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Does the Poverty Level Minimum Basket Adequately Inform the Scope of Governments' Poverty Reduction Strategies?

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Abstract

Appropriately guided and implemented government interventions help in achieving the desired outcome. They complement the household budget in meeting their basic needs, allowing them to move to a higher satisfaction level. The study looks at the nexus between household poverty and government strategies to stem it. The analysis uses various approaches including the binary and polychotomous logit models to see who is likely to benefit from the interventions, the Tobit model to measure the intensity in closing poverty gap and simulations to capture the impact and cost implications of interventions. While several interventions were introduced, results reveal implementation gaps where the deserving households are not comprehensively covered; the extremely poor have lower probability of uptake of the interventions. Thus, more targeted coverage is necessary in closing the poverty gap.

Keywords: poverty alleviation, transfers, safety

JEL classification: I38

1. Introduction

Addressing poverty remains a key global development agenda as stipulated in the 2030 Agenda for Sustainable Development Goals (SDGs). Goal 1 of SDGs aims to '*end poverty in all its forms everywhere*' while the African Union (AU) Agenda 2063 Aspiration One (1) emphasises on African people having a high standard of living, and quality of life, sound health and well-being. Historically, interventions aimed at addressing poverty have broadly emphasised on growing economic activity and redistribution of incomes and resources including through social protection programs. Nonetheless, poverty remains high in Sub-Saharan Africa (SSA) having reduced from about 51% in 2005 to 41% in 2015, relative to a decline by 11% from 21% in the same period at global level (Patel, 2018).

Kenya registered an average economic growth rate of above 5% for almost a decade. However, poverty remained persistent with a less than 1% annual decline. Results from the Kenya National Bureau of Statistics (2018) reveal that the overall poverty headcount rate reduced from 46.8% in 2005/06 to 36.1% in 2015/16. The overall headcount poverty in rural areas decreased from 52.5% in 2005/06 to 40.1% in 2015/16 while for urban areas it reduced by 2.7% to 29.4%. Food poverty headcount rate declined from 45.8% in 2005/06 to 32.0% in 2016, demonstrating the dominance of food poverty in the overall poverty level headcount. Reductions in food poverty incidence was registered in rural areas by 11.4% to 35.8% while the urban food poverty declined by 16.0% to 24.4% in 2015/16. While poverty rate has declined substantially, overall, the total number of the poor declined marginally from 16.6 million in 2005/06 to 16.4 million in 2015/16.

Government interventions should guide allocation of resources to priority areas that facilitate a decent life with adequate food consumption. Further, the basic needs basket used in the construction of poverty line need to adequately guide on intervention to eliminate the deprivations. For example, Bluhm *et al*. (2018) established that prior to 2000, economic growth largely influenced the poverty levels, however this changed necessitating the revision of poverty strategies. Westmore (2017) also noted that growth and social security system in China had served to reduce the number of people living in extreme poverty since 1970s. However, Anderson *et al*. (2018), in reviewing various studies found mixed results on the implications of government spending including pro-poor spending and health spending on poverty reduction. This implies that unclear identification of components of the basic-needs basket used to characterise the poverty line could result to unsuccessful government interventions sought to eradicate poverty.

Since 1990s, measurement of poverty has gained a multidimensional approach incorporating both monetary and non-monetary components. This means broadening the concept of poverty from its narrowest sense of lack of income, to encompassing multidimensional issues including basic needs and other avenues of accessing resources, social power relations (inequality) and human capabilities. Further, poverty is increasingly linked to deprivation which reflects on what poor people 'have or do not have' of the necessities of life (Alcock, 2006). In defining the poverty line, the cost of a minimum basket of necessities is considered. Such a basket can help to appropriately focus policies and inform the priority areas to be supported by government and development partners.

Goal 1 of SDGs considers the following components of poverty; income, hunger (food), malnutrition (food quality), access to education, social discrimination and exclusion and participation in decision-making. This emphasises that measurement of poverty can use varying components and approaches in investigating poverty (Jones and Tvedten, 2019). The multidimensional index includes ten indicators[1]. A person is multidimensionally poor if she/he is deprived in three or more dimensions. The new index shows that 23.4 million (53%) Kenyans were multidimensionally poor in 2015/16 compared to 15.9 million (or 36.1%) considering income only.

It is possible that what a person living in poverty is deprived of among the necessities in one period, is different from what the same person is deprived in another period. This implies that the characterisation of poverty line should change across time. The composition of the minimum basket is therefore dynamic reflecting change in tastes and preferences across locality or gender. It could also be that certain components in the basket persist over time perhaps because the government interventions were not effective in addressing the issues. Thus, understanding the composition of the minimum basket would serve to understand how to ensure no one is left behind be it long-term poor, recently/poor or episodic poor (Alkire *et al*., 2017).

[1] Child mortality, nutrition, years of schooling, school attendance, cooking fuel, sanitation, access to safe water, access to electricity, housing and asset ownership.

This study looks at the components of the poverty line minimum basket in informing the interventions undertaken by the government to understand the challenges and opportunities in appropriately focusing the mix of interventions to effectively address poverty in Kenya. This is also an attempt to finding out how identified indicators of measuring basic deprivation sufficiently inform policy makers in coming up with interventions that address deprivations adequately.

1.1. Objectives

The objective of the study is to generate evidence and knowledge on the effects of poverty reduction strategies. Specifically, the study aims to:

a) Examine whether access to various interventions make a difference in the lives of the poor.
b) Assess the impact of poverty reduction strategies on poverty and the cost of universalising the transfers.
c) Draw lessons on what to consider in designing the mix of policy interventions that are highly impactful in reducing poverty.

2. Review of poverty measurement approaches and surveys

2.1. Defining poverty level in Kenya

Determination of the poverty line is the most critical first step in poverty analysis. In the consumption-based, money-metric, approach to poverty, two methods are used to derive the poverty line: The Food Energy Intake (FEI)[2] method and the Cost of Basic Needs (CBN)[3] method. Some studies have used both the FEI and CBN method in their analyses of poverty, arguing that these two approaches are not mutually exclusive and can be used in a complementary way—the former to set the food poverty line and the latter to arrive at a total poverty line (Piachaud, 1987).

It is important to recognise that poverty lines in Kenya have previously been estimated using a modified linear programming approach by Crawford and Thorbecke (1980), which assumed a daily adult equivalent calorie intake of 2,250 calories, using information available on current prices, food weight-to-calorie conversion factors, and the share of food in total expenditure. The Foster-Greer-Thorbecke (FGT) index of poverty measurement measures the head count, depth and severity of poverty in most studies[4] (Foster *et al*., 1984; Ravallion, 1993; Ali and Thorbecke, 2000).

The food poverty line defines a certain minimum nutrition level an individual aim to achieve at the lowest cost; while considering or accounting for regional preferences and prices (Greer and Thorbecke, 1986). In a classical linear model, price of commodities is considered since other variables including the required dietary allowance, calories content of food and minimum quantities required for each commodity are exogenously determined. The classical linear programming solution may therefore imply consumption patterns that do not correspond to local tastes and preferences.

To ensure the consumption basket corresponds to the local consumption and production patterns. Wasay (1977) took the major food items in the budget of a low-income family and applied the percentage of the total calorie intake attributable to each item to calculate the desired consumption levels of the various food items. Further, Ali and Thorbecke (2000)

[2] The FEI approach has the advantage of specificity and reflects better the actual food consumption behaviour of individuals for both children and adults.
[3] The CBN approach ensures consistency in treating all individuals with the same living standards equally.
[4] The definition of subjective poverty is based on the perception of individuals about their well-being and attempts to relate the self-reported subjective welfare levels with observed income.

provided estimates of the state and path of poverty in sub-Sahara Africa using income distribution between rural and urban areas. Finally, the minimum expenditure on each item was derived using the respective commodity prices. The total amount was then used to calculate the poverty level. This means that first, you determine the low-income families and define the cut-off point in terms of what to include in the basic need basket[5].

Besides the food poverty, other nonfood expenditure items are crucial in determining the poverty levels, this including employment, schooling and other essential basic needs (Sen, 2004). Studies on non-monetary measures focuses on the deprivation and social exclusion approaches and examines the extent to which households have been excluded on social interventions. Most researchers identify a set of items that constitute the essentials of life—things that no family should have to go without—and these form the basis of the indicators of deprivation[6] and exclusion[7].

The deprivation indicators highlight the fact that many families are unable to afford basic needs. The exclusion indicators show how lack of access to basic services and social and economic activities affects poverty interventions. Addressing the different dimensions of social disadvantage aid in developing programs to combat the different forms of poverty levels in the society.

3. Does access to the various interventions make a difference in the lives of the poor?

This section focuses on methodological approaches for examining effects of various poverty interventions on the poor and the impacts of these interventions.

3.1. Methodology

The approach used focuses on explaining the role of public sector socio-economic interventions in reducing poverty. In addition, the methods employed explain the differing probabilities of benefiting from public sector interventions by poverty status of a household. To achieve these objectives, various estimation models were used. A binomial model was used to compute the likelihood of benefitting from a public sector intervention for the poor and non-poor. In this model, the dependent variable takes the value 1 if a household (or individual) is poor and zero otherwise. Poverty is defined based on per adult equivalent terms.

Besides the binary logit, a polychotomous logit model is used to assess or explain the differential effects of the interventions on the non-poor, poor and extremely poor. In this model, the population subsamples are ordered using poverty lines as cut-off points. The binary and polychotomous logit models may not explain the relationship between the interventions and the intensity of poverty. The study's approach therefore estimates a Tobit model—which is used to explain how receipt or non-receipt of an intervention may explain the intensity of poverty. In this model, the dependent variable is a poverty index restricted to the poor households while the non-poor households are assigned a value of zero.

Even so, the three sets of regressions may not answer the predicted impacts and costs associated with scaling up the public sector interventions. This aspect of the objective is achieved through ex-ante or 'naïve' simulations supplemented by propensity score matching (PSM).

[5] The basic need basket is defined by frequency of using those commodities assuming the cultural differences or the pattern of consumption of the same for families at higher income levels.

[6] Missing out on set of items that constitute the essentials of life things because of a lack of resources.

[7] Being left out of participation in common activities that constitute the essentials of life things.

3.1.1 Estimation equations

The estimations were carried out using three broad different kinds of models, i.e., Logit, Ordered Logit and Tobit models. The general form of the estimated models took the form:

$$y^*_i = \delta + \Sigma \sum x'_i \beta' + \mu_i$$

where y^*_i is a latent variable and it is represented by a dummy variable which takes the value 1 when $y^*_i > 0$ and 0 otherwise for the binary logit model. For the ordered logit regression, the dependent variable took the values 0, 1 and 2 as follows: a value of zero if the household was non-poor, i.e., per adult equivalent income was equal to or greater than Ksh. 3,252 in rural and peri-urban areas and Ksh. 5,995 in core urban areas. A value of 2 if extremely poor, i.e., the monthly per adult equivalent total consumption expenditure of less than Ksh. 1,954 in rural and peri-urban areas and Ksh 2,551 in core urban areas. The rest of the poor (not extremely poor) were assigned a value of 1. In the Tobit model, the dependent variable (GAP) was measured as a continuous index measuring the distance between the household poverty level (X1) from the poverty line (X0) defined as GAP = ((X1 – X0)/X0). The higher the absolute value the higher the poverty gap. It varies from 0 to −100 where 0 was the upper limit (at the poverty line) while −100 was the poorest household with respect to per adult equivalent consumption spending. The Tobit model thus allowed for an examination of the relationship between the explanatory variables and the intensity of poverty.

As for the other variables in the general form of the estimated models, δ is a constant term, x'_i is a vector of explanatory variables. Most of the explanatory variables[8] were dummies taking a value of 1 if a household has a particular attribute of interest, e.g., received a particular cash transfer or consumed a particular good/service. A comprehensive list of control variables[9] used were those found to be important in explaining poverty from past studies on poverty in Kenya. β'_i is a vector of parameter estimates each corresponding to the respective variables, while μ_i is the error term.

Regarding simulations, specifically, the study measured the predicted change in poverty at national level using the Foster *et al.* (1984) poverty measures before and after the interventions. Three metrics are produced before-and-after the interventions—and these are measures for the poverty headcount (P0)—or the proportion of the population that is below the national poverty line. The poverty gap (P1) or the average amount by which the population is below the poverty line, and the poverty severity index (P2) the square of the poverty gap. The nominal costs of the transfers are easily derived from the transfer per household multiplied by the number of beneficiary households.

3.1.2 Construction of variables

The construction of variables and their descriptive statistics is summarised in Table 1. Poverty, the dependent variable, was defined based on per adult equivalent consumption and its construction is discussed in the previous subsection. The construction of each of the variables is described in the second column of the table. The composite index (compindex) is a variable that varies from 1 to 6. The index takes the value 1 if a household received only one of the public sector interventions (i.e., consumption of fortified maize (X), consumption of fortified wheat (Y), consumption of fortified fat (Z), consumption of free health services (Health1), Bursary, orphaned and vulnerable children cash transfer

[8] These variables include consumption of fortified maize flour, wheat flour and fat as well as receipt of bursary or free medical healthcare.

[9] These variables included sex, age, literacy, marital status, household size, sector of employment (public or otherwise), occupation (agriculture or otherwise) and area of residence (Mwabu *et al.*, 2000; Geda *et al.*, 2001; Odhiambo, 2019).

Table 1. Construction of Variables and Their Descriptive Statistics

Variable name	Variable description	*N*	Mean overall	Standard deviation	Min	Max	Mean (rural)	Mean (urban)
MPI	Multidimensional poverty index	21,773	0.4788	0.2904	0	1	0.5339	0.3337
Fortified maize (X)	*X* = 1 if consumed fortified maize and zero otherwise	21,773	0.1971	0.3978	0	1	0.1182	0.3344
Fortified wheat (Y)	*Y* = 1 if consumed fortified wheat and zero otherwise	21,773	0.1888	0.3914	0	1	0.1772	0.2090
Fortified fat (Z)	*Z* = 1 if consumed fortified fat and zero otherwise	21,770	0.0999	0.2999	0	1	0.1165	0.0710
Bursary	Bursary = 1 if household with individual aged 14–17 years received a bursary and zero otherwise	21,773	0.0214	0.1450	0	1	0.0234	0.0181
ReceivedCT	ReceivedCT = 1 if a household received either Bursary, OVC CT, or OPCT	21,773	0.0445	0.2061	0	1	0.0548	0.0265
Health1	Health1 = 1 if sick and gets free health services and zero otherwise	21,750	0.2513	0.4338	0	1	0.3030	0.1612
Health2	Health2 = 1 if sick, got diagnosis from the medical facility and gets free health services and zero otherwise	21,751	0.3430	0.4747	0	1	0.3875	0.2654
CompIndex	Composite index	21747	1.7625	0.9213	1	6	1.7608	1.7655
Age	Age in years	21,773	43.2	40.4	12	95	46.7	37.1
Agesq	Agesquared/100	21,773	21.2	15.9	1.44	90.25	24.5	15.4
Literate	Literate = 1 if household head can read and write in any language	21,773	0.6425	0.4793	0	1	0.6244	0.6739
Residence	Residence = 1 if urban	21773	0.365	0.479	0	1	0	1
Sex	Sex = 1 if Male	21,773	0.3240	0.4680	0	1	0.3565	0.2675
Household size	Size of the household	21773	4.0	2.4	1	28	4.5	3.1
Monogamous	= 1 if married and monogamous and 0 otherwise	21773	0.608	0.488	0	1	0.6125	0.6012
Polygamous	= 1 if married and polygamous and 0 otherwise	21773	0.078	0.268	0	1	0.1050	0.0320
Employment	= 1 if formal or public and 0 otherwise	19384	0.345	0.475	0	1	0.2406	0.5254
Occupation	= 1 if in agriculture (includes subsistence farmer and pastoralist) and 0 otherwise	19,384	0.291	0.454	0	1	0.4434	0.0282

Source: KIHBS 2015/16.

Table 2. Deprivation Based on the Indicators

Variable	Deprived if . . .
Years of schooling	No member has completed 5 years of schooling (= 1)
Child school attendance	Any school-aged child is not attending school in years 1–8
Child mortality	Any child has died in the family
Nutrition	Any adult or child in malnourished
No electricity	The household has no electricity
No sanitation	The household sanitation facility is not improved
No clean water	The household does not have access to safe drinking water
Floor type	The household has dirt, sand or dung floor
Cooking	The household cooks with dung, wood or carbon
Assets	The household does not own more than one of radio, TV, telephone, bicycle, scooter or refrigerator – and does not own a car or a truck.

Table 3. Multidimensional Poverty Index indicator scores

Variable	Number of observations	Mean	Standard deviation	Min	Max
Years of schooling	21,773	0.4411	0.4965	0	1
Child school attendance	21,773	0.7813	0.4134	0	1
Child mortality	21,773	0.0311	0.1737	0	1
Nutrition	21,773	0.2631	0.1824	0	1
No electricity	21,773	0.6566	0.4748	0	1
No sanitation	21,773	0.9995	0.0225	0	1
No clean water	21,773	0.4777	0.4995	0	1
Floor type	21,773	0.5589	0.4965	0	1
Cooking	21,773	0.5225	0.4995	0	1

(OVC CT), or older persons cash transfer (OPCT)). Its value increases with the number of interventions received. Age squared is divided by 100 to scale up the estimated coefficients. The constructio\Noissue n of the rest of the variables are clear from Table 1.

Besides the monetary measure of poverty, this report also uses the multidimensional poverty index (MPI) measure. The MPI used as a dependent variable in some of the regressions follows the approach suggested by Alkire and Santos (2010) and Santos and Alkire (2011) and used in the Human Development Report. It has three dimensions, education[10], health and living standard[11]. Table 2 below summarises the deprivation definitions for each of the ten indicators.

Adults are considered malnourished if the BMI is below 18.5 while children are considered malnourished if their *z*-score of weight-for-age is below two standard deviations from the median of the reference population. A household has improved sanitation if it has a flush toilet, ventilated improved pit or composting toilet, provided that they are not shared. A household has access to safe drinking water if the water source is either piped water, public tap, borehole, protected well, protected spring or rainwater, and it is within a distance of 30 minutes' walk (roundtrip). Each of the three dimensions is given a weight of one third. We compute the indicators and in each case an indicator takes a value of 1 if the household is deprived and 0 otherwise. The results are summarised in Table 3 below.

[10] Education has two indicators, years of schooling and child attendance to school.
[11] Health has two indicators mortality and nutrition while standard of living has six indicators electricity, sanitation, water, floor, cooking fuel and assets.

Table 4. MPI Descriptive Statistics of Dimensions

Variable	Number of observations	Mean	Standard deviation	Min	Max
Education	21,773	0.2037	0.1263	0	0.33
Health	21,773	0.0104	0.0579	0	0.33
Standard of living	21,773	0.2143	0.0994	0	0.33
Headcount ratio (H)	21,773	0.7739	0.4183	0	1
Average intensity (A)	16,851	0.6186	0.1498	0.25	1
MPI	21,773	0.4788	0.2904	0	1

The indicators are summed up into three dimensions each set of indicators weighted such that the weights add up to one third. The respective weights of each of the two education and health indicators are 1/6 while each of the five standard of living indicators has a weight of 1/15. Table 4 below indicates the descriptive statistics of the dimensions. A score of 0.33 in education or health would suggest that a household is deprived in each of the two indicators of these dimensions.

The MPI reflects both the incidence or headcount ratio (H) of poverty—the proportion of the population that is multidimensionally poor—and the average intensity (A) of their poverty—the average proportion of indicators in which poor people are deprived. The MPI is calculated by multiplying the incidence of poverty by the average intensity across the poor (H∗A). The cutoff for poverty that we use is that a person is identified as poor if he or she is deprived in at least one third of the weighted indicators (i.e., a score of 0.33). The mean incidence of poverty, H, is 77.4%. The average share of weighted indicators in which the poor are deprived, A, is 61.9%. The MPI is 47.9%.

3.1.3 Data source and type

The data used for the analyses are the KIHBS 2005/06 and KIHBS 2015/16 from the Kenya National Bureau of Statistics. The data were representative of the whole country and covered about 13,000 and 21,773 households respectively. The 2015/16 KIHBS was conducted over a 12-month period (September 2015–August 2016) and was designed to provide estimates for various socio-economic indicators at the national and sub-national levels, and place of residence (rural and urban areas). The sample was divided into four quarters (a consecutive 3-month period) to capture seasonality. Each of the 2,400 clusters was randomly assigned into one of the quarters to generate nationally representative quarterly samples of approximately 600 clusters that can be analysed independently.

3.2. Regression results

The regression tables are presented at the end of the discussions. The poor have a higher probability to uptake the package of interventions being implemented by the government as compared to the non-poor as indicated by the positive and significant *COMPINDEX* variable. The probability is higher among the urban households as compared to the rural households (Table 5).

While the poor have a higher probability to uptake the interventions, it is much lower among the extreme poor as compared to the other poor group. While in both rural and urban areas, the probability for the extreme poor is less than that of the other poor households, it is much lower in urban areas than in the rural areas (Table 6).

The uptake of the interventions helps in reducing the poverty gap (Table 7). The rate at which the poverty gap is closed is higher in the rural areas as compared to the urban areas when the interventions are taken into account.

Table 5. Marginal Effects: Results of Binary Regression Model (Probit Marginal Effects) (Dependent Variable: Poverty Based on Income Per Adult Equivalent)

Variable	Overall	Rural	Urban
Model 1	*n* = 19,355; *F*-ratio = 72.6; *P* = 0.000	*n* = 13,990; *F*-ratio = 85.0; *P* = 0.000	*n* = 5,365; *F*-ratio = 29.0; *P* = 0.000
Compindex	0.900***	0.106***	0.058***
Model 2	*n* = 19,355; *F*-ratio = 53.9; *P* = 0.000	*n* = 13,990; *F*-ratio = 58.2; *P* = 0.000	*n* = 5,365; *F*-ratio = 21.3; *P* = 0.000
Fortified maize (X)	−0.058***	−0.039**	−0.071***
Fortified wheat (Y)	−1.66***	−0.222***	−0.087***
Fortified fat (Z)	−0.005	−0.034**	0.059***
Health1	−0.004	−0.011	0.018
ReceivedCT	0.0360[1]	0.043**	0.011
Model 3	*n* = 19,356; *F*-ratio = 54.3; *P* = 0.000	*n* = 13,990; *F*-ratio = 57.7; *P* = 0.000	*n* = 5,366; *F*-ratio = 22.4; *P* = 0.000
Fortified maize (X)	−0.058***	−0.039**	−0.071***
Fortified wheat (Y)	−0.166***	−0.223***	−0.085***
Fortified fat (Z)	−0.005	−0.034**	0.061***
Health2	−0.030***	−0.041***	−0.019
ReceivedCT	0.036[1]	0.042**	0.012
Model 4	*n* = 18,456; *F*-ratio = 47.4; *P* = 0.000	*n* = 13,251; *F*-ratio = 50.1; *P* = 0.000	*n* = 5,205 *F*-ratio = 20.3; *P* = 0.000
Fortified maize (X)	−0.058***	−0.037**	−0.073***
Fortified wheat (Y)	−0.159***	−0.214***	−0.081***
Fortified fat (Z)	−0.005	−0.032**	0.057***
Health1	−0.008	−0.016	0.019
Bursary	−0.167	−0.050	−2.622***
OVC CT	0.168***	0.149**	2.477***
OPCT	0.179	−0.057	Dropped[1]
Model 5	*n* = 18,456; *F*-ratio = 47.5; *P* = 0.000	*n* = 13,251; *F*-ratio = 49.4; *P* = 0.000	*n* = 5,366; *F*-ratio = 26.0; *P* = 0.000
Fortified maize (X)	−0.057***	−0.037**	−0.069***
Fortified wheat (Y)	−0.159***	−0.216***	−0.086***
Fortified fat (Z)	−0.005	−0.033**	0.062***
Health2	−0.029***	−0.040***	−0.019
Bursary	−0.162	−0.045	−0.074
OVC CT	0.167***	0.148**	Dropped[1]
OPCT	0.173	−0.060	0.526***

[1]Dropped due to lack of convergence. *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Although the uptake of the interventions and multidimensional poverty have the expected sign, the result are not significant in the overall, rural and urban samples (Table 8).

3.2.1. What are the differences across the various interventions?

The key elements considered include the fortified foods, access to free health care, bursary and cash transfers, i.e., OVC CT and OPCT.

a) Fortified foods

For both the maize and wheat flour, the probability of the poor up-taking is lower than that of the non-poor (Table 5), while for the fortified fats the results are insignificant. This is an

Table 6. Marginal Effects: Income Per Adult Equivalent Ordered Logit Models for Probability of Being Non Poor (0), Moderately Poor (1) and Extremely Poor (2)

	Overall			Rural			Urban		
	0	1	2	0	1	2	0	1	2
Model 1									
Compindex	−0.081***	0.067***	0.015***	−0.095***	0.072***	0.023***	−0.055***	0.051***	0.004***
Model 2									
Fortified maize (X)	0.054***	−0.044***	−0.010***	0.034*	−0.025**	−0.008**	0.073***	−0.068***	−0.005***
Fortified wheat (Y)	0.172***	−0.139***	−0.032***	0.227***	−0.170***	−0.057***	0.088***	−0.082***	−0.006***
Fortified fat (Z)	0.009	−0.008	−0.002	0.037**	−0.028**	−0.009**	−0.057***	0.053***	0.004***
Health1	0.008	−0.007	−0.002	0.015	−0.011	−0.004	−0.019	0.018	0.001
ReceivedCT	−0.037*	0.030*	0.007*	−0.040*	0.030**	0.010*	−0.021	0.019	0.001
Model 3									
Fortified maize (X)	0.054***	−0.044***	−0.010***	0.033*	−0.025*	−0.008*	0.072***	−0.068***	−0.005***
Fortified wheat (Y)	0.172***	−0.139***	−0.032***	0.229***	−0.172***	−0.057***	0.086***	−0.080***	−0.006***
Fortified fat (Z)	0.009	−0.008	−0.002	0.038***	−0.028***	−0.009***	−0.058***	0.054***	0.004***
Health2	0.036***	−0.029***	−0.007***	0.048***	−0.036***	−0.012***	0.020	−0.018	−0.001
ReceivedCT	−0.038*	0.031*	0.007*	−0.040*	0.030**	0.010*	−0.022	0.020	0.001
Model 4									
Fortified maize (X)	0.052***	−0.042***	−0.010***	0.027	−0.021	−0.007	0.073***	−0.068***	−0.005***
Fortified wheat (Y)	0.165***	−0.135***	−0.030***	0.221***	−0.167***	−0.054***	0.082***	−0.077***	−0.005***
Fortified fat (Z)	0.008	−0.006	−0.001	0.033**	−0.025**	−0.008**	−0.056***	0.052***	0.003***
Health1	0.012	−0.010	−0.002	0.020*	−0.015*	−0.005*	−0.019	0.018	0.001
Bursary	0.146	−0.120	−0.027	0.050	−0.038	−0.012	0.397***	−0.372***	−0.025***
OVC CT	−0.131***	0.107***	0.024***	−0.117**	0.088**	0.029**	−0.236***	0.221***	0.015***
OPCT	−0.166	0.136	0.031	0.069	−0.052	−0.017	−0.258***	0.242***	0.016***
Model 5									
Fortified maize (X)	0.051***	−0.042***	−0.009***	0.026	−0.020	−0.006	0.072***	−0.068***	−0.004***
Fortified wheat (Y)	0.166***	−0.135***	−0.030***	0.224***	−0.170***	−0.054***	0.080***	−0.075***	−0.005***
Fortified fat (Z)	0.008	−0.006	−0.001	0.034**	−0.026**	−0.008**	−0.057***	0.054***	0.004***
Health2	0.035***	−0.028***	−0.006***	0.047***	−0.035***	−0.011***	0.019	−0.018	−0.001
Bursary	0.141	−0.115	−0.026	0.043	−0.033	−0.011	0.383***	−0.359***	−0.024***
OVC CT	−0.130***	0.106***	0.024***	−0.116**	0.088**	0.028**	−0.231***	0.217***	0.014***
OPCT	−0.162	0.133	0.030	0.074	−0.056	−0.018	−0.255***	0.239***	0.016***

*$p<0.1$, **$p<0.05$, ***$p<0.01$.

Table 7. Consumption Per Adult Equivalent Among the Poor—Tobit Model for Overall, Rural and Urban Samples (the Dependent Variable = ((X1 – X0)/X0)

	Overall	Rural	Urban
Model 1	*n* = 19,355;	*n* = 13,990;	*n* = 5,365;
	F-ratio = 79.2;	*F*-ratio = 96.4;	*F*-ratio = 26.5;
	P = 0.000	*P* = 0.000	*P* = 0.000
Compindex	−8.352***	−8.564***	−7.670***
Model 2	*n* = 19,355;	*n* = 13,990;	*n* = 5,365;
	F-ratio = 61.2;	*F*-ratio = 64.9;	*F*-ratio = 23.8;
	P = 0.000	*P* = 0.000	*P* = 0.000
Fortified maize (X)	7.886***	3.681**	13.112***
Fortified wheat (Y)	19.729***	23.570***	13.469***
Fortified fat (Z)	1.724	4.621***	−7.707***
Health1	0.656	1.262	−2.711
ReceivedCT	−4.870**	−3.905*	−6.477
Model 3	*n* = 19,356;	*n* = 13,990;	*n* = 5,366;
	F-ratio = 62.0;	*F*-ratio = 63.7;	*F*-ratio = 25.6;
	P = 0.000	*P* = 0.000	*P* = 0.000
Fortified maize (X)	7.820***	3.596**	13.028***
Fortified wheat (Y)	19.641***	23.602***	13.249***
Fortified fat (Z)	1.679	4.636***	−7.923***
Health2	4.143***	5.079***	2.715
ReceivedCT	−4.881**	−3.840*	−6.641
Model 4	*n* = 18,456;	*n* = 13,251;	*n* = 5,205;
	F-ratio = 53.6;	*F*-ratio = 56.2;	*F*-ratio = 21.9;
	P = 0.000	*P* = 0.000	*P* = 0.000
Fortified maize (X)	7.744***	3.171*	13.266***
Fortified wheat (Y)	19.240***	23.271***	12.813***
Fortified fat (Z)	1.434	4.146***	−7.585***
Health1	1.011	1.612	−2.710
Bursary	21.562*	9.981	67.583***
OVC CT	−12.309***	−9.400**	−30.238***
OPCT	−31.218**	−0.9278	−42.397***
Model 5	*n* = 18,456;	*n* = 13,251;	*n* = 5,205;
	F-ratio = 54.0;	*F*-ratio = 55.3;	*F*-ratio = 23.1;
	P = 0.000	*P* = 0.000	*P* = 0.000
Fortified maize (X)	7.674***	3.053*	13.199***
Fortified wheat (Y)	19.190***	23.361***	12.617***
Fortified fat (Z)	1.403	4.192***	−7.852***
Health2	3.988***	4.995***	2.659
Bursary	21.028*	9.375	65.766***
OVC CT	−12.123***	−9.207**	−29.509***
OPCT	−31.009***	−0.1385	−42.028***

*$p<0.1$, **$p<0.05$, ***$p<0.01$.

undesirable outcome given that the poor are prone to having low/deficient micronutrients levels.

While the poor and the extreme poor have lower probability to take up the fortified food, there are differences in rural and urban areas. For example, in rural areas the probability for the fortified maize is lower compared to that of the fortified wheat. In the urban areas, the results are significant for the poor and extreme poor for all the components.

Considering the poverty gap, the food fortification seems to have higher poverty gap with differences across the products. For example, the poverty gap is higher in urban areas with maize and in rural areas with the wheat.

Table 8. Regressions, Dependent Variable: Multidimensional Poverty Index – for Overall, Rural and Urban Samples

	Overall	Rural	Urban
Model 1	$n = 19{,}355$; $R^2 = 0.157$	$n = 19{,}355$; $R^2 = 0.157$	$n = 5{,}365$; $R^2 = 0.049$
Compindex	−0.003	−0.001	−0.005
Age	0.004***	0.002**	0.002
Age squared	−0.006***	−0.005***	−0.003
Literate	−0.022***	0.019***	−0.097***
Residence	−0.201***		
Sex	−0.022***	−0.028***	−0.001
Household size	0.011***	0.014***	0.001
Marymono	−0.019***	−0.018**	−0.018
Marypoly	−0.009	−0.002	−0.016
Employment sector	0.014**	−0.015**	0.040***
Occupation	0.052***	0.040***	0.080**
Constant	0.480***	0.481***	0.347***
Model 2	$n = 19{,}355$; $R^2 = 0.164$	$n = 13{,}990$; $R^2 = 0.060$	$n = 5{,}365$; $R^2 = 0.051$
Fortified maize (X)	−0.028***	−0.066***	−0.005
Fortified wheat (Y)	−0.018***	−0.034***	0.015
Fortified fat (Z)	0.007	0.004	0.015
Health1	0.044***	0.046***	0.025**
ReceivedCT	0.003	0.002	0.022
Constant	0.461***	0.467***	0.334***
Model 3	$n = 19{,}356$; $R^2 = 0.160$	$n = 13{,}990$; $R^2 = 0.056$	$n = 5{,}366$; $R^2 = 0.050$
Fortified maize (X)	−0.0292***	−0.0703***	−0.00396
Fortified wheat (Y)	−0.0147**	−0.0296***	0.0162
Fortified fat (Z)	0.00855	0.00519	0.0162
Health2	0.0104*	0.0184***	−0.00880
ReceivedCT	0.00242	0.000614	0.0226
Constant	0.474***	0.485***	0.338***
Model 4	$n = 18{,}456$; $R^2 = 0.168$	$n = 13{,}251$; $R^2 = 0.062$	$n = 5{,}205$; $R^2 = 0.057$
Fortified maize (X)	−0.028***	−0.066***	−0.005
Fortified wheat (Y)	−0.019***	−0.036***	0.015
Fortified fat (Z)	0.005	0.003	0.008
Health1	0.045***	0.049***	0.022**
Bursary	−0.152*	−0.218*	−0.022
OVC CT	0.005	0.024	−0.082
OPCT	0.095	0.021	0.121
Constant	0.476***	0.474***	0.344***
Model 5	$n = 18{,}456$; $R^2 = 0.164$	$n = 13{,}251$; $R^2 = 0.057$	$n = 5{,}205$; $R^2 = 0.056$
Fortified maize (X)	−0.029***	−0.071***	−0.004
Fortified wheat (Y)	−0.016**	−0.031***	0.016
Fortified fat (Z)	0.006	0.005	0.00930
Health2	0.010*	0.019***	−0.00895
Bursary	−0.158*	−0.229**	−0.0174
OVC CT	0.006	0.026	−0.0826
OPCT	0.088	0.014	0.117
Constant	0.489***	0.493***	0.348***

Note: All the models had similar control variables not reported here for brevity. *$p<0.1$, **$p<0.05$, ***$p<0.01$.

When considering the multidimensional measure of poverty, the consumption of fortified maize and wheat are significant only in the overall and rural samples. As multidimensional poverty worsens, a household is less likely to consume fortified maize or wheat. The consumption of oil is not significant in all the models.

b) Health care

When it comes to access to health-care, in general the poor have a lower probability than the non-poor in accessing free medical care as well as being diagnosed in a health facility. First, most of the poor self-diagnose themselves and even for the poor who are diagnosed in the health facility the probability is still low to uptake the free medical care as compared to the non-poor. The results with accessing free medical care without considering where they were diagnosed is insignificant (*Health1*). The results where one is diagnosed in health facility and receiving the free medical care (*Health2*), are significant. It means that although the poor have a lower probability it is important that they get to be diagnosed in a health facility to access the free medical care.

Both in the rural and urban areas, the probability of the poor having both diagnosed and free medical care is lower than that of the non-poor. The results are significant for those in rural areas as compared to those in urban areas, among those getting diagnosed in the health facility and getting free medical care.

Receiving free medical services is key in closing the poverty gap. However, given the low level of utilisation by the poor this is serving to widen the poverty gap.

The multidimensionally poor are more likely to get free health services when sick (*Health1*) in the overall and rural samples. The urban relationship is not significant. Those with higher deprivation are more likely to be diagnosed in a medical facility (*Health2*) and *Health2* are significant in the urban and rural samples.

c) *Bursary*

Bursary has insignificant results although showing lower access by the poor. When using the ordered logit, the results for the non-poor are significant and positive implying that the non-poor are benefiting from the bursary. The poor have lower probability both in the rural and urban areas to uptake the bursary. It is therefore not surprising that the bursary is serving to widen the poverty gap rather than reduce it.

d) Cash transfers

For the total cash transfers that include cash transfer to vulnerable children, bursary and older persons cash transfer, the probability of the poor receiving cash transfers is higher than for the non-poor. In addition, the probability is higher in rural than in urban areas.

While the poor are more likely to take cash transfers, the extreme poor probability is much lower yet they are the most deserving. That said cash transfers play a critical role in closing the poverty gaps. This means a transitioning of the vulnerable receiving the cash transfers should be evidenced overtime.

For the OVC CT, the probability of getting the cash transfer is higher for the poor compared to non-poor. The per capita element seems to matter as results indicate that the per capita benefit is lower for the poor. This is because the poorer households are more likely to have larger households and more than one OVC CT. The probability is higher among the urban compared to the rural areas. However, the old persons cash transfers are not significant.

3.2.2. Other factors determining uptake of poverty interventions

Factors explaining poverty were included in the model. These factors have been discussed in various studies of determinants of poverty in Kenya and include age, age squared, sex,

literacy, marital status, sector of employment, occupational status, and area of residence (Mwabu *et al*., 2000; Oyugi, 2000; Geda *et al*., 2001; Odhiambo, 2019).[12]

According to the estimation results for the overall sample, one of the consistent results across the models is that female headed households are more likely to be poor. Household size is a significant determinant and larger households are more likely to be poor. Employment in the formal or public sector is associated with lower probability of being poor and if the main occupation of the household head is agriculture there is a higher probability of being poor. For the overall model, age, age squared and residence were not statistically significant across all the estimated models. Being literate and being in a polygamous marriage were only significant in the Tobit model that was linking the control variables to the intensity of being poor. The Tobit results indicate that not being able to read and being in a polygamous household were associated with a higher intensity of poverty.

The urban and rural results are largely similar, and literacy, household size and sector of employment were significantly associated with poverty in both areas. However, a key difference is that age and age squared are statistically significant variables in the urban but not rural areas. The negative coefficient of age for the urban sample suggests probability of being poor declining with increase in the age of household head. The positive age squared coefficient suggests this effect declines as age increases.

The succeeding tables summarise the results for the regression models. These include the logit, ordered logit and Tobit models, respectively. For brevity, the coefficients of the control variables are not presented.

4. Simulations of the predicted impacts of scaling up poverty interventions

4.1. Cash transfer baseline

Next, is simulating the predicted impacts of scaling up the poverty interventions with specific focus on cash transfers. This is done by measuring the predicted change in poverty at national level using the Foster-Greer-Thorbecke poverty measures before and after the interventions[13]. In the literature, this approach is referred to as a 'naïve' or 'morning after' simulation method.

A key assumption is that the households use the cash transfers for their basic needs. Indeed, the KIHBS 2015/16 indicates that a significant share of the cash transfers is spent on essential items and basic needs and in particular education (43.52% of all transfers) and food (38.75% of all transfers). The remaining 17.7% was spent on health and other expenditures. The potential impact of cash transfers on poverty is examined by developing a baseline scenario that measures the poverty level that assumes the households did not receive the transfers at all.

The summary of the changes in poverty measures when the cash transfers (per adult equivalent) are excluded from per adult equivalent household incomes are presented in Table 9. The impacts on headcount poverty are relatively small—ranging from 20.64% (when transfers are included) and 20.85% (when transfers are removed). This low impact has been attributed to the low coverage of the interventions. As an example, the OVC CT reached less than 353,000 households in 2015/16 or 11.5% of all poor households in Kenya. The hunger safety net programme reached just about 100,000 households (3.25% of all

[12] Assets such as land size has also been identified as an important variable. Although this variable was available in the dataset used, it was anonymised and could not be analysed.

[13] Three metrics are produced before-and-after the interventions—and these are measures for the poverty headcount (P0)—or the proportion of the population that is below the national poverty line. The poverty gap (P1) or the average amount by which the population is below the poverty line, and the poverty severity index (P2) the square of the poverty gap.

Table 9. Poverty Measures When Cash Transfers are Excluded

	Poverty headcount index			Poverty gap index			Poverty severity		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Household poverty level (including all transfers)	0.2064	0.3126	0.3097	0.0581	0.0872	0.0976	0.0246	0.0371	0.0433
Excluding the Hunger Safety Net Programme	0.2065	0.3130	0.3101	0.0583	0.0879	0.0980	0.0247	0.0378	0.0438
Excluding the OPCT	0.2067	0.3144	0.3104	0.0583	0.0884	0.0984	0.0248	0.0382	0.0441
Excluding the OVC CT	0.2069	0.3131	0.3097	0.0582	0.0875	0.0978	0.0246	0.0373	0.0434
Excluding all cash transfers	0.2085	0.3169	0.3118	0.0588	0.0906	0.1000	0.0251	0.0405	0.0457

poor households) and expands in times of drought emergencies—but hardly would exceed 5% of all poor households.

After developing this baseline scenario, we simulate the possible impact of the transfers assuming adjustments in scope or coverage. We focus on three programmes—the CT OVC, the OPCT and the bursary fund.

4.2. Older persons cash transfer

The impacts on poverty is examined, assuming all persons aged 70 years and above are reached with the *Inua Jamii* 70 Pension, and compared with the poverty impacts of extending the transfers to those aged 65 and 60 years, respectively (Table 10). It is estimated that Kenya had about 760,524 persons (1.70% of the total population) aged 70 years and above in 2016. The respective populations of persons aged 65 and 60 years and over are 1,280,221 (2.9%) and 1,943,586 (4.3%) in an estimated total population of 44,979,953.

If the OPCT would be transferred to all persons age 70+, the total (urban plus rural) household poverty headcount would fall from 31.0% to 27.5%. Rural poverty would decline much more than urban poverty partly because more older persons are in rural areas. The nominal value of the transfer would be about Shs. 1.5 billion or 0.02% of the 2016 GDP. In 2019, it would cost nearly Ksh. 1.7 billion and just about 0.02% of GDP.

The OPCT, if made to all persons aged 60+ (excluding pensioners) would increase the nominal value of the transfer to more than double (those for 70+) to about 3.5 billion in 2016 and 4.1 billion in 2019. The transfers would be about 0.05% of GDP in 2016 and 0.04% of GDP in 2019 (Table 11).

4.3. Orphans and vulnerable children cash transfers

The study predicted the cost and impact of a universal cash transfer to OVC CT. Extending OVC CT to all households with at least one OVC reduces the headcount poverty from 31.0% to 29.2%. Rural headcount poverty would decrease from 31.3% to 28.4%, while urban poverty would decline from 20.7% to 18.8%. Extending the transfer to individual OVCs would have greater impact but cost more. Extending the transfer to individual OVCs would reduce total poverty from 31.0% to 23.8%. Headcount poverty would decline from 31.3% to 23.6% in rural areas while that of urban areas would decline from 20.7% to 15.4% (Table 12).

Table 10. Household Poverty and Inclusion/Exclusion of the OPCT to Various Age Cohorts

	Poverty headcount index			Poverty gap index			Poverty severity		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Household poverty level (excluding OPCT)	0.2067	0.3144	0.3104	0.0583	0.0884	0.0984	0.0248	0.0382	0.0441
Extending OPCT to all individuals aged 70+	0.1984	0.2697	0.2753	0.0554	0.0736	0.0843	0.0231	0.0307	0.0367
Extending OPCT to all individuals aged 65+	0.1937	0.2498	0.2598	0.0535	0.0672	0.0782	0.0222	0.0277	0.0336
Extending OPCT to all individuals aged 60+	0.1895	0.2265	0.2404	0.0517	0.0607	0.0713	0.0212	0.0249	0.0304

Table 11. Nominal Transfer Values of OPCT to Various Age Cohorts in 2016 and 2019

Age	Year	Number	Amount	Nominal value of transfer Ksh	GDP million	% of GDP
70+	2016	684,472	2,000	1,368,943,200	7,022,963.10	0.02
	2019	761,972	2,000	1,523,943,000	9,740,360.00	0.02
65+	2016	1,152,199	2,000	2,304,397,800	7,022,963.10	0.03
	2019	1,254,727	2,000	2,509,453,800	9,740,360.00	0.03
60+	2016	1,749,227	2,000	3,498,454,800	7,022,963.10	0.05
	2019	2,022,953	2,000	4,045,906,800	9,740,360.00	0.04

Note: The number includes an adjustment of those receiving pension (an estimated 10 per cent).

Table 12. Simulated Impacts of CT OVC

	Poverty headcount index			Poverty gap index			Poverty severity		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Household poverty level (excluding OCV CT)	0.2069	0.3131	0.3097	0.0582	0.0875	0.0978	0.0246	0.0373	0.0434
Extending OVC CT to all households with at least 1 OVC	0.1875	0.2843	0.2916	0.0524	0.0776	0.0884	0.0216	0.0325	0.0383
Extending OVC to all individual OVCs	0.1539	0.2362	0.2377	0.0424	0.0665	0.0738	0.0173	0.0285	0.0327

The nominal value of transferring Ksh. 2000 to each individual OVC is five times larger than the cost of targeting households. The nominal value is estimated at Ksh. 8.9 billion

Table 13. Estimated Nominal Values of Universal Transfer to All Households with OVCs and All OVCs

Year	Total households	Percentage of households (with OVC)	Households with OVC	Total nominal value of transfer (Ksh.)
All households with OVC				
2015/2016	11,244,988	7.35	826,507	1,653,013,273
2019	12,274,275	7.35	902,159	1,804,318,444
All OVCs				
2015/2016	44,979,953	9.89	4,448,517	8,897,034,703
2019	47,869,673	9.89	4,734,311	9,468,621,319

Table 14. Simulated Impacts of Bursary Fund FGT Measures Before and After Extending Bursary to All Poor Households with School Going Age Child (14–17 years)

	Poverty headcount index			Poverty gap index			Poverty severity		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Household poverty level (excluding Bursary Fund)	0.2082	0.3136	0.3104	0.0583	0.0875	0.0979	0.0246	0.0372	0.0434
Extending Bursary to all households with at least 1 school going age 14–17 years	0.1806	0.2253	0.2849	0.0482	0.0575	0.0734	0.0194	0.0233	0.0294

Table 15. Estimated Nominal Value of Bursary Fund to All Poor Household with 14−17 year olds

Year	Total number of households	Total number of poor households (poverty rate of 27.4%)	Number of poor households with 14–17 year olds (0.15%)	Total nominal value of transfer @ 5,000 (Ksh.)
2015/2016	11,244,988	3,081,127	462,169	2,310,845,034
2019	12,274,275	3,363,151	504,473	2,522,363,513

Note: Ksh 5,000 was slightly above the mean transfer value to each household in 2015/16.

in 2015/16 and Ksh. 9.5 billion in 2019 equivalent to 0.13% and 0.10% of the GDP, respectively (Table 13).

4.4. Bursary

The study simulated the poverty and cost impacts of the bursary fund benefit to eligible students. Extending the transfer to all poor households with children aged 14–17 would reduce total poverty from 31.04% to 28.49%. Headcount poverty would decline from 31.36% to 22.53% in rural areas while that of urban areas would decline from 20.82% to 18.06% (Tables 14 and 15).

It should be noted that the basic method used in the simulations has inadequacies and it is complimented by the use of PSM. PSM can answer the question 'what would have

Table 16. Average Treatment Effect of Cash Transfers on Extreme Poverty Nearest Neighbour Matching

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Per adult equivalent expenditure	Unmatched	4,254.7	5,326.2	–1,071.5	157.4	6.81
	ATT	4,254.7	4,828.1	−573.4	111.9	5.13

Note: ATT is the average treatment effect on the treated.

happened to poverty/welfare if households did not receive transfers?' more effectively. The process involved estimating the propensity scores through the probit model. The average difference in outcomes between treated units (households that received cash transfers) and their matched untreated units is the estimated impact of the intervention. The critical variables are: extreme poverty as the outcome variable and receipt of cash transfer as the treatment variable.

A key finding is that households that receive any transfer have lower per adult equivalent expenditure by Ksh 573.4—relative to the control group. This is significant at the 1% level given that the reported T-Statistic is above the critical threshold of 2.58 for significance at the 1% level (Table 16).

A pairing of beneficiaries and non-beneficiaries for each of the separate programmes—the OVC CT, the OPCT and the bursary fund were also examined. Beneficiary households have a lower and statistically significant difference in their per capita adult equivalent expenditure for the older persons cash transfer and CT OVC.

5. Review of poverty reduction interventions and their effectiveness

Over time, the government has put in place various policies and resources to alleviate poverty. Among the interventions, include food related programs such as fortification of food; school feeding programme; infant feeding programme for mothers; subsidised agricultural inputs and food diversification. Also, the pro-poor programs such as the school bursary and the cost sharing in the health sector. Further is social protection including the National Safety Net Program (NSNP), which include Hunger Safety Net Program (HSNP), Cash transfers for Orphans and Vulnerable Children (CT-OVC), Older Persons Cash Transfer (OPCT) and Persons with Severe Disabilities Cash Transfer (PWSD-CT).

5.1. Fortification of food

Kenya has made great strides in food fortification[14]. The history of fortification in the country dates back in early 1970s with initiation of iodised salt. Between 2006 and 2010, fortification standards of maize flour, wheat flours and edible fats, oils and sugar were developed. In 2012, a legislation was passed to include mandatory fortification of all packaged maize flour, wheat flours and edible fats/oils with specific vitamins and minerals[15]. The question on consumption of fortified food has only appeared in the 2015/16 KIHBS survey.

Compared to other interventions, food fortification is assumed to be more cost-effective. It is also considered a more sustainable intervention because it can reach wider populations without changes in existing consumption patterns. It is often assumed that if fortified foods are regularly consumed in sufficient quantities, it has the advantage of maintaining steady body stores of the micronutrients.

[14] Food fortification is the addition of vitamins and minerals in commonly consumed staple foods to make food superior source of micronutrients.

[15] This was a Technical Regulation Number 62 of 15 June 2012 published under The Food, Drugs and Chemical Substances Act requiring all packaged wheat flour, maize meal and edible fats and oils be fortified with vitamin and mineral.

Table 17. Consumption of Fortified Foods (Maize, Wheat and Fat) by Poverty Status (Last 1 Week) 2015/16

Poverty status	Proportion consuming fortified maize flour %	Proportion consuming fortified wheat flour %	Proportion consuming fortified fat %	Proportion consuming unfortified maize flour %
Poverty status				
Absolutely poor	12.7%	12.0%	10.0	65.2
Non-poor	22.4%	21.8%	10.1	51.8
Total	**19.8%**	**19.1%**	**10.0**	**55.5**
Income Quintile				
1 = lowest income group	9.3	7.6	9.1	69.5
2	8.7	14.3	11.3	74.0
3	12.9	19.8	12.4	67.7
4	20.2	23.0	10.5	55.0
5 = highest income group	34.0	23.7	8.1	32.6
Total	**19.8**	**19.1**	**10.0**	**55.5**

The use of such foods has given rise to much debate involving health care workers, nutritionist, donors and government departments. The most common debates usually centre around issues like whether the food is needed at all or whether it is better to ensure an adequate family food basket, what kind of food should be given, to whom, how much and how often. The food basket for the KIHBS 2015/16 introduced fortified food items[16]. The National food and nutrition security policy highlights the promotion of use of fortified foods in the diet to meet dietary requirements and address food poverty in the country.

The extent to which food fortification addresses deprivation can be gleaned from the extent to which households consume fortified foods. The KIHBS 2015/16 data indicate that consumption of fortified maize flour, the leading staple food, is lower for the absolute poor at 12.7% (Table 17). Further the consumption of fortified maize flour is higher in urban (33.6%) than in rural areas (11.9%) (Table 18). The rural households consume more own processed maize flour (or 'loose maize flour'). The lowest income group (quintile 1) are less likely to consume fortified maize flour than the highest income group (quintile 5) with respective rates of 9.3% and 34.0% (Table 17). It means the poor could be missing out in terms of the micronutrients if there is no alternative to have them access such foods. In terms of the calories, there is no difference between the fortified versus the non-fortified flour. In terms of prices though, there is difference in prices between the fortified and non-fortified flour and fats.

5.2. Uptake of education services

In the education sector, programs expected to be pro-poor include abolition of fees in primary schools, loan scheme for tertiary education and free primary education programme introduced in January 2003. Further, in 2008, as part of achieving basic education in Kenya the country introduced the free day secondary education programme.

To assess the reach of the education interventions targeting the poor, this study generated a dummy variable with a value of 1 if a household has at least 1 school age individual, i.e., ages 6–23 years. Based on this dummy, households that qualify for bursary are about 2,659,505 poor households with at least 1 school age individual (Table 19). Among these only 71,009 (2.7%) received a bursary. Among the non-poor about 3.5% received a bursary. The proportions are suggestive of lack of efforts to or difficulty in enabling larger

[16] This included fortified maize flour, fortified wheat and fortified fats.

Table 18. Consumption of Fortified Foods by Sex, Age, Area of Residence and Poverty Status (Last 1 Week) 2015/16

Residence	Poverty status	Proportion consuming fortified maize flour %	Proportion consuming fortified wheat flour %	Proportion consuming fortified fat %
Sex of head of household				
Male		20.1	19.0	10.3
Female		19.0	19.2	9.5
Total		19.8	19.1	10.0
Age of head of household				
Less than 18 years		24.7	27.4	18.3
18–34		24.5	18.4	9.4
35–64		18.0	20.7	10.5
65 and over		13.1	14.1	9.8
Total		**19.8**	**19.1**	**10.0**
Area of residence and poverty status				
Rural	Food poor	9.8	9.2	11.8
	Non-food poor	12.6	21.1	11.7
	Total	**11.9**	**17.8**	**11.7**
Urban	Food poor	24.3	17.2	9.4
	Non-food poor	35.5	22.3	6.7
	Total	**33.6**	**21.4**	**7.2**
Total	Food poor	13.7	11.3	11.2
	Non-food poor	21.7	21.5	9.7
	Overall Total	**19.8**	**19.1**	**10.0**

Table 19. Bursary Status of Absolutely Poor and Non-Poor Households in Last Academic Year (Percent)

	Total households by poverty status	Households with at least 1 school age individual (Number)	Proportion of households received bursary in last academic year %	Number of households that received bursary
2005/06				
Absolutely poor	2,671,000	2,411,646	6.63	159,892
Non poor	4,302,890	3,220,283	7.73	248,928
Total (poor and non-poor)	6,973,890	5,631,929	7.26	408,820
2015/16				
Absolutely poor	3,125,153	2,659,505	2.67%	71,009
Non poor	8,288,847	5,375,317	3.52%	189,211
Total (poor and non-poor)	11,414,000	8,034,823	3.24%	260,220

Source of Data: KIHBS, 2015/16.

proportions of the poor to benefit. This is also demonstrated by the access to bursary by household quintiles where the lowest quintile has the lowest proportion of individuals accessing bursary (Table 19).

Inferentially, the food poor households deserve various forms of support including in form of education bursary as demonstrated by the relative secondary school access rates for the food poor households with individuals aged 14–17 years who receive support and

Table 20. Distribution of 14- to 17-Year Olds by Education Level and for Those Receiving/Not Receiving Bursary in last 1 year (2015/16)

Education level	Education level for 14–17 years olds (%)	Education level 14–17 years olds (food poor) receiving bursary (%)	Education level 14–17-year olds (food poor) not receiving any bursary (%)
2005/06			
Primary education	76.2	53.6	78.1
Secondary education	22.5	45.7	20.6
Tertiary education	0.0	0.4	0.0
Other	1.3	0.3	1.3
Total (%)	**100.0**	**100.0**	**100.0**
2015/16			
Primary education	56.0	40.5	63.4
Secondary education	42.8	58.6	35.3
Tertiary education	0.1	0.0	0.3
Other	1.1	0.9	1.0
Total (%)	**100.0**	**100.0**	**100.0**
Estimated population	4,401,770		

Source of Data: KIHBS, 2015/16. *Note*: This is a mixed bag of those who deserve and those who may not. The reason is that besides poverty most bursaries are pegged on performance.

Table 21. Share of Households Having 14- to 17-Year Olds Who Received Bursary by Poverty Status 2015/16

Poverty status	Share received bursary % 2005/06			Share received bursary % 2015/16	
Food poor	4.5			2.7	
Non-food poor	2.5			3.5	
Total households	3.2			3.2	
Share of households who received bursary by poverty status					
Quintile	1 = Lowest income group	2	3	4	5 = Highest income group
Share received bursary %	2.3	3.5	2.7	3.1	2.4

Note: Quintiles 1 and most of quintile 2 are deserving.

those who do not[17]. Among the food poor households who received bursary, 58.6% of the age group 14–17 years were in secondary school. But among food poor households who did not receive bursary only 35.3% were in secondary education (Table 20).

Notably, the coverage of the bursary fund was quite low relative to the needs. The bursary fund benefitted just about 3.2% of food poor households in 2015/16 (Table 21). This implies that the programme is likely to have a major impact on secondary school attendance given the larger access rates for beneficiaries.

5.3. Uptake of health services

The government is committed to achieve universal health care (UHC) by the year 2022. This is embodied in the Big 4 agenda that include healthcare for all. In this regard, good progress has been made in some indicators of service coverage such as full immunisation and family planning services, which have improved in the period leading to and after 2014. One

[17] Note: The 14- to 17-year olds should be in secondary school.

Table 22. Proportion of Individuals Reporting Illness in Last 4 Weeks to the 2005/06 Survey

	Estimated population	Percentage of sick or injured (last 4 weeks)	Estimated population sick and injured
Total population % 2005/06	35,514,542	26.0%	9,233,781
Total population % 2015/16	44,979,953	21.5	9,670,690
2005/06			
Individual in absolute poverty	16,549,777	25.3	4,187,093
Not absolutely poor	18,964,765	26.6	5,044,628
Food poor individuals	16,265,660	24.6	4,001,352
Not food poor	19,248,882	27.2	5,235,696
Total population % 2015/16		26.0	9,233,781
Individual in absolute poverty	16,237,763	39.4	6,520,612
Not absolutely poor	28,742,190	42.0	7,965,201
Food poor individuals	14,393,585	19.7	3,204,335
Not food poor	30,586,368	22.3	4,292,501
Total population %		21.5	9,670,690

Computations based on KIHBS, 2005/06 and 2015/16 data.

drawback was that access to these services were unequal with the poor being disadvantaged (Barasa *et al*., 2019; McIntyre *et al*., 2018).

Antenatal visit remained low between 2003 and 2013 a factor linked to the relatively high maternal and perinatal mortality. To address this problem the government abolished user fee for maternity care under the Free Maternity Service policy in 2013 in public health facilities. A study by Lang'at *et al*. (2019a, b) finds that there was a significant and sustained increase of 97% for health facility deliveries.

In yet another intervention, the government implemented the managed equipment services (MES) project beginning in 2013/14 to address the perennial problem of inadequate healthcare equipment. The project was designed to support devolution and two hospitals in each county (selected by the county governments) and four national referral hospitals were supplied with outsourced state-of-the-art medical equipment. The supplies included: theatre equipment (at level four and five facilities).

Other interventions in healthcare is the ongoing phased implementation of universal health coverage (UHC). Initial reports from the piloted counties[18] indicated the need to support the rollout with enhanced investments in health equipment and personnel. In some regions there is need for more health facilities.

The proportion of individuals reporting illness in the last four weeks to the 2005/06 survey were 26% of the total population and estimated at 9.2 million persons. In 2015/16 about 22% of the total population or nearly 9.7 million persons reported they were sick or injured in the last 4 weeks (Table 22).

Among those who reported that they were sick or injured in the last 1 month, 45.3% were diagnosed by a medical practitioner in 2005/6 (i.e., medical worker at hospital 22.7% or medical worker at other facility 22.6%). The other 56% were diagnosed by other means including self, traditional healer, non-medical household member, herbalist and faith healers. The food poor individuals were more likely to be self-diagnosed in 2005/06 with respective rates of 40.5% and 35.6% for the food poor and non-food poor, respectively. The

[18] The government began a pilot of the UHC in four counties (Isiolo, Kisumu, Machakos and Nyeri) in 2018 to inform a national roll-out.

Table 23. Diagnosis of Individuals (Who Reported Illness or Injury in the Last 4 weeks) 2005/06 and 2015/16

Who diagnosed	Food poor %	Non-food poor %	Total %
2005/06			
Self	40.5	35.6	36.8
Medical worker at hospital	19.7	24.9	22.7
Medical worker at other facility	20.6	23.8	22.6
Household member	17.5	14.5	16.5
Non-household member (not medical)	0.7	0.3	0.5
Herbalist	0.4	0.3	0.3
Traditional healer	0.3	0.2	0.23
Faith healer	0.04	0.01	0.02
Others	0.3	0.4	0.4
Total	100	100	100
Number	4,001,352	5,235,696	9,233,781
2015/16			
Self	25.4	26.8	26.4
Medical worker at hospital	26.7	29.2	28.5
Medical worker at other facility	33.3	30.9	31.6
Household member	12.6	11.9	12.1
Non-household member (not medical)	0.5	0.5	0.5
Herbalist	0.7	0.4	0.5
Traditional healer	0.3	0.2	0.2
Faith healer	0.1	0.04	0.1
Others	0.4	0.1	0.2
Total	100.0	100.0	100.0
Total number (reporting sickness/injury)	3,204,335	4,292,501	9,670,690

Source of Data: KIHBS, 2005/06 and 2015/16.

2015/16 scenario represented a significant improvement as the proportion of individuals who reported illness experienced a reduction in the share of those reporting self-diagnosis from 36.8% to 26.4%. The food poor and no-food poor individuals were equally likely to be diagnosed by a medical worker at hospital or other facility in 2015/16 (Table 23).

Access to health services improved between 2005/06 and 2015/16. For the total population the proportion of individuals diagnosed in medical facility increased from 44% to 60% over the 10-year period. There was a significant gap in access rates between the poor and non-poor in 2005/06. This gap was all but wiped out in 2015/16 (Table 24). What is more striking is that the proportion diagnosed in a medical facility was just about equal between urban and rural areas in 2015/16 representing a major improvement from the unequal access rates in 2005/06.

Among those who reported that they were hospitalised in the 12 months (or had an overnight stay in a medical facility), the poor were more likely to borrow or sell their assets to meet the associated health costs (Table 25).

5.4. Social protection

The government introduced affirmative actions for special interest groups who are vulnerable to poverty. Cash transfers programs under the NSNP include HSNP, CT-OVC, OPCT and PWSD-CT. The primary objective of the cash transfer programmes was to reduce extreme hunger and vulnerability by delivering regular and unconditional support to some of the most vulnerable in Kenya. Table 26 and Table 27 summarises information on the

Table 24. Proportion of Individuals (Who Reported Illness or Injury in the Last 4 Weeks) Diagnosed in Medical Facility by Poverty Status, 2005/06

Poverty status	Diagnosed in medical facility %		
2005/06			
	Rural %	Urban %	Total %
Individual in absolute poverty	36.2	47.1	37.7
Not absolutely poor	47.9	55.4	49.3
Food poor individuals	37.5	49.7	39.4
Not food poor	45.9	54.4	47.7
Total population %	42.1	52.7	44.0
2015/16			
Individual in absolute poverty	59.1	60.8	59.5
Not absolutely poor	60.4	60.2	60.3
Food poor individuals	59.9	60.6	60.0
Not food poor	60.0	60.2	60.1
Total population	60.0	60.3	60.1

Source of Data: KIHBS, 2005/06 and 2015/16.

Table 25. Proportion of Individuals Who Had to Borrow or Sell Assets Following Hospitalisation in the Last 12 Months by Poverty Status, 2005/06

	Proportion who had to borrow (%)	Proportion who had to sell assets (%)
Individual in absolute poverty	54.8	38.0
Not absolutely poor	36.3	25.6
Food poor individuals	52.7	38.4
Not food poor	37.1	25.1
Total	42.6	29.8

Source of Data: KIHBS, 2015/16.

Table 26. Proportion of Households with Access to Free Medical Services by Poverty Status, 2005/06 and 2015/16

	Proportion who had access to free medical care last 1 year (%) 2005/06	Proportion who had access to free medical care last 1 year (%) 2015/16
Individual in absolute poverty	5.9	12.5
Not absolutely poor	5.6	12.5
Food poor individuals	6.0	123
Not food poor	5.6	12.6
Total	5.7	12.5

Source of Data: KIHBS, 2015/16.

households receiving free medical services and transfers in 2005/06 and 2015/16. Most of the government transfers were introduced after 2009, explaining the relatively negligible levels of government cash transfers to households in 2005/06.

Overall, 70.6% of households received some form of transfer (cash, in kind or gifts) from any source (individuals, non-profits, government, diaspora, corporates) in the last 12 months. Those who received cash transfers from the government were just about 1% of all households. Nearly 20% of households reported they received food transfers from the government while 3.4% received some in kind transfer.

Table 27. Proportion of Households that Received Cash Transfers (from Government) by Residence and Household Headship 2005/06 and 2015/16

Residence/household	Household receiving cash transfers (%) 2005/06[1]	Household receiving transfers (%) 2015/16
National	0.70	4.5
Male headed	0.76	3.6
Female headed	0.61	6.3
Rural	0.80	5.5
Male headed	0.87	4.6
Female headed	0.69	7.0
Urban	0.3.1	2.7
Male headed	0.35	2.0
Female headed	0.23	4.6

Source of Data: KIHBS, 2005/06 and 2015/16. [1]Includes receipt of cash transfers only from government.

Among households who received cash transfers from the government, 46.4% were absolutely poor relative to a poverty rate of 40% for the non-recipients. This suggests that the poor were more likely to receive a cash transfer—but the difference was still small and implied there is room to improve on targeting of beneficiaries.

The objective of the CT-OVC is to encourage fostering and retention of OVC children within their families and communities and to promote their human capital development. The eligibility criteria is that the household must be extremely poor; have OVCs; and not enrolled in another cash transfer programme. From KIPPRA (2020) it is observed that in 2015/16, only 17% of extreme poor households received cash transfers while 20% of the non-poor households received cash transfers.

6. Conclusion and proposed poverty measures

The study attempted to generate knowledge on the nexus between the poverty reduction strategies and the poverty line minimum basket. The interventions by the government are aimed to supplement the household in meeting their basic needs and improve their welfare. The study undertook the analysis using various models to ensure all aspects are considered. This including the binary and polychotomous logit models to see who is likely to benefit, the Tobit model to measure the intensity and closing of poverty gap and the simulations to capture the impact and cost implications.

In general, the integrated household surveys have significant data to inform the policy maker on policy direction and if those deserving the intervention packages benefit this will improve their welfare therefore reduce the poverty gap. That said, keeping the basket dynamic in considering the current developments especially indicators that reflect on the government interventions. It helps to measure the level of success in implementation. The recent multidimensional measure is an improvement in capturing beyond the food poverty that make up the monetary poverty.

A well-targeted implementation is necessary for comprehensive coverage of the deserving segment of the society. This calls for sensitisation programs to create awareness on the interventions being implemented to enhance uptake especially among the poor. For example, on the fortification of foods it is important that more channels are identified in having the fortification of the maize flour which is a preference of the majority. In addition, it is important to conduct a good mapping of those deserving to ensure enhanced coverage especially of the cash transfers to reach to the targeted.

The following are the key findings from the study:

i) Kenya has made efforts over time to use evidence to guide the policy direction. Previous surveys were not comprehensive as they covered either rural or urban areas separately, until the 2005/06 integrated household survey was rolled out. Previous surveys excluded some sections of the population or had weaknesses in their methodology. This made it impossible to make holistic implications in informing the policy direction. The integrated household surveys for 2005/06 and 2015/16 have improved this status.
ii) The poverty line has been defined using selected food basket that costs the consumption of required daily calories per adult equivalent. As it turns out, food poverty is a major component of overall poverty at over 60%. Comparing 2005/06 and 2015/16 food basket, we find that the size of the basket has not changed significantly, but there are components in various aspects that tend to show the effect of government interventions like the uptake of fortified products, expanded tastes, preferences and the price changes.
iii) Several measures have been implemented to address poverty, but it was not until 1999 that a national poverty eradication program was put in place paving way to putting together the poverty reduction strategy paper 2001–2004. These were followed by various interventions including the social protection program in 2009 and food fortification that was legislated in 2012.
iv) Fortified food was included in the food basket for 2015/16 KIHBS. Results show that the uptake among the poor is lower compared to the non-poor yet they are the most deserving in terms of micronutrient deficiency. The probability of uptake varies across the various fortified foods with wheat having the least uptake by the poor. It is clear from the results that up-taking the fortified product serve to close the poverty gap especially with the health outcomes.
v) Access to health services has seen various measures put in place. The evidence shows with increasing number of those seeking diagnosis and treatment from health facility, this is necessary to close the poverty gap. This makes them less deprived compared to those who use alternative channels for diagnosis and treatment when they are sick or injured.
vi) A key element in education is provision of bursary. Based on those households with at least one school going child, it is evidenced that the poor have benefited less than the non-poor yet they deserve more in supporting their children transition to secondary schools. A significant proportion of those who do not receive bursary among the poor do not attend secondary education.
vii) On the social protection programs, there is notable growth in uptake given that this came into being in 2009. However, a significant proportion of the deserving are yet to benefit while the un-deserving segment have a higher uptake compared to the poor.

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