	0	1
School feeding programme	30,888	0.2445	0.4298	0	1
Type of school	30,798	0.7836	0.4118	0	1
Government assistance	2,465	0.1039	0.3051	0	1
Household size	37,159	6.4513	2.3853	1	15
Place of residence	32,494	0.8015	0.3989	0	1
Overall Poverty	37,159	0.4917	0.4999	0	1

Source: KNBS (2016), KIHBS 2015/16

At household level, the average size was 6 members in 2015/16. This has decreased to an average of 4 members, according to the census report of 2019 (KNBS, 2019). In assessing government support to the household, we find that 10% of the household receive government assistance towards education, specifically bursaries. In households with children between 3 and 17 years, the poverty rate is 49%, which is significantly higher than the national rates which stand at 36% (KNBS, 2016), approximately 80% of these households live in rural areas.

Table 3.2 describes the differences in school enrolment between schools with SFP and those without at the various levels, thus bringing out differences in access to

school feeding programmes. Most pre-primary school children (75%) are enrolled in schools that have no feeding programmes, while only 25% go to schools with feeding programmes. Chi-square test results show that there is no statistically significant relationship between feeding programme and school enrolment at pre-primary level. About 75% of primary school pupils attend schools with no feeding programmes, while only 25% are in schools with feeding programmes. Chi-square test results show that there is no statistically significant relationship between feeding programme and school enrolment at the pre-primary level. Approximately 69% of secondary school students are in schools with no feeding programmes, while 75% are enrolled in schools with no feeding programmes. The Chi-square test shows a significant relationship between the presence of a feeding programme and secondary school enrolment.

Table 3.2: School enrolment between schools with SFPs

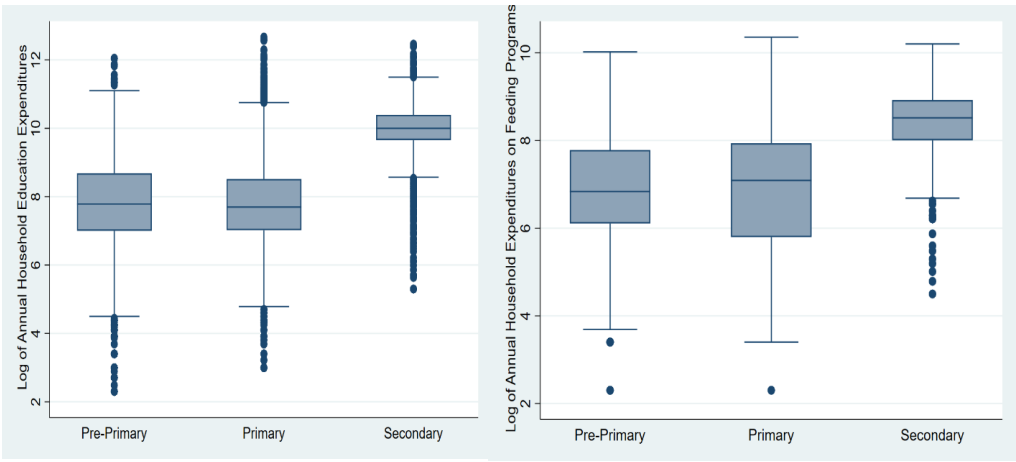
Pre-primary		
Presence of a School Feeding Programme	Enrolled in school without SFP	Enrolled in School with SFP
No	293	5,427
Yes	98	1,795
Total	391	7,222
	Pearson $chi^2(1) = 0.0087$	Pr = 0.926
Primary		
Presence of School Feeding Programme	Enrolled in school without SFP	Enrolled in School with SFP
No	2,108	17,058
Yes	703	5,666
Total	2,811	22,724
	Pearson $chi^2(1) = 0.0075$	Pr = 0.931
Secondary		
Presence of a School Feeding Programme	Enrolled in school without SFP	Enrolled in School with SFP
No	3,914	2,850
Yes	1,289	1,307
Total	5,203	4,157
	Pearson $chi^2(1) = 51.2428$	Pr = 0.000

Source: KNBS (2016), KIHBS 2015/16

Figure 3.1 shows household expenditure on education and expenditure towards school feeding programmes to bring out differences in education spending at each level. Household expenditure on education is computed as the total household expense towards education. At the pre-primary level, median household expenditure on education is Ksh 2,240, whereas the highest expenditure was observed at secondary school with Ksh 21,642. Notably, expenditure in primary schools is lower at Ksh 2,160 compared to pre-primary. The findings are in line

with education expenditure in Kenya, where primary education is subsidised through government capitation, whereas pre-primary education is financed out of pocket by households. We also find that household expenditure on school feeding is highest at secondary school at Ksh 5,000 and lowest at the pre-primary levels at Ksh 930.

Figure 3.1: Total household expenditure on education and school feeding programmes at different levels of education



Source: KNBS (2026), KIHBS, 2015/16

4. Results and discussions

Effects of school feeding programme on school attendance

We present findings using the coefficients and marginal effects across the three levels of basic education. In Table 4.1, we report findings on the effect of SFP at pre-primary, primary and secondary schools singly. In the next step, an interaction term between government assistance and SFP is introduced at the secondary school level. In both pre-primary and primary schools, the presence of school feeding programmes has no effect on school enrolment. In the secondary schools, we find that SFP increases school enrolment by 8 percentage points at $p>0.01$. We use access to government bursary as a proxy for social protection. Introduction of the variable on the model leads to favourable effect on secondary enrolment. However, the effect of SFP when government assistance is included reduces by 1 percentage point, whereas government assistance leads to 43% increase in school enrolment. When we introduce an interaction term between government assistance and SFP, both SFP and government assistance remain significant, and the interaction term is insignificant. Still, the influence of government assistance is greater at $p<0.01$ compared to SFP at

p<0.1.

Table 4.1: Regressions results on the effect of SFP across the three levels of education

Variable	Pre-primary (Model 1)	Primary (Model 2)		Secondary (Model 3)		Secondary (Model 4)		Secondary (Model 5)		
	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects
Feeding programme	-0.017 (0.056)	-0.002 (0.006)	-0.013 (0.024)	-0.003 (0.005)	0.192*** (0.032)	0.075 (0.012) ***	0.259 (0.108) **	0.066 (0.027) **	0.206 (0.119) *	0.052 (0.030) *
Government assistance	-	-	-	-	-	-	1.697 (0.123) ***	0.429 (0.025) ***	1.628 (0.134) ***	0.412 (0.028) ***

Government assistance*Feeding programme	-	-	-	-	-	-	-

Sources: Authors' conceptualisation. Significance at *** p<0.01, ** p<0.05, * p<0.1

In the next step, we estimate the effect of SFP in a pooled sample, and by school type, that is private and public schools at each level of education, while controlling for other household and learner characteristics such as age of the learner, gender of the learner, distance to school, household size, overall poverty, place of residence and type of school in all pooled samples. At the secondary school level, we introduce a government assistance variable based on provision of bursaries to households. This variable is included at this level because government bursaries are given to secondary school learners in Kenya. Table 4.2 presents results at the pre-primary level.

Not surprising, distance has an unfavourable effect on pre-primary enrolment (negative). In situations where the learner travels above 5km to schools, pre-primary enrolment rates are reduced by 7 percentage points in the full sample regression. Similarly, the effect of distance is similar to results from full estimation, where distance was found to have a negative effect on enrolment. Interestingly, in private schools, enrolment is reduced by 2 percentage points at a distance between 1-3 kilometres, whereas in public schools, the effects are more pronounced at longer distances (same as the full sample regressions). The reduction in enrolment in public schools is 9 percentage points in situations where learners must travel 5km and above.

Table 4.2: Pre-primary attendance in overall population, private and public schools, 2016

Variables	Pooled Sample (Margins)	Pooled Sample (Coefficient)	Private Sample (Margins)	Private Sample (Coefficient)	Public Sample (Margins)	Public Sample (Coefficients)
1-3km	-0.0083	-0.0807	-0.0242**	-0.231**	0.0008	0.0088
	(0.0057)	(0.0550)	(0.0101)	(0.0917)	(0.0069)	(0.0694)
Between 3-5km	0.0011	0.0118	-0.0127	-0.131	0.0123	0.137
	(0.0130)	(0.139)	(0.0201)	(0.191)	(0.0168)	(0.206)
5kms and above	-0.0709**	-0.499***	-0.0457	-0.384	-0.0901*	-0.576**
	(0.0331)	(0.173)	(0.0420)	(0.274)	(0.0482)	(0.224)
Age of learner	0.0079***	0.0778***	0.0005	0.0052	0.0117***	0.115***
	(0.001)	(0.0089)	(0.0017)	(0.0171)	(0.00128)	(0.0102)
Gender of learner	0.0132**	0.129**	0.0149*	0.147*	0.0119*	0.117*
	(0.0054)	(0.0523)	(0.0087)	(0.0860)	(0.00671)	(0.0661)
Feeding programme	0.0009	0.0094	-0.0029	-0.0286	0.00460	0.0455
	(0.0061)	(0.0607)	(0.0103)	(0.102)	(0.00769)	(0.0760)
Type of school	-0.0067	-0.0659	-	-	-	-
	(0.0062)	(0.0605)	-	-	-	-
Household size	-0.0008	-0.0075	-0.0015	-0.0148	-0.0004	-0.0037
	(0.0012)	(0.0121)	(0.0019)	(0.0188)	(0.0016)	(0.0154)
Place of residence	0.0059	0.0579	0.0046	0.0462	0.0095	0.0941
	(0.0070)	(0.0690)	(0.0093)	(0.0922)	(0.0103)	(0.101)

Poverty	0.0071	0.0701	0.0139	0.136	0.0036	0.0357
	(0.0059)	(0.0575)	(0.0103)	(0.101)	(0.0071)	(0.0702)

Sources: Authors' conceptualisation. Significance at *** p<0.01, ** p<0.05, * p<0.1

The age of the learner is significant and has a positive effect on enrolment, where older children are likely to attend pre-primary. While age of the learner was significant in the full sample regression, it becomes insignificant when we estimate a private school regression only, but remains significant and positive in public school regressions at 1.2 percentage points. Boys are 1 percentage more likely to enrol in pre-primary school compared to girls. Similarly, boys are 1.5 percentage and 1.2 percentage points more likely to enrol in private and public pre-primary schools, respectively, compared to girls. Across the three regressions, the effect of SFP is not significant. Albeit insignificant at pre-primary levels, it is important to note that SFP at these levels has immense human capital development benefits, including motivating chronically hungry children from low-income households and marginalis ed regions to enrol in school and classes, providing minimum nutritional requirement necessary in enhancing cognitive abilities, and overall growth and development (Vermeerch and Kremer, 2005).

Table 4.3 shows the results for the primary level regressions. Distance to school is favourable and significant across all levels of education, except in public primary schools. Interestingly, in the three regressions, travelling between 1-3km increases enrolment by 2 percentage, 5 percentage and 1 percentage points in both private and public, private and publics schools, respectively. We find a similar effect when the distance increases to between 3 and 5 km in both private and public schools, and private schools only. In public primary schools, travelling 5 km and above to school reduces enrolment rates by 6 percentage points. Boys are less likely to enrol in school across all three regressions, but the effect is highly significant in both private and public schools and public schools only. When estimating enrolment by type of school, it is higher in public schools by 3 percentage points at p<0.01 compared to private schools. Kenya has been implementing Free Primary Education (FPE) since 2003, which reduces the burden of financing primary education on the households, thus observed increased enrolment.

Table 4.3: Primary attendance in overall population, private and public schools, 2016

Variables	Pooled Sample (Coefficients)	Pooled Sample (Margins)	Private (Coefficients)	Private (Margins)	Public (Coefficients)	Public (Margins)
1-3km	0.145***	0.0204***	0.272***	0.0551***	0.0984***	0.0123***
	(0.0284)	(0.0039)	(0.0582)	(0.0116)	(0.0329)	(0.0041)
Between 3-5km	0.139**	0.0196**	0.340***	0.0672***	0.0534	0.0068
	(0.0654)	(0.0087)	(0.116)	(0.0211)	(0.0779)	(0.0097)

5km and above	-0.0265	-0.0039	0.327*	0.0649**	-0.224*	-0.0317
	(0.103)	(0.0156)	(0.171)	(0.0306)	(0.127)	(0.0195)
Age of learner	0.353***	0.0496***	0.340***	0.0681***	0.362***	0.0455***
	(0.0088)	(0.0010)	(0.0182)	(0.0029)	(0.0102)	(0.0010)

continued next page

Table 4.3 Continued

Variables	Pooled Sample (Coefficients)	Pooled Sample (Margins)	Private (Coefficients)	Private (Margins)	Public (Coefficients)	Public (Margins)
Gender of learner	-0.0916***	-0.0129***	-0.101*	-0.0203*	-0.0840***	-0.0105***
	(0.0274)	(0.0038)	(0.0546)	(0.0109)	(0.0319)	(0.0040)
Feeding programme	-0.00174	-0.0002	0.257***	0.0514***	-0.107***	-0.0135***
	(0.0319)	(0.0044)	(0.0639)	(0.0128)	(0.0369)	(0.0046)
Type of school	0.236***	0.0332***	-	-	-	-
	(0.0347)	(0.0048)				
Place of residence	-0.209***	-0.0293***	-0.320***	-0.0641***	-0.123**	-0.0154**
	(0.0385)	(0.0053)	(0.0591)	(0.0116)	(0.0499)	(0.0062)
Household size	-0.0414***	-0.0058***	-0.0784***	-0.0157***	-0.0280***	-0.0035***
	(0.0059)	(0.0008)	(0.0122)	(0.0024)	(0.0069)	(0.0008)
Overall poverty	-0.322***	-0.0453***	-0.509***	-0.102***	-0.240***	-0.0301***
	(0.0294)	(0.0040)	(0.0588)	(0.0112)	(0.0336)	(0.0041)

Sources: Authors' conceptualisation. Significance at *** p<0.01, ** p<0.05, * p<0.1

In the pooled sample regression, the effect of school feeding programme is not significant, but when we decompose the analysis to private schools, the effect is positive and significant, and negative in public schools. In private schools, the presence of a school feeding programme increases enrolment by 5 percentage points, whereas in public schools, enrolment was lower by 1 percentage point at p<0.01 than in schools without feeding programmes. While this finding is not expected, there are several factors that could explain this effect. First, in public schools, school feeding is financed by the government, which is marred with late disbursement of funding, thus still leading to out-of-pocket expenditures on the households or, in some cases, lack of implementation of the feeding programmes. This was the case in Ghana where there was delay in disbursement of funds for feeding programmes, causing arrears in payment to food suppliers for two terms, and in payment for cooks for six months (Sulemana, Ngah and Majid, 2013). Moreover, in instances where SFP is financed by the government, delays in disbursement of funds and political interference hinders implementation of programmes, thus an overall reduction in public school enrolment (Iddrisu et al., 2020).

Across all the three regressions, learners in rural areas are less likely to enrol in primary school by 3, 6 and 2 percentage points in the full sample, in private, and public schools, respectively. Enrolment is influenced by several factors, with

environment of the learner being one of them. Rural areas are characterised by high poverty levels, which reduces access to education due to direct costs of education such as uniform, textbooks, tuition fees, among others (Huisman and Smits, 2009); high levels of child labour, especially in high food production areas; and cultural practices such as early marriages, FGM, teenage pregnancies which prevent girls from going to school (Omoeva, Hatch and Sylla, 2014). Irrespective of the type of school that a learner attends, if they come from large households, the probability of attendance is reduced. Family size is negatively correlated to attendance because resources are divided among more children in large households (Huisman and Smits, 2009). Moreover, in households with children under that age of five, older siblings may provide childcare services and forego school enrolment and attendance, or even engage in child labour to increase household income (Huisman and Smits, 2009). The effect of poverty on enrolment is slightly higher at 10 percentage points in private schools compared to that of the full sample at 4 percentage points, and in public schools at 3 percentage points, respectively, at $p<0.01$. Financing private school education places a high financial burden on households due to the direct and indirect costs involved. Thus, poor households are less likely to enrol their children in private schools compared to public schools (Huisman and Smits, 2009).

In the secondary school regression, we include a variable, government assistance, measured as household that receives government bursaries as shown in Table 3.1 above. Just like pre-primary level, the effect of school feeding programme is insignificant, albeit positive. Unlike other levels of education, distance to school was insignificant and the effect of distance is still positive and highly significant ($p<0.01$) in distance between 3 and 5km and above 3km in the pooled sample and public schools. Over 70% of secondary schools in the country are day schools. With the introduction of Free Day Secondary Education (FSDE), travelling long distance is not a hindrance to access to education. Moreover, learners in both primary and secondary schools use other means of transport, such as cycling or using motorcycles, to go to school, in some regions. Not surprising, age of the learner is highly significant and positive in the pooled sample and public-school regressions. Thus, in public schools, a unit increase in the age of a learner, is more likely to cause them to be enrolled in secondary school by 10 percentage points and one percentage point more likely in the pooled sample. This is indicative of the high gross enrolment rates in public schools compared to private schools.

Table 4.4: Secondary school attendance in overall population, private and public schools, 2016

Variables	Pooled Sample (Coefficient)	Pooled Sample (Margins)	Private (Coefficients)	Private (Margins)	Public (Coefficients)	Public (Margins)
1-3km	0.211	0.0580	-0.320	-0.0774	0.242*	0.0658*
	(0.133)	(0.0369)	(0.517)	(0.123)	(0.139)	(0.0382)

Between 3-5km	0.709***	0.194***	-0.581	-0.135	0.833***	0.224***
	(0.245)	(0.0653)	(0.805)	(0.167)	(0.251)	(0.0646)
5km and above	1.014***	0.271***	0.669	0.177	1.050***	0.276***
	(0.229)	(0.0548)	(0.499)	(0.133)	(0.267)	(0.0612)

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Table 4.4 Continued

Variables	Pooled Sample (Coefficient)	Pooled Sample (Margins)	Private (Coefficients)	Private (Margins)	Public (Coefficients)	Public (Margins)
Age of learner	0.364***	0.0944***	0.0664	0.0164	0.401***	0.103***
	(0.0597)	(0.0134)	(0.192)	(0.0473)	(0.0645)	(0.0139)
Gender of learner	-0.123	-0.0320	-0.438	-0.108	-0.118	-0.0302
	(0.123)	(0.0318)	(0.410)	(0.0984)	(0.131)	(0.0335)
Feeding programme	0.170	0.0442	0.240	0.0593	0.169	0.0434
	(0.158)	(0.0410)	(0.408)	(0.101)	(0.174)	(0.0448)
Type of school	0.623***	0.162***	-	-	-	-
	(0.231)	(0.0583)				
Government assistance	1.557***	0.404***	2.291***	0.566***	1.562***	0.400***
	(0.187)	(0.0379)	(0.645)	(0.127)	(0.203)	(0.0408)
Place of residence	-0.675***	-0.175***	-0.779*	-0.192**	-0.632***	-0.162***
	(0.156)	(0.0393)	(0.410)	(0.0924)	(0.169)	(0.0424)
Household size	-0.0146	-0.0038	-0.0921	-0.0228	-0.00848	-0.0022
	(0.0256)	(0.0066)	(0.0744)	(0.0171)	(0.0275)	(0.0070)
Overall poverty	-0.560***	-0.145***	-0.160	-0.0396	-0.614***	-0.157***
	(0.131)	(0.0317)	(0.426)	(0.105)	(0.141)	(0.0334)

Sources: Authors' conceptualisation. Significance at *** p<0.01, ** p<0.05, * p<0.1

Learners are 16 percentage points more likely to be enrolled in public schools than private schools. These findings are not surprising, as public secondary schools are most preferred compared to private education in Kenya. Government assistance has been used for years to ease the burden of education on households through provision of education transfers such as bursaries through the establishment of the Constituency Development Fund (CDF) in 2013. We find a positive and highly significant effect of bursaries on enrolment in the three regressions. A learner who receives government bursaries is 40 percentage points more likely to enrol in both public and private school and 57 and 40 percentage points more likely to be enrolled in private and public schools, respectively. While provision of SFP is an important factor in access to secondary education, we find that provision of bursaries has a higher effect on enrolment. In rural areas, learners are 3 percentage points less likely to be enrolled in

private schools, compared to public schools and, in general, enrolment in rural areas is reduced by 17 percentage points. Overall poverty has no effect in private schools but reduces general enrolment by 14 percentage points and 16 percentage points in public schools at $p<0.01$.

Effects of school feeding programme on school attendance in the poorest counties

In the final estimate (Table 4.5), we present the effects of school feeding programme on enrolment in the top ten poor counties in Kenya. Counties with the highest overall poverty rates include Mandera (80%), Turkana (76%), Samburu (74%), Garissa (70%), Busia (68%), Tana River (65%), Wajir (62%), Marsabit (59%), West Pokot (56%) and Isiolo (50%) compared to the national average of 36%. These counties are characterised by prolonged drought, long distance to school, poor educational infrastructure, and economic marginalisation. Moreover, these counties are characteried by low enrolment rates at the pre-primary, primary, and secondary school levels. Table 4.5 presents the findings on the ASAL sub-sample at pre-primary, primary and secondary school levels. The results from the pre-primary level show highly significant and positive results on age of the learner. Enrolment in pre-primary increased by 2 percentage points. Notably, in schools where there are school feeding programmes, enrolment increases by 3 percentage points compared to those without, whereas in large households, enrolment is reduced by 1 percentage point.

The effect of distance on enrolment in the ASALs' sub-sample is similar to the pooled sample effects, where it has a positive effect on enrolment at primary school level. Travelling between 1-3km and 3-5km reduces enrolment by 5 and 6 percentage points, respectively. Older children are more likely to be enrolled in primary school by 6 percentage points. In larger households and households experiencing high levels of poverty, enrolment decreases by 3 and 5 percentage points, respectively.

Unlike results from the overall regression, the effect of school feeding programme in these counties is positive and significant. Notably, in primary schools with school feeding programmes, enrolment is likely to be more by 4 percentage points. Public schools also experience higher enrolment rates by 7 percentage points. The effect of SFP in secondary schools is positive, an indication that provision of school meals increases enrolment in Kenyan secondary schools. It is important to note that about 70% of secondary schools in Kenya are day schools, thus presence of school meals provides an incentive for enrolment. While provision of SFP is an important factor in access to secondary education, we find that provision of bursaries has a higher effect on enrolment. These findings are consistent in both the pooled and the ASAL sub-sample. Empirical evidence has shown that provision of bursaries and scholarships reduces household expenditure on education, thereby increasing enrolment, and

increases disposable income to the households, which can be spent on other school-related expenses such as SFP and non-education related expenses (Glewwe and Muralidharan, 2016).

Table 4.5: ASAL sub-sample regressions at pre-primary, primary and secondary attendance in top ten poor counties, 2016

Variables	Pre-primary (Coefficient)	Pre-primary (Margins)	Primary (Coefficients)	Primary (Margins)	Secondary (Coefficients)	Secondary (Margins)
1-3km	0.0578	0.0058	0.305***	0.0513***	0.705	0.137
	(0.123)	(0.0122)	(0.0578)	(0.0094)	(0.534)	(0.105)
Between 3-5km	0.300	0.0251	0.378***	0.0621***	1.533**	0.311*
	(0.448)	(0.0294)	(0.134)	(0.0195)	(0.781)	(0.160)
5km and above	-0.478	-0.0707	0.111	0.0199	2.061***	0.412***
	(0.412)	(0.0794)	(0.196)	(0.0339)	(0.633)	(0.121)
Age of learner	0.187***	0.0191***	0.338***	0.0574***	0.388**	0.0617***
	(0.0192)	(0.0027)	(0.0136)	(0.0019)	(0.161)	(0.0236)
Gender of learner	-0.0381	-0.0039	0.0530	0.0090	0.00332	0.0005
	(0.111)	(0.0114)	(0.0528)	(0.0089)	(0.391)	(0.0621)
Feeding programme	0.215*	0.0219*	0.221***	0.0376***	0.664	0.105
	(0.115)	(0.0118)	(0.0529)	(0.0089)	(0.427)	(0.0674)
Type of school	0.148	0.0151	0.420***	0.0714***	1.650***	0.262***
	0.0578	(0.0139)	(0.0706)	(0.0118)	(0.526)	(0.0684)
Government assistance	-	-	-	-	2.325***	0.370***
					(0.512)	(0.0807)
Place of residence	-0.0490**	0.0144	-0.154**	-0.0261**	-0.667	-0.106
	(0.0209)	(0.0138)	(0.0692)	(0.0117)	(0.419)	(0.0646)
Household size	0.141	-0.0050**	-0.00679	-0.0012	-0.161**	-0.0256*
	(0.135)	(0.0022)	(0.0106)	(0.0018)	(0.0788)	(0.0131)
Overall poverty	-0.0328	-0.0034	-0.287***	-0.0487***	-0.487	-0.0774
	(0.125)	(0.0128)	(0.0622)	(0.0105)	(0.534)	(0.0803)

Sources: Authors' conceptualisation. Significance at *** p<0.01, ** p<0.05, * p<0.1

Distance and age of learner have a favourable effect on enrolment at secondary school level. Although positive, the effect of school feeding programme is not significant. However, government assistance in form of bursaries is positive and highly significant at p<0.01. Learners that receive bursaries are 37 percentage points more likely to enrol in secondary schools compared to those without. Not surprising, learners in rural areas are 3 percentage points less likely to enrol in secondary schools.

5. Conclusion and policy recommendations

School feeding programmes have been universally implemented in both developed and developing nations to encourage human capital development. In Kenya, school feeding programmes are mainly implemented by the government in conjunction with other agencies such as the World Food Programme. While the effect of it is not significant in the pooled sample at pre-primary, it is important to note that SFP has improved school enrolment outcomes and nutritional benefits to children in pre-primary schools. Similarly, although SFP has negative effects on public primary schools, this could be attributed to observed inefficiencies associated with its implementation in public schools (Wineman et al., 2022).

From the analysis, we can conclude that school feeding programmes improve school enrolment when targeted to poor households and if efficiency is improved through prompt and timely disbursement of funds to ensure that these programmes are continuous. In secondary schools, we find that provision of bursaries and scholarships increases school enrolment. This does not negate the effects of school feeding on enrolment, since we find a positive and significant effect of SFP on enrolment.

It is recommended that targeting of school feeding programmes be improved to target schools from poor households in the Kenya ASALs, and informal settlements in urban areas. Household poverty is a key hindrance to access to education, whether in public or private school. Secondly, there is need to ensure timely disbursement of funds towards public school feeding programmes. Untimely delivery of funds has been found to reduce enrolment in public schools. More so, as shown in the study, there is need to increase investment towards bursaries and SFPs in secondary schools. Bursaries reduce education financing burden on the household, which significantly increases attendance and enrolment. Finally, county governments need to provide financial support to public pre-primary schools towards school feeding programmes.

One of the key limitations of this research is use of data that was not comprehensively collected on SFP. Future research could focus on assessing the implementation of specific SFP programmes, such as the Home-Grown School Meals Programme, which is implemented in public schools and whose goal is to tackle low school enrolment and attendance, high dropout rates and low academic achievement.

Notes

1. According to the World Bank's Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE).

2. http:////WACIE-RR-school%20feeding-EN.pdf

3. https://www.worldbank.org/en/region/afr/publication/potential-social-safety-nets-in-africa

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