BENCHMARKING DEVELOPMENT PROGRAMS: A PREFERENCE-BASED APPROACH

Jeremy Shapiro†
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Abstract

This study proposes a preference-based benchmarking approach to assess trade-offs between alternative uses of aid dollars. We ask ~800 low-income Kenyans their valuation (in cash) for common aid and development programs. We compare recipients’ stated valuations to the cost of each program and to the valuations of a population working in the development industry. We find that recipients value some common programs less than the cost of delivery. On an absolute basis, development professionals also value certain interventions less than the cost of provision, but not always the same interventions as recipients. While development professionals and recipients are in accord on the raking of value for cost according to broad categories (e.g., public vs. private goods), they place different relative value weights on specific interventions. Thus, in a world with limited resources a portfolio of interventions selected by development professionals could be significantly less valuable in the eyes of recipients than recipients’ preferred allocation.

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†Busara Center for Behavioral Economics jeremy.shapiro@busaracenter.org
1 Introduction

Hundreds of billions of dollars are spent each year on aid programs. In 2014, for example, OECD countries provided USD 135 billion in official development assistance (OECD, 2014) and US charitable giving to international programs exceeds USD 20 billion (Reuters, 2012). Beyond this, developing country governments allocate substantial sums to programs intended to benefit the poor and spur development. These billions of dollars are allocated across a wide variety of programs focused on infrastructure, education, health, agriculture, direct assistance (e.g., subsidized goods, food aid, livestock transfers and cash transfers) and other initiatives. Yet it is incredibly difficult to decide how to allocate resources across programs.

Often the allocation of aid and development dollars is a function of complex political and bureaucratic processes, which can lead to sub-optimal outcomes and generally ineffective spending (Easterly, 2002). A technocratic strategy to address the question, and the failure of the political process, is to come armed with data from impact evaluations assessing the specific impacts of various uses of aid dollars. Typically these take the form of randomized control trials, or RCTs (Banerjee and Duflo, 2009, Cohen and Easterly, 2010). The idea behind this approach is that by randomizing the implementation of an aid program across a population, and carefully collecting data on outcomes of interest, such as income or health, it is possible to identify the causal impact of aid spending on outcomes of interest to governments and donors. The number of RCTs applied to aid programs has increased significantly over the last few decades, and has generated a substantial body of high quality research pertaining to the impacts of specific forms of aid. Banerjee, Karlan, and Zinman (2015), for instance, find that micro-finance has modest impacts on the profits of existing businesses but little impact on broader outcomes such as consumption. Banerjee et al. (2015) demonstrate that a comprehensive program including livestock transfers, cash transfers and training is successful in improving multiple measures of well-being, including income, assets and self-perceived welfare. In a 2016 review, which included many RCTs, ODI concluded that cash transfers alone also result in substantive reductions in poverty (Bastagli et al., 2016). Alongside these successes, there are some challenges to and limitations in the ability of RCTs to provide useful information by which to judge the effectiveness of aid programs (Deaton, 2010). Notably, not all aid or development programs can effectively be studied with an RCT (e.g., trade policy changes) and there is considerable uncertainty about how well the results of any particular trial will generalize to other contexts. For example the livestock program studied in Banerjee et al. (2015) did not produce positive impacts across all study sites, and a program implemented by an NGO in Uganda had positive impacts on women’s economic activity but had no effects when conducted in Tanzania (Buehren et al., 2015).
Beyond these concerns, there are other limitations in using RCTs to inform decisions about which aid programs merit investment and which do not. First, RCTs can be both expensive and time consuming, which results in the number of RCTs being much smaller than the number of potential aid investment opportunities. Second, in the case where RCT evaluations are available, it is not easy to use the evaluations to prioritize or make tradeoffs between different investment opportunities. For instance, the RCTs noted above show impacts on business profits, school attendance, income, assets and psychological well-being. These RCTs are not helpful in determining what weight should be placed on each distinct outcome in allocating dollars to aid programs. A third, and related, issue is that a narrow RCT comparing a particular aid program to a control group receiving nothing may not be especially helpful in deciding whether the benefits of the program outweigh the costs. In the case of the comprehensive livestock transfer program, for example, multiple RCTs document positive impacts across a variety of outcomes, but the program is expensive (costing more than $1,000 per household). Do the benefits outweigh the costs?

A potential solution to the third issue is to estimate the opportunity cost of aid funding in a particular context alongside a randomized program evaluation (i.e., test the benefits of a program compared to a control group that receives a cash transfer cash equal to the cost of the program rather than a control group that receives nothing). Unfortunately, this approach does not address the first and second issues above. Adding a cash transfer comparison group to RCTs would make them more expensive and do nothing to reduce the time required to obtain results. Therefore, it is unlikely that the number of cash vs. program RCTs will soon be sufficient to inform all, or even the majority, of aid allocation decisions. Further, a cash transfer component will not help in prioritizing among aid programs above and beyond what can be accomplished by RCTs without a cash arm. Given that cash transfers impact a wide variety of welfare indicators, being able to compare various aid programs to cash does not help any more than comparing each aid program to another. The issue of multiple outcome indicators with different units and subjective value remains.

Despite these challenges, significant sums of aid dollars are constantly allocated and spent. Those charged with allocation decisions do so based on the incentives and political forces they face, their belief on the impact of a particular use of aid dollars on specific outcomes - which may be informed by evidence or not - and a purely subjective weighting of distinct outcomes. A grant maker might, for instance, consider funding digital agricultural extension services which have been shown to increase crop output by 10% or a self-help group organization which declares it enables women to have greater control over decisions in their household. The hypothetical grant-maker will assess her belief in the self-help group’s claim, the capacity of each organization to actually achieve the desired outcome and weigh off agricultural productivity and enhanced
status for women in making a decision. The evidence is what it is, but the subjective components are driven by the perspectives, assumptions and beliefs of the grant maker. The same is true more broadly - most aid allocation decisions are made, in part, by the subjective suppositions of those who allocate aid dollars. This is unavoidable, but it is worth asking whether the subjective perspectives of aid recipients also have merit in the allocation decision. Given extensive direct and indirect experience on the receiving end of aid and development spending, it is plausible that recipients have reasonable assumptions about the likelihood a particular use of resources will produce a particular outcome: Does the farmer know if the training will increase her yield? Does the woman know if the group will benefit her? It may be that recipients have even better information on the weight that should be placed on various outcomes - the farmer should know if she would rather have higher yields or a supportive group to join.

This study evaluates a preference-based approach to estimate the relative weights aid recipients place on alternative uses of aid resources, taking into account their subjective expectation of the likelihood the program will impact one or more specific outcomes and the value they place on changes in each outcome. Though cash transfers are not a unique measure of the opportunity cost of aid resources, they are unique in that the welfare enhancing value created by cash transfers relies on the preferences and decisions of the recipients. Indeed, the notion that cash transfers are a relevant performance benchmark stems from the notion that transfer recipients will use the cash to maximally improve their well-being. This suggests using cash transfers as a preference-based benchmark.

Several earlier studies directly elicit recipients’ preferences or valuations before delivering aid: Hidrobo et al. (2012) conducted RCTs in Ecuador, Uganda, Niger and Yemen to assess the impact and cost-effectiveness of cash, food vouchers, and food transfers. The impact evaluations also incorporated surveys of beneficiaries’ preferences over the different transfer modalities. Khera (2014) conducted qualitative and quantitative surveys of rural households across India to elicit preferences over cash versus food transfers through the Public Distribution System. Ghatak, Kumar, and Mitra (2013) conducted a household survey among the beneficiaries of the Bihar Chief Minister’s Bicycle Programme (which provides money to purchase a bicycle for every student enrolled in ninth grade at a government school) to examine program coverage, benefit utilization by recipients, and beneficiaries’ preferences over cash vs. in-kind transfers. Melamed, Devlin, and Appleby (2012) draw on patient-based outcome measures used by health care systems to guide the construction of development program performance measures that incorporate beneficiaries’ perspectives.

Prior studies have focused on recipient preferences for specific programs, whereas this study elicits valuations for a wide variety of interventions in health, agriculture, education and other sectors, allowing broader comparisons. In addition, this study elicits preferences from a non-
recipient population - allowing a comparison between the weighting recipients place on different uses of aid dollars and the weighting of a population of individuals in the development industry. This study considers 18 common uses of aid dollars, based on a review of existing aid projects in Kenya. For each potential use of resources, potential recipients were asked what amount of cash would make them just as well off as receiving the aid program. Similar choices - giving an aid recipient programs or cash - were presented to a sample of individuals employed at development institutions. This provides a contrast between the implicit weighting of interventions among recipients and those who are similar to aid allocation decision makers. In estimating recipient valuations, this study employs various incentive compatible methods of eliciting the cash-equivalent value and incentivizes truthful reporting by giving cash or the good or service provided by the aid program to randomly selected respondents. The chance that the respondent will actually receive what they say they want makes truthful reporting of the cash-equivalent value optimal.

We compare recipients’ stated valuations to the cost of each program and to the valuations of a population working in the development industry. We find that recipients express variation in their valuations for programs relative to the costs of those programs - with the median valuation being less than the cost of the program in some instances. There is also ample variation in value within recipients for the same intervention, suggesting that successfully targeted interventions could significantly increase perceived surplus by recipients. We find, however, that objectively perceived “need” for certain interventions is not a reliable predictor of recipient valuation. For example, individuals without power do not disproportionately value a solar power unit. On an absolute basis, development professionals also value certain interventions less than the cost of provision, but not always the same interventions as recipients. Development professionals and recipients are in accord on the ranking of value for cost according to broad categories. Both recipients and development professionals value public good interventions more than interventions with spillovers, and interventions with spillovers more than private goods. In this sample (and for these specific interventions) both groups value interventions in water, education and agriculture more than interventions in other sectors. Within these categories, however, recipients and development professionals place different relative value weights on specific interventions. This could be a function of different beliefs that the intervention will cause a particular outcome, different beliefs that the intervention will be successfully implemented or different intrinsic valuation of the outcome produced by the intervention in question. As a result of differing value weights, a portfolio of interventions selected by development professionals could be significantly less valuable in the eyes of recipients than recipients’ preferred allocation.

This study is not meant to suggest that governments, donors and development organizations should align resources entirely with the preferences of aid recipients.Recipient preferences are
one of many factors to consider in the allocation of resources to aid and development programs - evidence, impact evaluations, politics, technology and the information of funders are also important. Furthermore, these results pertain only to a limited set of existing interventions - some technological advance in health might be very highly valued, for example, and R&D spending may be more valuable than anything else. The overall message of this study is: the preferences and needs of aid recipients are not easily observable - we find no evidence that recipients with some observable “need” for a specific intervention value that intervention more highly than others - and the weights placed by potential aid recipients on various uses of aid dollars differ significantly from the weights of individuals similar to those allocating aid resources. To the extent there is intrinsic value in enabling choice, or if recipients have valuable information on the relative merit of different uses of aid dollars it is important to understand their preferences. Though not a replacement for information obtained through other mechanisms, a preference-based approach has the potential to reach significant scale at low cost, and provides standardized information, denominated in dollars, on the relative, and subjective, value of various aid programs to the recipients of aid.

2 Study design

2.1 Program selection

We undertook a multistep process to select programs for benchmarking. First, we identified entities primarily responsible for funding and/or delivery of development programs in Kenya, specifically the Government of Kenya (GoK), official development assistance (ODA) by multilateral and bilateral donors, philanthropic foundations and international non-governmental organizations (INGOs). For each of these entities we collected data on development program spending in Kenya. GoK spending data was obtained from Kenya Open Data.

Since we are interested in development spending in particular, we classified GoK spending according to category (e.g., “Security”, “Education”) and then according to whether it was likely to directly improve the economic situation of Kenyans (e.g., education and health), do so through macroeconomic channels (e.g., trade policy and infrastructure investment) or was a government service (e.g., national defense); we focus on the first category of spending. Bi and multilateral donor data was obtained from the OECD.

For foundations, we focused on two large and prominent foundations (the Gates Foundation and Ford Foundation), obtaining grant level data from:

https://opendata.go.ke/dataset/Kenya-Open-Budget-Program-Based-Budget-2015/5jh8-v7sc
2 http://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=CRS1&ShowOnWeb=true&Lang=en
nual statements and reports. We selected 7 large INGOs, with total charitable spending >$500 million in 2014, and obtained spending data from annual and financial reports.

For each of these sources of development spending, we identified priority sectors. For the GoK, the primary sectors intended to directly improve the economic situation of Kenyans were education (25% of GoK spending), health (3% of GoK spending), agriculture (3% of GoK spending) and water (2% of GoK spending). Among categories intended to benefit Kenyans through macroeconomic channels, major categories included transport (15% of GoK spending) and energy (7% of GoK spending). OECD data indicates that the main category (46%) of ODA to Kenya goes to “Social Infrastructure & Services.” Major subcategories include health (62% of category spending), water (14% of category spending) and education (7% of category spending). The primary specific program areas are sexually transmitted disease control, malaria control, large water systems and primary education. For the Gates Foundation, primary spending categories are agriculture (20%), financial services for the poor (19%), family planning (16%) and water, sanitation and hygiene (12%). Ford Foundation grants were highly varied, with many larger grants focused on human rights issues. INGOs have varied programs, classified according to idiosyncratic categorizations. Broad categories assigned to these categories suggest that primary sectors of focus are health (30%) and humanitarian, emergency and disaster assistance (24%).

Priority sectors for this study were selected based on major overall categories of development spending. A back-of-the-envelope calculation, which may include double counting but is indicative, suggests that the vast majority of spending is done by the GoK (72%) and ODA actors (24%). Foundations and INGOs make up a relatively smaller percentage of spending. Therefore we choose to focus on sectors that are primary for the GoK and ODA spending, namely: education, health (including reproductive health), agriculture and water. In addition, we consider some smaller but important categories of development spending (e.g., financial services and livelihoods).

Having identified major categories of development spending, we identified specific programs within each category that could be replicated, in whole or in part, to benchmark against cash transfers. This was necessary since incentive compatibility required that we were able to actually deliver the intervention. To do so, we identified large GoK programs within each category from Kenya’s OpenData Government Funded Projects database. Thirty-four programs were


identified and researched to identify whether it would be feasible to replicate elements of the program and to benchmark against cash transfers. For ODA funded programs, we focused on USAID programs, as USAID is the largest donor to Kenya among bi and multilateral donors. We similarly identified large programs in priority thematic areas and assessed the feasibility of benchmarking them against cash transfers. Thirteen programs were selected for further research.

Based on this research we compiled a list of specific interventions (e.g., extension services, agricultural input subsides, family planning services) that appeared important based on the number of GoK or USAID programs where the specific intervention was included and the size of the program budget. That list was filtered to a smaller list of interventions based on logistical considerations of what we could feasibly provide to respondents (in order to incentivize accurate revelation of indifference points). The final list of interventions included in the study is:

1. Agriculture:
   (a) Extension - group-based agricultural extension courses over the period of one cropping season
   (b) Inputs - 50 kg fertilizer

2. Water
   (a) Water supply - an easily accessible water source such as a water tank for the community
   (b) Hygiene / WASH education - a group-based single session on safe water practices
   (c) Hygiene / WASH supplies - basic hygienic supplies (soap and chlorine for water treatment) for two months

3. Health
   (a) Family planning services - one free visit to a family planning clinic to receive family planning services with allowance for transportation
   (b) Condoms - box of 50 condoms
   (c) Bed nets - an insecticide treated bed net
   (d) HIV research - a donation to HIV / AIDS research
   (e) Malaria research - a donation to malaria research
   (f) Mass deworming - a donation to support deworming programs
4. Education

(a) Teacher training - training for one teacher
(b) Computers in schools - computers provided to one government run school
(c) Out of school tutoring - weekly tutoring sessions for one child for one school term
(d) Vocational training - a vocational training course in computer skills

5. Energy

(a) Solar power - a solar power system that allows one to power a lamp and recharge a cell phone

6. Other

(a) Access to stress management smartphone app - a smartphone and training on how to use stress and anxiety reduction tools available on that phone
(b) Financial literacy training - a group-based training session on financial management

This list is not intended to comprise the “most important” interventions. Rather it is a selection of interventions that: a) pertain to thematic areas to which massive quantities of development aid is allocated and b) are similar to components included in government and donor funded aid programs.

For the analysis below, interventions are considered public interventions (water supply, HIV research, malaria research, deworming, teacher training, computers in schools), spillover interventions (extension, WASH education, stress management smartphone app, computer skills training, after school tutoring and financial literacy training) and private interventions (agricultural inputs, WASH supplies, family planning services, condoms, bed nets, solar power).

2.2 Location selection

The aim of this study is to understand the preferences of current or potential recipients of development programs. We therefore selected areas with relatively high poverty. Beginning with a list of Kenyan counties, we filtered all counties with less than a 40% poverty rate, or just below the national rate of 46% (World Bank, 2015). The one exception is Nairobi County, as we sought to include low-income households in urban centers as well. Due to logistical considerations, we then filtered out counties in the lower third based on household density. Remaining counties were then filtered or prioritized based on the poverty rate, household density, fertilizer use,
HIV, diarrhea and malaria prevalence, bed net use and secondary school enrollment rates (all data comes from Kenya Open Data). Ultimately we chose to collect data in three Kenyan counties: Nairobi, Nakuru and Makueni.

2.3 Data and program delivery

2.3.1 Recipient valuation survey

The baseline survey was conducted with 806 individuals across the three locations mentioned above and the follow-up survey with 793 of these individuals. In Nairobi, eligible individuals include those over 18 years of age residing in low-income neighborhoods. In Nakuru and Makueni eligible individuals are those over 18 years of age residing in a home made of all or partially natural materials (e.g., wood, local stone or mud, excluding homes which include cement or cinder blocks). Eligible households were first identified, and later revisited for data collection if they met the screening criteria.

Each respondent was administered a baseline survey that elicits indifference points between cash and aid programs. This was done using a variety of methods (see appendix), which will be assessed for reliability in a separate study. The survey also measured a range of baseline characteristics. The survey was administered on tablets using SurveyCTO software built on the Open Data Kit platform. We had different survey versions where the questions on baseline characteristics were the same for all individuals but the value elicitation treatments differed as mentioned above. Further within each survey version, the order in which different programs are asked about is randomized through SurveyCTO (with the exception of the last program, in order to complete the certainty treatment. The last program was randomly selected \textit{ex ante} to be sanitation supplies).

In order to maintain data quality, the following checks were administered during and after the survey:

- High Frequency Checks: This entails continuous monitoring of data coming into the server to check for missing observations and inconsistencies in responses. A standardized project-specific .do file was run every few days on incoming data to check for errors. In case any errors or discrepancies were detected, action was taken to rectify these errors immediately. Further, these checks informed the content of refresher training for field officers to emphasize attention to the particular error points within the survey.

- Random Spot Checks and Field Observations: Field officers were supervised by senior field officers, who conduct unannounced spot-checks to observe the manner in which questions were asked and field protocols were being followed. Observations were recorded and
feedback relayed to field officers on areas that require improvement and acknowledgement of areas that were conducted well.

- GPS checks: GPS coordinates were recorded for all surveys. A separate team member checked these coordinates on Google Earth to confirm the existence of a house at the specified location.

### 2.3.2 Development professional valuation survey

As a point of comparison, we collected similar data from 77 development professionals by inviting individuals to take the online survey through the mailing list of a prominent development research organization (JPAL - https://www.povertyactionlab.org/). We know this invitation was forwarded to other development focused organizations. All respondents were asked to indicate the minimum amount of cash they would rather give a low-income household in a developing country instead of a particular program. This question was repeated for each of the programs listed above. To incentivize accurate responses, randomly selected choices were actually implemented for low-income Kenyan households.

### 2.3.3 Program delivery

If respondents chose to receive the program, the goods or services were delivered in-person by an individual not involved in the initial data collection. At that visit, the respondent’s name and other details were verified. For respondents choosing cash, a transfer was sent through the M-Pesa digital payment platform. This platform allows the researchers to confirm the name from the survey matches the name associated with the mobile money account. Finally, we followed up with recipients (by phone or in person) to confirm receipt of goods, services or cash. Out of the 116 program recipients that could be contacted, 6 reported not receiving the program; whereas for cash respondents, we were able to verify through the receipt confirmation survey and M-Pesa details that all received the transfer amount.

### 3 Results

#### 3.1 Recipient valuations

We begin by observing the 25th and 75th percentile of recipient valuations relative to the cost of the intervention in question. Table 2 in the appendix shows the cost estimates for each program and rationale for the calculation. As shown in Figure 1, there is ample variation in the spread of the interquartile range and the relative valuations to the intervention costs. Within the specific
interventions considered in this study, several are perceived as not worth the cost by the median recipient, in particular solar energy provision, tutoring, deworming, malaria research and family planning. For most of these interventions, however, some portion of the recipient population values the intervention above the cost. Moreover, there are highly variable valuations for other interventions, in particular for stress reduction coaching, agricultural extension and financial literacy assistance. This suggests that recipient surplus would be maximized by targeting interventions to those with the highest valuations.

Figure 1: Recipient Valuation & Cost by Program

Targeting according to valuation requires either direct measurement of recipient valuation, or targeting according to a proxy. Since it is not uncommon for aid resources to be targeted to a population with a perceived need, we assess whether perceived need correlates with recipient valuations for particular programs. In particular, we hypothesize that:

1. Households spending more time in agriculture (% of total time on own agricultural activities) will have a higher valuation for agricultural interventions

2. Households experiencing water shortages (indicator variable for shortages of water for drinking or household use) will have a higher valuation for water access

3. Households without a bed net (indicator) will have a higher valuation for bed nets
4. Households scoring low on our educational outcomes index (see below) will have a higher valuation for educational interventions

5. Households without electricity (indicator) will have a higher valuation for solar energy

We estimate:

\[ v_{ip} = \alpha_p + \beta_1 X_i + \beta_2 P + \beta_3 X_i \ast P + \varepsilon_i \] (1)

where \( X \) is one of the five sources of heterogeneity mentioned above and \( P \) is an indicator for the specific program to which the hypothesis pertains. \( \beta_3 \) measures whether individuals with characteristic \( X \) have disproportionately lower or higher valuations for program \( P \).
Table 1: Mean Recipient Valuation-Cost Ratio by Household Characteristics

<table>
<thead>
<tr>
<th></th>
<th>(1) Value - Cost Ratio</th>
<th>(2) Value - Cost Ratio</th>
<th>(3) Value - Cost Ratio</th>
<th>(4) Value - Cost Ratio</th>
<th>(5) Value - Cost Ratio</th>
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<tr>
<td>Time spent on agriculture X agriculture intervention</td>
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<td>Water shortage X water intervention</td>
<td></td>
<td>4.7 (2.3)</td>
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<td></td>
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<td></td>
<td>0.1 (2.3)</td>
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<td></td>
</tr>
<tr>
<td>Has no electricity X energy intervention</td>
<td></td>
<td></td>
<td></td>
<td>0.6 (2.6)</td>
<td></td>
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<tr>
<td>Education index X education intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.7 (2.8)</td>
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<tr>
<td>Observations</td>
<td>7346</td>
<td>13183</td>
<td>13183</td>
<td>13183</td>
<td>13167</td>
</tr>
</tbody>
</table>

Notes: Table shows estimates from linear regression of program recipients’ valuation-cost ratio on program and household characteristics with respondent fixed effects. Standard errors are clustered at the respondent level and reported in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.
Generally characteristics associated with a perceived need do not correlate with higher stated valuations for interventions that would address that need. Individuals who experienced water shortages express a higher valuation for water interventions (significant at the 10% level) but the remaining hypotheses do not appear to hold in the data.

3.1.1 **Comparison of recipient and development professional valuations**

As seen in Figure 2, development professionals also perceive some interventions as not worth the cost. Among this sample of intervention, solar energy, tutoring, teacher training, family planning, vocational education and stress reduction coaching are valued at less than the cost by the median development professional. Thus on an absolute basis at the intervention level, recipients and development professionals disagree about whether certain interventions are worth the cost.

![Figure 2: Development Professional Valuation & Cost by Program](image)

We also consider whether development professionals and recipients are in alignment on the general areas where the greatest bang for the buck exists. To do so, we aggregate interventions into type (public, private and spillover) and sector. The goal here is not to establish a definitive valuation for interventions in a particular sector or of a particular type, since the results here pertain only to the select interventions considered and ignore other options in these sectors,
but to observe any patterns in valuations based on these categories. In Figure 3 and 4 we see that development professionals and recipients are broadly aligned in perceptions of attractive intervention types and sectors. Both groups express the highest value-cost ratios for public good interventions, and tend to value education and water interventions above others.

Figure 3: Recipient and Development Professional Value-Cost Ratio by Program Sector
The analyses above focus on absolute valuations - whether an intervention is worth the cost, or what types of interventions tend to be worth the cost. In allocating scarce resources across a variety of interventions, what matters is relative valuation, or how the benefits of each intervention stack up against the benefits of the others. In Figure 5 we show the relative valuations of each intervention according to development professionals and recipients by standardizing valuations (subtracting the group mean and dividing by the group standard deviation).
For 3 of the 18 interventions, the difference in recipients’ and development professionals’ relative values is quite large - between 0.6 and 2.5 standard deviations. For 4 of the 18, the differences are more moderate - 0.2 - 0.4 standard deviations, while for the rest of the interventions the relative valuations of recipients and development professionals are quite similar. To understand the potential implications of this divergence in relative valuations, we conduct several simulations. First we consider a hypothetical investment portfolio of aid dollars and create 100 random allocations of those resources. For each allocation of resources we can calculate the value recipients or development professionals would place on that portfolio by multiplying the amount allocated to each intervention in that scenario by the value recipients or development professionals place on that intervention. We sum these components into an overall valuation of the portfolio. Below we plot recipients’ and development professionals’ valuations for these 100 hypothetical uses of aid dollars. In general the perceived value for development professionals and recipients are correlated (correlation coefficient of 0.64). However, the maximally valuable portfolio from development professionals’ perspective is only 63% as valuable to recipients as the portfolio most valuable according to recipients’ preferences.
Figure 6: Simulated Recipient and Development Professional Value Across 100 Portfolios

NOTE: The graph displays perceived recipient & development professional mean surplus over 100 different hypothetical allocation scenarios given a fixed budget of 100,000 KES. Perceived surplus for an individual for an intervention is calculated as the amount allocated for that intervention from the fixed budget multiplied by the valuation-cost ratio. This is summed over all recipients (or development professionals) and interventions and then divided by the number of recipients (or development professionals). The allocation scenarios are arranged in ascending order of perceived development professional surplus. Correlation coefficient across scenarios is .64. Net percentage loss to recipients from development professional's choosing is 37.2% and is calculated as the percentage loss of surplus for recipients when the scenario providing development professional with highest surplus is chosen instead of one providing recipients with highest surplus.

Similarly, we construct the “optimal” portfolio from development professionals’ and recipients’ perspective by allocating hypothetical resources to each intervention in proportion to the value-cost ratio placed on that interventions by development professionals or recipients. These allocations are shown in Figure 7. If development professionals were to choose this optimal portfolio from their perspective, it would only be 70% as valuable to recipients as the optimal allocation from the perspective of recipients.
4 Conclusion

The question of how to allocate aid and development dollars across programs is critical to donors and governments, yet it is difficult to know what relative weight to place on different programs. This study proposes a preference-based benchmarking approach to assessing trade-offs between alternative uses of aid dollars. Specifically we ask ~800 low-income Kenyans their valuation (in cash) for common aid and development programs. We also compare recipients’ stated valuations to the cost of each program and to the valuations of a population working in the development industry. We find that recipients express variation in their valuations for programs relative to the costs of those programs - with the median valuation being less than the cost of the program in some instances. There is also ample variation in value within recipients for the same intervention, suggesting that successfully targeted interventions could significantly increase perceived surplus by recipients. We find, however, that objectively perceived “need” for certain interventions is not a reliable predictor of recipient valuation, making targeting a complex undertaking. This indicates that while “objective” need may be a poor proxy for the value of a program to an individual, investment in developing appropriate targeting techniques could enhance the subjective value of programs delivered to recipients. On an absolute basis,
development professionals also value certain interventions less than the cost of provision, but not always the same interventions as recipients. Development professionals and recipients are, however, in accord on the raking of value for cost according to broad categories. Both groups value public goods more than private goods, and in this sample of interventions value programs in similar sectors (water and education). This suggests that there is overall alignment on the approach to spending aid dollars. However development professionals and recipients place different relative value weights on specific interventions. Based on various simulations, a portfolio of program spending selected by development professionals could be only two thirds as valuable to recipients as their preferred allocation. Thus, in a world with limited resources a portfolio of interventions selected by development professionals could be significantly less valuable in the eyes of recipients than recipients’ preferred allocation.
References


Hidrobo, Melissa, John Hoddinott, Amber Peterman, Amy Margolies, and Vanessa Moreira. 2012. “Cash, Food, or Vouchers.” *Evidence from a Randomized Experiment in

Table 2: Intervention Cost Estimates

<table>
<thead>
<tr>
<th>No.</th>
<th>Intervention</th>
<th>Description</th>
<th>Sample</th>
<th>Cost (KES)</th>
<th>Cost Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital Stress Reduction</td>
<td>Smartphone with stress reduction apps and training on using the applications</td>
<td>Urban</td>
<td>3500</td>
<td>Market price in Kenya for basic smartphone is 3500 KES.</td>
</tr>
<tr>
<td>2</td>
<td>Vocation: Computer Skills training</td>
<td>Vocational training course in computer skills</td>
<td>Urban; Rural</td>
<td>10000</td>
<td>Based on a survey of vocational skills training centers in Kibera. Eg: PCEA Kibera Emmanuel Technical Training Centre charges 10,000 KES for a 3-month computer skills course</td>
</tr>
<tr>
<td>3</td>
<td>Water: Water supply</td>
<td>Water tank or borehole for community</td>
<td>Urban; Rural</td>
<td>1400</td>
<td>Market price in Kenya for 10,000 liter water tank is 76,000 KES and one-time cost for filling the tank using a water truck is 800 KES. If the tank serves 50 households (200 people), each of whom consume 35 liters/day (average per-capita water consumption according to <a href="http://www.waterfund.go.ke/watersource/Downloads/004.2013Improving%20Urban%20Water%20Supply%20in%20Kenya.pdf">http://www.waterfund.go.ke/watersource/Downloads/004.2013Improving%20Urban%20Water%20Supply%20in%20Kenya.pdf</a>), then annual cost of refilling tank is 204,400 KES. Hence, total per-recipient cost is estimated to be 1400 KES.</td>
</tr>
<tr>
<td>4</td>
<td>Water: WASH education and workshops</td>
<td>Group-based training session on safe water practices</td>
<td>Urban; Rural</td>
<td>115</td>
<td>According to <a href="http://www.africapay.org/kenya">http://www.africapay.org/kenya</a>, average salary for trainer is 46,000 KES/month. For a single session with 20 people in a group, cost per recipient is estimated to be 115 KES</td>
</tr>
<tr>
<td>5</td>
<td>Water: WASH supplies</td>
<td>Waterguard and 2 months supply of soap</td>
<td>Urban; Rural</td>
<td>860</td>
<td>Waterguard costs 60 KES and each respondent received 4 x 200 g bars of soap which cost 200 KES each for a total cost of 860 KES of WASH supplies</td>
</tr>
<tr>
<td>6</td>
<td>Health: Family planning services</td>
<td>1 visit to a family planning clinic to receive services plus cost of transportation to clinic</td>
<td>Urban; Rural</td>
<td>5200</td>
<td>Vipawa health clinic in Kibera charges 5000 KES for one visit that includes injectable contraceptives plus 200 KES maximum for transportation</td>
</tr>
</tbody>
</table>
Table 2: Intervention Cost Estimates

<table>
<thead>
<tr>
<th>No.</th>
<th>Intervention</th>
<th>Description</th>
<th>Sample</th>
<th>Cost (KES)</th>
<th>Cost Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Health: Condom distribution</td>
<td>A box of 100 condoms</td>
<td>Urban</td>
<td>2000</td>
<td>A package of 3 condoms costs 60 KES at health clinics in Nairobi</td>
</tr>
<tr>
<td>7</td>
<td>Health: Condom distribution</td>
<td>A box of 50 condoms</td>
<td>Urban; Rural</td>
<td>1000</td>
<td>A package of 3 condoms costs 60 KES at health clinics in Nairobi</td>
</tr>
<tr>
<td>8</td>
<td>Health: Bed net distribution</td>
<td>An insecticide treated bed net</td>
<td>Urban; Rural</td>
<td>900</td>
<td>A bed net costs 900 KES at health clinics in Nairobi</td>
</tr>
<tr>
<td>9</td>
<td>Health: Donation to HIV research</td>
<td>5000 KES donation to HIV research</td>
<td>Urban</td>
<td>5000</td>
<td>5000 KES donation to HIV research</td>
</tr>
<tr>
<td>9</td>
<td>Health: Donation to HIV research</td>
<td>2500 KES donation to HIV research</td>
<td>Urban; Rural</td>
<td>2500</td>
<td>2500 KES donation to HIV research</td>
</tr>
<tr>
<td>10</td>
<td>Health: Donation to malaria research</td>
<td>5000 KES donation to malaria research</td>
<td>Urban</td>
<td>5000</td>
<td>5000 KES donation to malaria research</td>
</tr>
<tr>
<td>10</td>
<td>Health: Donation to malaria research</td>
<td>2500 KES donation to malaria research</td>
<td>Urban; Rural</td>
<td>2500</td>
<td>2500 KES donation to malaria research</td>
</tr>
<tr>
<td>11</td>
<td>Health: Donation to deworming program</td>
<td>5000 KES donation to deworming program</td>
<td>Urban</td>
<td>5000</td>
<td>Evidence Action estimates $0.56 as per-child cost of deworming in Kenya</td>
</tr>
<tr>
<td>11</td>
<td>Health: Donation to deworming program</td>
<td>2500 KES donation to deworming program</td>
<td>Urban; Rural</td>
<td>2500</td>
<td>Evidence Action estimates $0.56 as per-child cost of deworming in Kenya</td>
</tr>
<tr>
<td>12</td>
<td>Education: Teacher training</td>
<td>Training course for school-teachers</td>
<td>Urban; Rural</td>
<td>1000</td>
<td>Kenya Technical Training College's training course for instructors costs 30000 KES. For a class of 30 children, the per-beneficiary cost is 1000 KES.</td>
</tr>
</tbody>
</table>
Table 2: Intervention Cost Estimates

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<tr>
<th>No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Education: Inputs for ICT</td>
<td>Computers for government run school in community</td>
<td>Urban; Rural</td>
<td>500</td>
<td>Desktop computer costs 15000 KES. For a class of 30 children, per-beneficiary cost is 500 KES.</td>
</tr>
<tr>
<td>14</td>
<td>Education: Tutoring</td>
<td>Weekly tutoring sessions for child for one school term</td>
<td>Urban; Rural</td>
<td>8400</td>
<td>KTTC reports 1 tutoring session costs 700 KES. For 12 weekly sessions (1 school term), total cost is 8400 KES</td>
</tr>
<tr>
<td>15</td>
<td>Finance: Technical assistance</td>
<td>A training session on financial management</td>
<td>Urban; Rural</td>
<td>77</td>
<td>According to <a href="http://www.africapay.org/kenya">http://www.africapay.org/kenya</a>, average salary for trainer is 46000 KES/month. For a single session with 30 people in a group, cost per recipient is estimated to be 77 KES</td>
</tr>
<tr>
<td>16</td>
<td>Energy: Household solar light supply</td>
<td>Solar power system to recharge lamp and cell phone</td>
<td>Urban; Rural</td>
<td>21750</td>
<td>According to <a href="http://www.m-kopa.com/products/">http://www.m-kopa.com/products/</a>, the basic M-KOPA Solar Home System costs 3500 KES deposit plus 50 KES daily payments for a year</td>
</tr>
<tr>
<td>17</td>
<td>Agriculture: Inputs</td>
<td>50 kg bag of fertilizer</td>
<td>Rural (Makueni)</td>
<td>3110</td>
<td>1 bag of 50 kg Mavuno planting fertilizer for green leafy vegetables costs 3110 KES</td>
</tr>
<tr>
<td>17</td>
<td>Agriculture: Inputs</td>
<td>50 kg bag of fertilizer</td>
<td>Rural (Nakuru)</td>
<td>2530</td>
<td>1 bag of 25 kg Mavuno DAP planting fertilizer for maize costs 1477 KES and 1 bag of 25 kg Mavuno CAN top-dressing fertilizer for maize costs 1053 KES</td>
</tr>
<tr>
<td>18</td>
<td>Agriculture: Extension</td>
<td>Agricultural extension courses over one cropping season</td>
<td>Rural</td>
<td>1500</td>
<td>Estimated cost for 6 extension sessions to be delivered over one cropping season is 30000 KES. With 20 people per group, cost per recipient is 1500 KES</td>
</tr>
</tbody>
</table>
Elicitation Methods

In order to find an accurate, efficient and low-cost method to measure recipients’ valuations of aid programs, we tested a variety of elicitation techniques. Respondents were asked about their valuation of each of the aforementioned interventions but in distinct ways. These elicitation techniques - which were randomized across respondents - can be categorized as:

- Hypothetical (H): Respondents were administered 18 questions asking how much cash would make them as well off as each of the aforementioned aid programs, with no mention of receiving either. (N = 136)

- Becker-DeGroot-Marschak with example and probabilistic payment (BDMe): Respondents are administered 18 questions asking how much cash would make them as well off as each of the aforementioned aid programs. Respondents are told that the particular program for which their choice will actually be applicable is determined by lottery. The BDM mechanism\(^6\) is explained and an example is provided. (N = 142)

- Becker-DeGroot-Marschak on faith and probabilistic payment (BDMf): Respondents were administered 18 questions asking how much cash would make them as well off as each of the aforementioned aid programs. Respondents are told that the particular program for which their choice will actually be applicable is determined by lottery. Respondents are told simply that they will receive either cash or the program by a lottery which is designed by scientists in such a way that it is always in their best interest to report their true valuation. (N = 133)

- Multiple Price List (MPL): Respondents were administered 18 questions where they are asked to choose between a program and a given amount of cash. If they choose the program, they are asked the same choice for a larger amount of cash. This continues until the respondent selects the cash or until an upper bound of cash is reached. Respondents are told that the particular program for which their choice will actually be applicable is determined by lottery. (N = 117)

- Certainty (c): Respondents were administered 18 questions where they are asked to choose between a program and a given amount of cash. In this condition, when making the choice about the final program, respondents are told that this (randomly selected ex-ante to be WASH supplies) question is the one which will determine their award. Thus, they have certainty they will receive this program or cash when asked how much cash would make

\(^6\https://en.wikipedia.org/wiki/Becker%E2%80%93DeGroot%E2%80%93Marschak\_method
them as well off as the program. (N = 265 - cross-randomized among other elicitation methods)

1. **Hypothetical:** I’d like to ask you about various programs that are often provided by NGOs, government or other aid organizations. For each program, I will describe the program - which might provide goods or services to you - and then I’d like you to tell me how much money, if you could have it as cash to spend however you thought best, would make you just as well off as receiving the program I describe. Note this is what you would prefer. For example, I might say "Some NGOs provide school books, how much cash would make you just as well off as receiving school books from an NGO?" If you thought school books are worth KSH 1000 to you, you would say 1000.

   - Do you understand? --> IF RESPONDENT SAYS NO, PLEASE EXPLAIN TO THE RESPONDENT AGAIN.
   - DESCRIBE <<PROGRAM>> -- > How much cash, that you could spend however you thought best, would make you just as well off as receiving <<PROGRAM>>?

2. **BDM with Example & Probabilistic Payment:** I’d like to ask you about various programs that are often provided by NGOs, government or other aid organizations. For each program, I will describe the program - which might provide goods or services to you - and then I’d like you to tell me how much money, if you could have it as cash to spend however you thought best, would make you just as well off as receiving the program I describe. Note this is what you would prefer. For example, I might say "Some NGOs provide school books, how much cash would make you just as well off as receiving school books from an NGO?" If you thought school books are worth KSH 1000 to you, you would say "1000". For one of the questions you will actually receive either the program or an amount of cash - so these choices matter and you should make sure to think carefully and give the most accurate answer. First, we will pick one of the programs by lottery, then you will either get that program or an amount of cash. To determine if you get the program or the cash, we will choose a quantity of shillings randomly: if that number of shillings is higher than the amount of cash you said would make you just as well off as the program, you will get the number of shillings which we chose randomly. If the number we choose is less than the amount you said, you will get the program. Let’s do an example: imagine I asked about school books and you said they were worth KSH 1,000 to you. random number drawn is <<XYZ>>.

   - IF XYZ>1000 --> Since the number is more than the number you said, you will get <<XYZ>> which is worth more to you than the books. Imagine I had drawn 500,
then you would have received the books, which are worth more to you than 500. So if you give the exact value that makes you just as well off as the books, you always get the thing that is most valuable.

- **IF** $XYZ < 1000 --> Since the number is less than the number you said, you will get the books which is worth more to you than $XYZ$. Imagine I had drawn 1500, then you would have received KSH 1500 which is worth more to you than the books. So if you give the exact value that makes you just as well off as the books, you always get the thing that is most valuable.

- Think about it this way: imagine I asked about school books and you said they were worth KSH 1000 to you. Imagine you gave me KSH 1000 and I went to the market. If the price of the books was more than 1000 I would give you the books even though you only gave me 1000. If the price of the books is less than 1000, you wouldn’t get the books but I would return your 1000 and give you some additional money as well. So you always get the thing that is most valuable to you as long as you say the exact amount of cash that makes you just as well off as the school books.

- Do you understand? --> **IF** RESPONDENT SAYS NO, **PLEASE EXPLAIN TO THE RESPONDENT AGAIN**.

- **DESCRIBE** $PROGRAM$ --> How much cash, that you could spend however you thought best, would make you just as well off as receiving $PROGRAM$?

### 3. BDM with Example & Certain Payment:

**SAME AS ABOVE BUT RESPONDENT IS INFORMED THAT THEIR CHOICE WILL BE VALID FOR ONE PROGRAM – RANDOMLY SELECTED TO BE WASH SUPPLIES**

- Our lottery has selected “Water: Hygiene / WASH supplies: Delivering soap, waterguard and hygiene supplies” to households to be the one where you receive either the program or an amount of cash. So please think carefully and tell me the exact amount of money; if you could have it as cash to spend however you thought best, that would make you just as well off as receiving this program. Apart from water, accessibility to supplies for basic hygiene practices such as soap, waterguard and other necessary hygiene supplies is a major hindrance to many low income households around the country. This can lead to insufficient hygiene practices that can lead to certain avoidable hygiene related diseases and heightened social stigma. How much cash, that you could spend however you thought best, would make you just as well off as receiving 2 months supply of basic hygienic supplies (soap and waterguard)?
4. **BDM on Faith & Probabilistic Payment:** I'd like to ask you about various programs that are often provided by NGOs, government or other aid organizations. For each program, I will describe the program - which might provide goods or services to you - and then I’d like you to tell me how much money, if you could have it as cash to spend however you thought best, would make you just as well off as receiving the program I describe. Note this is what you would prefer. For example, I might say "Some NGOs provide school books, how much cash would make you just as well off as receiving school books from an NGO?" If you thought school books are worth KSH 1000 to you, you would say "1000". For one of the questions you will actually receive either the program or an amount of cash - so these choices matter and you should make sure to think carefully and give the most accurate answer. First, we will pick one of the programs by lottery, then you will either get that program or an amount of cash. To determine if you get the program or the cash, we also use a lottery that makes sure you always get the thing that is most valuable to you as long as you say the exact amount of cash that makes you just as well off as the program. This lottery is carefully designed by scientists in such a way that it is always in your best interest to tell us your true valuation. So please think carefully and tell me the exact amount of money, if you could have it as cash to spend however you thought best, that would make you just as well off as receiving the program.

- Do you understand? --> IF RESPONDENT SAYS NO, PLEASE EXPLAIN TO THE RESPONDENT AGAIN.

- **DESCRMIE <<PROGRAM>>** --> How much cash, that you could spend however you thought best, would make you just as well off as receiving <<PROGRAM>>?

5. **BDM on Faith & Certain Payment:** SAME AS ABOVE BUT RESPONDENT IS INFORMED THAT THEIR CHOICE WILL BE VALID FOR ONE PROGRAM – RANDOMLY SELECTED TO BE WASH SUPPLIES

- Our lottery has selected “Water: Hygiene / WASH supplies: Delivering soap, waterguard and hygiene supplies” to households to be the one where you receive either the program or an amount of cash. So please think carefully and tell me the exact amount of money, if you could have it as cash to spend however you thought best, that would make you just as well off as receiving this program. Apart from water, accessibility to supplies for basic hygiene practices such as soap, waterguard and other necessary hygiene supplies is a major hindrance to many low income households around the country. This can lead to insufficient hygiene practices that can lead to certain avoidable hygiene related diseases and heightened social stigma. How much
cash, that you could spend however you thought best, would make you just as well off as receiving 2 months supply of basic hygienic supplies (soap and waterguard)?

6. **Multiple Price List:** I’d like to ask you about various programs that are often provided by NGOs, government or other aid organizations. For each program, I will describe the program - which might provide goods or services to you - and then I’d like you to tell me how much money, if you could have it as cash to spend however you thought best, would make you just as well off as receiving the program I describe. How we’ll do this is I will ask you about various amounts of shillings, and whether you would prefer the program or that amount of shillings. For one of the questions you will actually receive either the program or an amount of cash - so these choices matter and you should make sure to think carefully and give the most accurate answer. First, we will pick one of the programs by lottery, then you will either get that program or an amount of cash. To determine if you get the program or the cash, we also use a lottery to pick one of the shilling amounts you mentioned. If you said you preferred the program to that amount, you will get the program. If you said you preferred that amount of shillings, you would get cash. For examples, I might say "Some NGOs provide school books, would you rather KSH 500 or books?" Suppose you said you would prefer books. Then I asked "Would you rather KSH 1000 or books?" and you said you would like books. If we randomly picked KSH 500, you would get books since you said they were worth more than KSH 500. If we randomly picked KSH 1000 you would get KSH 1000, since you said that was more valuable than books.

- Do you understand? --> **IF** RESPONDENT SAYS NO, PLEASE EXPLAIN TO THE RESPONDENT AGAIN.
- **DESCRIBE** <<PROGRAM>> --> Would you prefer to receive this program or would you rather receive <<LOWEST AMOUNT OF MPL>> shillings to spend in a way you thought best?
- **IF** RESPONDENT CHOOSES PROGRAM --> Would you prefer to receive this program or would you rather receive <<NEXT HIGHEST AMOUNT OF MPL>> shillings to spend in a way you thought best?
- **CONTINUE ASKING FOR HIGHER AMOUNTS TILL CASH IS CHOSEN OR HIGHEST AMOUNT IN MPL IS REACHED**
Program Descriptions

- **Health: Bed net distribution:** Malaria is a serious threat to life especially in tropical climates such as Kenya. Many people lack access to treated bed nets and this results in many deaths, especially of young children below the age of 5. To combat this, many governments and NGO’s provide treated bed nets to households in order to provide them with access to simple prevention to malaria. How much cash, that you could spend however you thought best, would make you just as well off as receiving an insecticide treated bed net?

- **Finance: Technical assistance:** Access to adequate financial information inhibits many people from making the right decisions on basic ways of effectively planning and spending their finances as well as accessing financial resources. It is for this reason that some NGO’s and government bodies at times provide financial technical assistance to aid individuals on the best financial practices. How much cash, that you could spend however you thought best, would make you just as well off as having the opportunity to attend a training session on financial management and services (such as for borrowing and saving)? Note the training would be for you and 20 other individuals in one class.

- **Water: Water supply:** water tank or borehole: Geographic barriers to water supply pose social and economic barriers to many low income households. Providing households with access to water supply sources such as water tanks or boreholes alleviate the efforts that many people go through to access sufficient water. How much cash, that you could spend however you thought best, would make you just as well off as receiving an easily accessible water source such as a water tank or a borehole in your community? Note the water source would be shared by you and other members in your community.

- **Agricultural Inputs:** Agricultural inputs such as fertilizers, pesticides, agents an additives account for big differences between successful and unsuccessful crop yields. Unfortunately many smallholder farmers do not have the money or information required to access such inputs. Some NGO’s aim to solve this problem by providing small scale farmers with the necessary inputs that these farmers require to meet their crop needs. How much cash, that you could spend however you thought best, would make you just as well off as receiving a 50 kg bag of fertilizer?

- **Health: Donation to HIV research:** HIV/AIDS is still one of the world’s most serious public health challenge. Due to the provision of Antiretroviral drugs around the world, people can low live longer and healthier lives and prevent onward transmission of the
virus. ARV’s were developed due to research funded by donations gathered by various governments and organization solely for the purpose of HIV / AIDS research. Despite this progress there is no cure for HIV/AIDS. What is the smallest amount of cash, that you could spend however you thought best, that would make you just as well off as donors spending KSH 2,500 on HIV / AIDS research?

- **Energy: M Kopa: household solar light supply:** Around the world, access to electricity has kept people in lower standards of living. For example, a lack of light can prevent children from studying. Solar energy is an alternative to traditional sources of electricity and is sustainable due to the fact that it is wholly powered by the sun’s rays. How much cash, that you could spend however you thought best, would make you just as well off as receiving a solar power system that allows you to have a rechargeable lamp and provide power to a cell phone?

- **Education: Weekly tutoring to school children:** Many children around the country, due to various economic circumstances, experience slow academic progress due to high classroom numbers, low or inadequate staffing and the lack of basic materials to aid in sufficiently supporting school going children in their educational growth. Some NGO’s provide remedial tutoring lessons to children in schools that lack the resources to sufficiently support their educational growth. How much cash, that you could spend however you thought best, would make you just as well off as receiving weekly tutoring sessions for one of your children for one school term?

- **Agricultural Extensions and Inputs:** Smallholder farmers account for 70% of Kenya’s agricultural yield. One of the challenges that small scale farmers face in optimizing their yield is that they lack the information necessary to grow with the changing technologies, research and weather patterns. Some NGO’s and government programs provide agricultural extension programs to help smallholder farmers by increasing their access to knowledge and information for useful agricultural practices. How much cash, that you could spend however you thought best, would make you just as well off as receiving agricultural extensions education over the course of a planting season?

- **Education: Teacher training:** A challenge facing the public education system today is the quality of training that teachers receive. This is confounded by funding constraints and at times the challenges faced by the teachers in having to deal with inadequate resources. There has been a digital tool that has been developed in aiding teachers to effectively and adequately incorporate ICT learning mechanisms into their existing curriculum through a short term training course. How much cash, that you could spend however you thought
best, would make you just as well off as having this training course provided to the teacher in one class your children attend? Note the training would be for the teacher, benefitting your child and the rest of the class.

- **Digital stress reduction:** Stress is a common challenge for people all over the world. There are training tools that can be delivered over smartphones that teach people how to cope with stress and anxiety. How much cash, that you could spend however you thought best, would make you just as well off as receiving a smartphone and training on how to use stress and anxiety reduction tools available on that phone?

- **Health: Condom distribution:** One of the most common preventative practices against the spread of HIV/AIDS is the use of condoms for safe sex. In very low-income areas, the cost of purchasing condoms is considered quite high to incorporate into household spending budgets. Many NGO’s in Kenya freely distribute condoms in order to curb the spread of HIV infections among such low income communities. How much cash, that you could spend however you thought best, would make you just as well off as receiving a box of 50 condoms?

- **Water: Hygiene / WASH supplies:** Delivering soap, waterguard and hygiene supplies to households: Apart from water, accessibility to supplies for basic hygiene practices such as soap, waterguard and other necessary hygiene supplies is a major hinderance to many low income households around the country. This can lead to insufficient hygiene practices that can lead to certain avoidable hygiene related diseases and heightened social stigma. How much cash, that you could spend however you thought best, would make you just as well off as receiving 2 months supply of basic hygienic supplies (soap and waterguard)?

- **Education: Inputs for ICT: providing computers to school:** A major factor for growth and development lies in technology. One of the initiatives that the Kenyan government has proposed to ensure that the Kenyan population is as up to date in knowledge of ICT has been through providing computers to primary and secondary schools around the country. How much cash, that you could spend however you thought best, would make you just as well off as having computers provided to the government run school in your community? Note the computer would be for the class, benefitting your child and the rest of the class.

- **Health: Donation to malaria research:** Malaria is considered one of the world’s deadliest killers. Nearly half of the world Is at risk of malaria, more so young children under the age of 5 and pregnant women. Many charities gather donations from around
the world in order to make provisions for research and anti-malaria activities around the world. What is the smallest amount of cash, that you could spend however you thought best, that would make you just as well off as donors spending KSH 2,500 on malaria research?

- **Health: Family planning and reproductive health services:** Voucher for clinic offering these services, and transportation if needed: One of the challenges that some families face, aside from the cost of basic family planning methods, is the access to family planning and reproductive health services. Lack of information and knowledge is a major hinderance to families taking up these services. Various NGO’s work to establish the provision of the reproductive health services to communities that cannot access them. How much cash, that you could spend however you thought best, would make you just as well off as receiving one free visit to a family planning clinic to receive family planning services with transportation, if required?

- **Health: Donation to deworming program:** Deworming is a major and vital practice against children’s deaths due to infection of parasitic worms. Children are more susceptible to infection. Left untreated in children under the age of 5, parasitic worms can cause complications in cognitive development and overall quality of life. Some NGO’s gather donations from around the world in order to provide free deworming medication to school children. What is the smallest amount of cash, that you could spend however you thought best, that would make you just as well off as donors spending KSH 2,500 on deworming programs?

- **Water: Hygiene / WASH education and workshops:** 663 million people around the world lack access to safe water. Lack of access to safe water accounts for many deaths due to diseases such as diarrhea, cholera, typhoid and other worm diseases. To combat this problem, NGO’s around the world engage in providing accessible solutions to increasing access to safe water and safe water practices. Receiving hygiene education might change people’s everyday practices to safer and reliable ways of maintaining safe water practices. How much cash, that you could spend however you thought best, would make you just as well off as receiving a half day training on safe water practices? Note the training would be for you and 20 other individuals in one class.

- **Agricultural Extensions and Inputs:** Smallholder farmers account for 70% of Kenya’s agricultural yield. One of the challenges that small scale farmers face in optimizing their yield is that they lack the information necessary to grow with the changing technologies, research and weather patterns. Some NGO’s and government programs provide
agricultural extension programs to help smallholder farmers by increasing their access
to knowledge and information for useful agricultural practices. How much cash, that
you could spend however you thought best, would make you just as well off as receiving
agricultural extensions education over the course of a planting season?

Indices and Variables

1. Consumption - monthly KES consumption per capita

   (a) Food
      i. Food own production
      ii. Food bought
         A. Meat, fish & dairy
         B. Fruit & vegetables
         C. Cereals
         D. Other food

   (b) Temptation good expenditure
      i. Alcohol
      ii. Tobacco
      iii. Gambling

   (c) Airtime, internet, other phone expenses

   (d) Travel, transport, hotels

   (e) Personal and household items
      i. Clothing and shoes
      ii. Personal items such as soap, shampoo, etc.
      iii. Household items such as matches, kerosene, etc.
      iv. Cooking fuel

   (f) Recreation/entertainment

   (g) Housing
      i. Rent
      ii. Electricity
iii. Water
(h) Education expenditures
(i) Medical expenditure
(j) Social expenditure
   i. Religious expenses or other ceremonies
   ii. Weddings
   iii. Funerals
   iv. Charitable donations
   v. Dowry/bride price
   vi. Fees paid to the village elder, chiefs or other officials
(k) Other expense greater than KSH 1,000

2. Assets - sum (in KSH) of value of:

   (a) Productive assets
      i. Irrigation pump
      ii. Hose pipe
      iii. Ox-Ploughs
      iv. Oxen/work bulls
      v. Knapsack sprayers
      vi. Wheelbarrows
      vii. Ox-carts/donkey carts
      viii. Hand carts
      ix. Other farming tools
      x. Fishing equipment (boats, canoes, etc)
      xi. Other asset used for agriculture or business

   (b) Vehicles
      i. Bicycle
      ii. Motorbike

   (c) Furniture
      i. Sofas
      ii. Chairs
iii. Table
iv. Clock/Watch
v. Beds
vi. Mattresses
vii. Cupboards
viii. Other furniture
(d) Household durables
   i. Cell phone
   ii. Sewing machine
   iii. Radio, tape- OR CD player
   iv. Battery
   v. Solar panel
   vi. Television or computer
   vii. Kerosene stove
   viii. Refrigerator
   ix. Insecticide treated bed net
(e) Other
(f) Livestock
   i. Cows
   ii. Birds
   iii. Small ruminants
3. Labor
   (a) Hours spent per week on income generating activities, including:
      i. Working in agriculture for this household
      ii. Tending animals for this household
      iii. Working in a non-farm or livestock business owned by this household
      iv. Working for pay for someone outside the household (in agriculture, livestock, housework, casual labor, salaried job or other paid work)
4. Education index
   (a) Weighted standardized index of:
i. Average years of schooling per adult (18+)
ii. Proportion of children (<19) in school
iii. Average days of school missed per child (<19) - negatively coded
iv. Average perception of child (<19) school performance
v. Average spending on school expenses per child (<19)
vi. Average time studying or in school per child (<19)