Assessing the Reliability of Experimental Valuation Techniques

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Abstract

This study tests the relative ability of common incentive compatible value elicitation techniques to reliably measure preferences from respondents. 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 common incentive compatible techniques do not perform meaningfully better than simply posing a hypothetical question.

1 Introduction

This study evaluates a preference-based approach to estimate the values aid recipients place on alternative uses of aid resources, utilizing alternative incentive compatible methods.

There is a rich literature on value elicitation through field experiments utilizing methods such as contingent valuation, Becker-DeGroot-Marschak (BDM) lotteries, multiple price lists (MPL), and take-it-or-leave-it offers (TIOLI). Many studies have utilized these approaches to measure valuations for common development interventions (e.g., Altaf & Hughes (1994), Singh et al (1993), Bohm, Essenburg & Fox (1993), Whittington et al (1992), Swallow & Woudyalew (1994), Kremer, Leino, Miguel & Zwane (2011), Berry, Fischer & Guiteras (2015), Hoffman, Barrett & Just (2009), Cole & Fernando (2016), Cole, Stein & Tobacman (2014), Cole, Gine & Vickery (2013), Guiteras et al (2016), Guiteras, Levine, Polley, Quistorff (2016)). There is an equally rich literature on how biases and contextual factors may affect stated valuations (e.g., Singh et al (1993), Bohm, Essenburg & Fox (1993), Whittington et al (1992), Guiteras, Levine, Polley, Quistorff (2016), Bohm, Linden & Sonnegård (1997)). Several studies have also sought to understand the reliability of various mechanisms to elicit willingness to pay. Berry, Fischer & Guiteras (2015), for example, compare willingness to pay for water filters elicited through TIOLI and BDM experiments in Ghana. The authors find that BDM systematically under-predicts willingness to pay relative to TIOLI and the magnitude of this under-prediction increases with price. De Meza & Reyniers (2013) discuss how the BDM mechanism may not be incentive compatible due to reference-dependent preferences, price anchoring, and mechanism misunderstanding on part of the respondents. They conduct an experiment with university students using a modified BDM that resembles market offers with bids closer to that under TIOLI offers.

This study contributes to this brach of the literature by comparing the reliability of alternative value elicitation techniques. In this study, respondents' indifference points were elicited using various mechanisms (asking a hypothetical question, BDM and multiple price list). The specific elicitation mechanism used was randomly determined for each respondent. Following the value elicitation, one program was chosen for the respondent by lottery. Respondents were then revisited and offered a choice between that program and a cash amount close to their indifference point: observing what percentage of respondents have actual choices that are consistent with the predicted choices based on their indifference points across the different modes of value elicitation allows us to identify the most reliable method of obtaining respondent's subjective valuation for aid programs. We find that common incentive compatible techniques do not perform meaningfully better than simply posing a hypothetical question. Point estimates indicate consistency in responses following implementation of incentivized value elicitation techniques

are very similar to those from simply posing a hypothetical question. At the upper bound of the 95% confidence interval, incentive compatible techniques would increase consistency by up to ˜10 percentage points, relative to a mean of ˜40% consistent choices.

2 Study design

We test what method is most reliable to measure potential recipients valuations. To that end, we asked respondents their indifference points for a variety of programs using several distinct value elicitation methods.

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.[1] 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.[2] For foundations, we focused on two large and prominent foundations (the Gates Foundation and Ford Foundation), obtaining grant level data from annual statements and reports.[3] We selected 7 large INGOs, with total charitable spending >$500 million in 2014, and obtained spending data from annual and financial reports.[4]

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

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[1]https://opendata.go.ke/dataset/Kenya-Government-Funded-Projects-2015/ncdd-s55u ; 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

[3]http://www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database#q/k=kenya&page=7 ; https://www.fordfoundation.org/library/financial-statements/2014-annual-tax-return-form-990-pf/

[4]Including: CARE International, Catholic Relief Services (CRS), Médecins Sans Frontières, Oxfam International, Plan International, Save the Children and World Vision International (http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH11%20An%20Overview%20of%20International%20NGOs%20in%20Development%20Cooperation.pdf)

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 eduction. 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.[5] 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.[6]

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

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[5]https://opendata.go.ke/dataset/Kenya-Government-Funded-Projects-2015/ncdd-s55u
[6]Details of this process will be available at http://jeremypshapiro.com

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 which: 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 Value 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:

1. 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)

2. 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[7] is explained and an example is provided. (N = 142)

3. 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)

4. 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)

5. 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 them as well off as the program. (N = 265 - cross-randomized among other elicitation methods)

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[7]https://en.wikipedia.org/wiki/Becker%E2%80%93DeGroot%E2%80%93Marschak_method

2.4 Data and program delivery

2.4.1 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. 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. As per our field protocol, each surveyor administered one of these versions to each household surveyed in turn, i.e. the first household surveyed was administered survey version 1 (where the Hypothetical elicitation treatment was used), the second household surveyed was administered survey version 2 (where BDM with Example was used), and so on. 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 *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.

2.4.2 Valuation method reliability survey

The purpose of the follow-up visit was to verify the initial survey visit was conducted according to protocol as well as to offer respondents a choice between an aid program and a cash amount around the indifference point derived from their initial stated valuation. This procedure allows us to determine which elicitation mechanism is most likely to yield consistent preferences – if the cash offer is greater than the respondent's previously stated indifference point, the respondent should rationally choose cash; however, if at follow-up, the respondent chooses the program, the elicitation mechanism is inconsistent. Thus, measuring the relative proportions in each group whose choice coincides with that indicated by their previously measured indifference point is a reflection of the accuracy of the method in eliciting valuations for each program.

These 793 respondents then received either the program (N = 155) or the cash offer amount (N = 638), depending on their choice at follow-up. Figure 1 shows the distribution of cash offer amounts (based on respondents' indifference points) for respondents who chose to receive cash and those who chose to receive a program at follow-up.

Figure 1: Distribution of Cash Offer Amounts
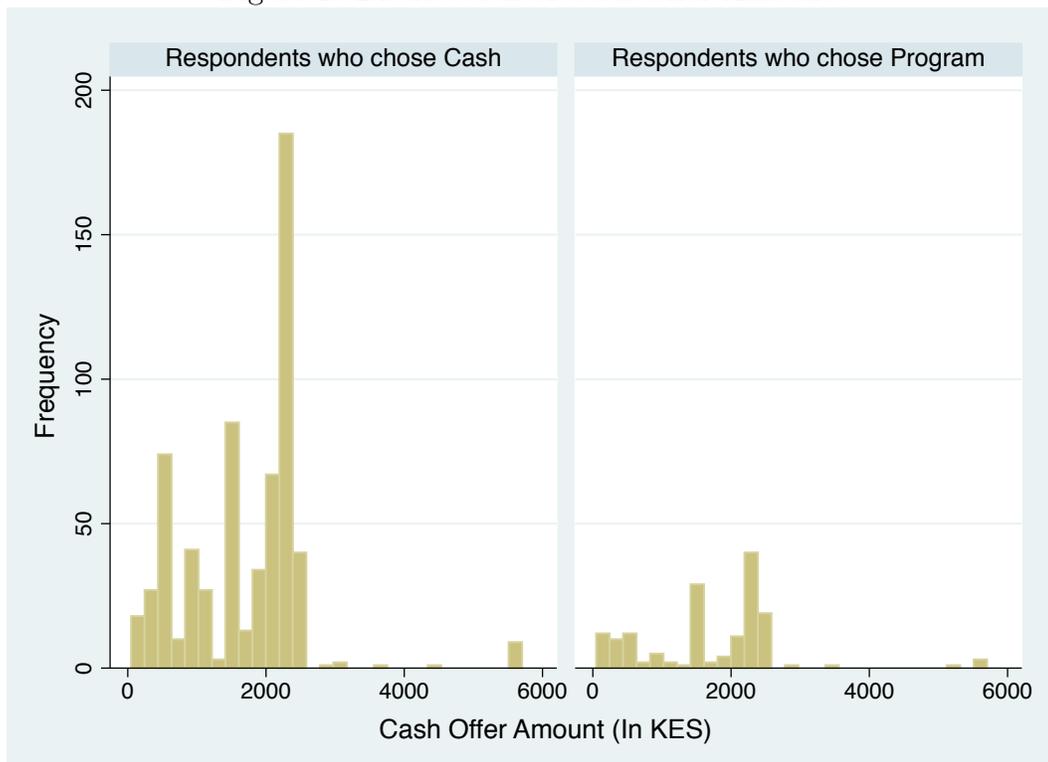
The aid programs randomly chosen for delivery included insecticide-treated bed nets, a supply of condoms, fertilizer, hygiene supplies, and donations to various programs. Respondents were informed that no matter what choice they made, the cash or the program would be delivered to them at the same time as the program would be.

As life events could cause the need for liquidity, we inquired whether the household received a liquidity shock since our initial visit. Finally, the interviewer confirmed the names and ID numbers of primary male and female household members, the location of residence and phone numbers listed for MPesa transfers. This information was used to ensure any transfers reach the intended recipient. These surveys were conducted by field officers other than those who conducted the initial recipient surveys. If discrepancies were found between this survey and the initial survey, transfers were delayed until issues were resolved.

2.4.3 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 MPesa 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 MPesa details that all received the transfer amount.

3 Results

3.0.1 Elicitation Method Consistency

As noted above, we expect that a reliable value elicitation method should result in the recipient sticking with the choice suggested by their stated indifference point (or perhaps 50% doing so if it is a true indifference point - we are interested in the differences in the proportion across elicitation methods). We therefore estimate:
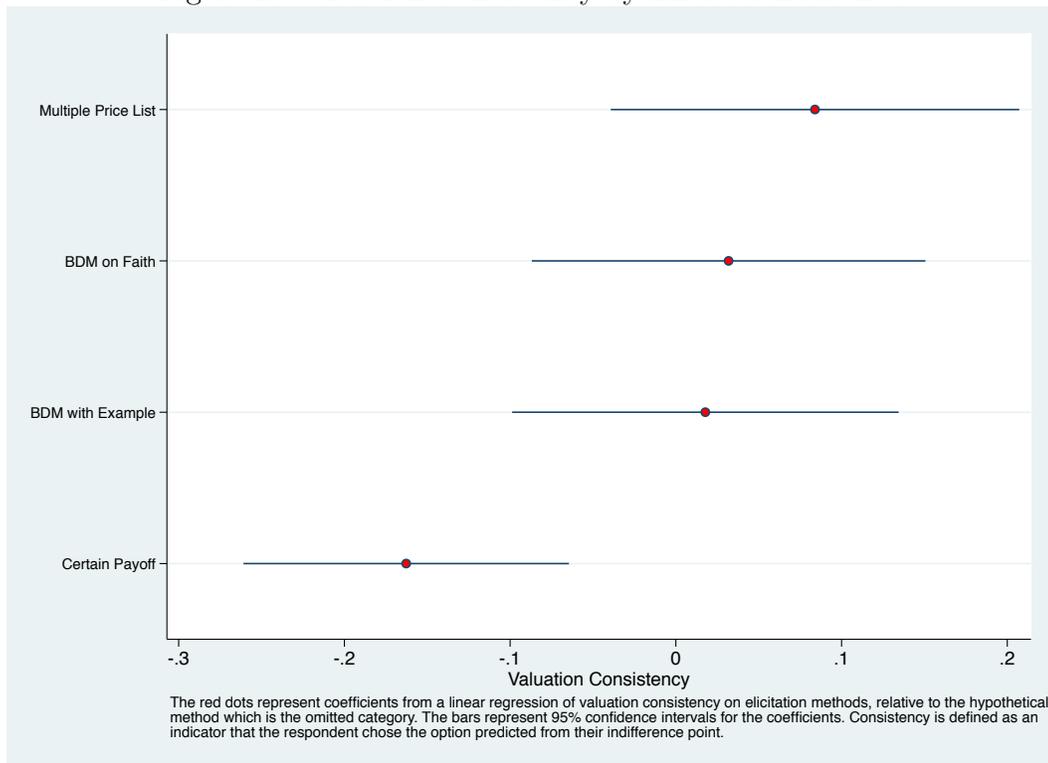
$$Consistent_i = \alpha_p + \beta_1 BDMe_i + \beta_2 BDMf_i + \beta_3 MPL_i + \beta_4 c_i + \varepsilon_i \tag{1}$$

where $Consistent$ is an indicator that the respondent chose the option predicted from their indifference point, $BDMe$, $BDMf$ and MPL are indicators that the respondent was in the

BDM with explanation, BDM on faith or MPL group. c is an indicator that the choice in question was *ex ante* certain to be selected in determining the respondent's award. α_p represents indicator variables for the program the individual was offered in lieu of cash. The hypothetical choice condition is the omitted category.

Figure 2 displays the consistency of each of the valuation elicitation methods relative to the hypothetical method (the omitted category). The figure shows the mean difference in the proportion with inconsistent choices (the dot) and the 95% confidence interval of the point estimate. With the exception of the certainty treatment, the point estimates suggest that inconsistency does not differ much between incentivized and hypothetical value elicitation. Moreover, the 95% confidence interval suggests that incentivizing the choice reduces inconsistent choices by a relatively small amount (~10 percentage points). Respondents assured of a certain payoff are significantly more likely to be inconsistent. This is an unexpected result. We note, however, that this result only applies to a single intervention (WASH supplies) whereas the other elicitation methods applied to a range of interventions. Thus, this finding may not generalize more broadly. The overall mean of consistency for all methods combined is 0.38.

Figure 2: Valuation Consistency by Elicitation Method

The red dots represent coefficients from a linear regression of valuation consistency on elicitation methods, relative to the hypothetical method which is the omitted category. The bars represent 95% confidence intervals for the coefficients. Consistency is defined as an indicator that the respondent chose the option predicted from their indifference point.

Appendix

Table 1: Intervention Cost Estimates

No.	Intervention	Description	Sample	Cost (KES)	Cost Rationale
1	Digital Stress Reduction	Smartphone with stress reduction apps and training on using the applications	Urban	3500	Market price in Kenya for basic smartphone is 3500 KES.
2	Vocation: Computer Skills training	Vocational training course in computer skills	Urban; Rural	10000	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
3	Water: Water supply	Water tank or borehole for community	Urban; Rural	1400	Market price in Kenya for 10000 liter water tank is 76000 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 `http://www.waterfund.go.ke/watersource/Downloads/004.%20Improving%20Urban%20Water%20Supply%20in%20Kenya.pdf`), then annual cost of refilling tank is 204400 KES. Hence, total per-recipient cost is estimated to be 1400 KES.
4	Water: WASH education and workshops	Group-based training session on safe water practices	Urban; Rural	115	According to `http://www.africapay.org/kenya` average salary for trainer is 46000 KES/month. For a single session with 20 people in a group, cost per recipient is estimated to be 115 KES
5	Water: WASH supplies	Waterguard and 2 months supply of soap	Urban; Rural	860	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
6	Health: Family planning services	1 visit to a family planning clinic to receive services plus cost of transportation to clinic	Urban; Rural	5200	Vipawa health clinic in Kibera charges 5000 KES for one visit that includes injectable contraceptives plus 200 KES maximum for transportation

Table 1: Intervention Cost Estimates

No.	Intervention	Description	Sample	Cost (KES)	Cost Rationale
7	Health: Condom distribution	A box of 100 condoms	Urban	2000	A package of 3 condoms costs 60 KES at health clinics in Nairobi
7	Health: Condom distribution	A box of 50 condoms	Urban; Rural	1000	A package of 3 condoms costs 60 KES at health clinics in Nairobi
8	Health: Bed net distribution	An insecticide treated bed net	Urban; Rural	900	A bed net costs 900 KES at health clinics in Nairobi
9	Health: Donation to HIV research	5000 KES donation to HIV research	Urban	5000	5000 KES donation to HIV research
9	Health: Donation to HIV research	2500 KES donation to HIV research	Urban; Rural	2500	2500 KES donation to HIV research
10	Health: Donation to malaria research	5000 KES donation to malaria research	Urban	5000	5000 KES donation to malaria research
10	Health: Donation to malaria research	2500 KES donation to malaria research	Urban; Rural	2500	2500 KES donation to malaria research
11	Health: Donation to deworming program	5000 KES donation to deworming program	Urban	5000	Evidence Action estimates \$0.56 as per-child cost of deworming in Kenya (`http://www.evidenceaction.org/blog-full/what-is-the-cost-of-deworming-a-2016-update`). For \$50, 90 children can be dewormed
11	Health: Donation to deworming program	2500 KES donation to deworming program	Urban; Rural	2500	Evidence Action estimates \$0.56 as per-child cost of deworming in Kenya (`http://www.evidenceaction.org/blog-full/what-is-the-cost-of-deworming-a-2016-update`). For \$25, 45 children can be dewormed
12	Education: Teacher training	Training course for school-teachers	Urban; Rural	1000	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.

Table 1: Intervention Cost Estimates

No.	Intervention	Description	Sample	Cost (KES)	Cost Rationale
13	Education: Inputs for ICT	Computers for government run school in community	Urban; Rural	500	Desktop computer costs 15000 KES. For a class of 30 children, per-beneficiary cost is 500 KES.
14	Education: Tutoring	Weekly tutoring sessions for child for one school term	Urban; Rural	8400	KTTC reports 1 tutoring session costs 700 KES. For 12 weekly sessions (1 school term), total cost is 8400 KES
15	Finance: Technical assistance	A training session on financial management	Urban; Rural	77	According to http://www.africapay.org/kenya 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
16	Energy: Household solar light supply	Solar power system to recharge lamp and cell phone	Urban; Rural	21750	According to http://www.m-kopa.com/products/ the basic M-KOPA Solar Home System costs 3500 KES deposit plus 50 KES daily payments for a year
17	Agriculture: Inputs	50 kg bag of fertilizer	Rural (Makueni)	3110	1 bag of 50 kg Mavuno planting fertilizer for green leafy vegetables costs 3110 KES
17	Agriculture: Inputs	50 kg bag of fertilizer	Rural (Nakuru)	2530	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
18	Agriculture: Extension	Agricultural extension courses over one cropping season	Rural	1500	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

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? --> <u>IF RESPONDENT SAYS NO, PLEASE EXPLAIN TO THE RESPONDENT AGAIN</u>.
   - <u>DESCRIBE <<PROGRAM>></u> --> 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>>.

   - <u>IF XYZ>1000</u> --> 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.
   - DESCRIBE <<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 fore 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?