International Initiative for Impact Evaluation

Community advocacy forums and public service delivery in Uganda

Impact, and the role of information, deliberation, and administrative placement

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A. Summary

In 2015, we proposed a cluster randomized control trial to evaluate the effectiveness of the community advocacy forums, also known as barazas, in Uganda. The baraza programme, an initiative of the president of Uganda and implemented by the Office of the Prime Minister (OPM), was designed to improve public service delivery by enhancing public involvement in holding the government accountable for service delivery in relation to the resources spent. The study had several objectives. First, it wanted to establish, in a rigorous way, if the program had an impact on public service delivery. A second objective of the study was to compare the effectiveness of barazas organized at lower administrative levels (the sub-county) to that of barazas that are organized at a more aggregate level (the district), as the level of administrative placement is an important determinant of the cost-effectiveness of the policy intervention. Third, the project also set out to explore pathways through which community advocacy forums may affect outcomes. Using a two-by-two factorial design, it differentiates between (1) the impact of providing citizens with information related to budgeting and planning, and (2) the impact of letting citizens engage with public servants and politicians in a facilitated questions-and-answers session. A baseline survey involving more than 12,500 households and 400 government officials was conducted late 2015. After completion of the baseline, we trained local government officials to ensure adherence to the intervention protocols, and the interventions were rolled out by the OPM, our main implementing partner.

While the project was initially assumed to take about 2 years, OPM faced various challenges that affected the timely roll-out of the barazas, including budgetary constraints and disruptions related to the general elections of 2016. Four years after the baseline survey, with about 50 percent of the planned barazas implemented, a trade-off needed to be made between waiting for the remaining barazas to be completed or conducting the end-line survey after partial roll-out. It was decided to proceed with end-line data collection and employ estimation and data collection strategies to control for potential selection bias that may have been introduced due to the partial roll-out. In January and February 2020 endline data was collected on 6,700 households and 260 government officials.

In a first part of this report, we strictly follow a pre-analysis plan that summarizes a range of outcomes into four different families of outcomes corresponding to the main sectors – agriculture, infrastructure, health and education – and one overall index of public service delivery. Judged by these summary indices, we find little evidence that the baraza intervention had an impact on public service delivery. The only exception is agriculture, where we find that sub-county level barazas have a positive impact, and that this impact is clearly superior to the (lack of) impact associated with district level barazas.

In a second part of the report, we proceed in a more exploratory way. We provide a detailed analysis of individual outcomes, grouped under different headings. We first look at each of the four sectors in more detail. We then look for changes in behaviour that is explicitly targeted by barazas, such as political participation, information seeking, and contributions to the common good. Finally, we provide results on changes in the perception of citizens on a range of issues that were most mentioned by stakeholders during qualitative fieldwork.

In a third part, we also explore heterogeneity in the treatment effect. We look at heterogeneity arising from differences in timing from the interventions and look at how remoteness affects

impact. We also investigate if we find different effects if stakeholders report that they recall the baraza event.

This second and third part add more nuance to this conclusion arrived at in the confirmatory part. For instance, we find that in the agricultural sphere, sub-county level barazas significantly increase access to extension. However, this seems to be driven especially by households that live close to the sub-county headquarter. Looking at outcomes in the area of roads and water infrastructure, we find some evidence that sub-county level barazas reduce waiting time at the water source. Interestingly, this effect seems to be strongest in more remote areas, among households that live further away from the sub-county headquarters. For health, we only find effects if we restrict the sample to include only treatment sub-counties where officials recall that a baraza happened. We then find that the information and deliberation components affect the use of government health facilities. For education, we see an increase in enrolment rates, but only if we allow for enough time to pass between the intervention and the collection of the endline data.

The somewhat complex picture that emerges from this more detailed analysis also means that conclusions in terms of cost-effectiveness are not unambiguous. For instance, if the focus is on public service delivery related to water infrastructure or in the area of education, we find that a district level baraza is far more cost effective than sub-county level barazas, as much more households are reached in the former. However, if the focus in on agriculture, sub-county level barazas are most cost-effective. The same holds for comparisons between the cost-effectiveness of the deliberation and information component. For example, in the health sector, we find the deliberation component to be slightly more effective in reducing waiting time. In general, though, we find that since baraza interventions (both at the sub-county and district level) impact large numbers of households and cost relatively little, the rate of return is substantial, even if treatment effects are small in size.

The mixed results are puzzling, especially given the fact that qualitative research prior to endline data collection suggested clear effects from the intervention (Van Campenhout et al. 2018). We suspect that the lack of impact in the quantitative part of the study may be due to the nature of the intervention. Different sub-counties face different challenges, which is reflected in what transpires at the baraza event. For instance, in districts where there are issues related to water, the baraza will mainly revolve around poor service delivery in the infrastructure sector and how this can be improved. In these sub-counties, barazas may impact service delivery in infrastructure, but leave outcomes in other sectors unaffected. In other sub-counties, problems may concentrate in the agricultural sector, and impact on infrastructure may be minimal.

The true treatment received by subjects may thus become hard to discern and may in fact be far from the standardized treatments given in randomized controlled trials (RCTs) in medical sciences. As a result, a focus on average treatment effects may fail to identify a significant effect, as the effect is averaged over many sub-counties that in reality received a “different” type of baraza. Heterogeneity in the treatment will also introduce selection bias, as barazas will tend to focus most on areas that are most problematic (Barrett and Carter 2010). Issues related to non-standardized treatments are confirmed when looking at heterogeneous treatment effects and a case study of access to water in Bagezza sub-county.

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CAO	Chief administrative officer
CRSE	Cluster robust standard errors
e.g.	Exempli gratia, for example
i.e.	Id est, in other words
km	Kilometre
LC1	Sub-county local council chairperson
LC5	District local council chairperson
MDE	Minimal detectable effects
min	Minutes
NAADS	National agricultural advisory services
NGO	Non-governmental organization
OPM	Office of the prime minister
PTA	Parent teacher association
RCT	Randomized controlled trial
RDC	Resident district commissioner
SMC	School management committee
UGX	Uganda shillings
VHT	Village health teams

1. Introduction

Since Uganda's independence in 1962, the country's development efforts have been thwarted by political turmoil and economic mismanagement. In the mid-1980s, after attainment of relative stability, the Government of Uganda (GoU) supported by development partners, initiated reforms to address development challenges of the time. Notable among these initiatives was the liberalization of the economy and the introduction of a decentralized system of governance (Francis and James 2003, Benin et al. 2007). Decentralization was particularly viewed as a suitable mechanism for addressing welfare and political challenges by improving efficiency of public service delivery, formulating more appropriate services, bringing representative governance closer to citizens (Steiner 2007, Francis and James 2003). A major ingredient of decentralization is to enhance empowerment and build a sense of ownership of the local citizens to actively participate in planning, implementation and evaluation of development interventions in their locations, to improve accountability and responsiveness of local leaders and service providers (Burki et al. 1999).

The realization of benefits of decentralization in Uganda has been greatly affected by ineffective monitoring and weak accountability mechanisms, especially with respect to beneficiaries holding the service providers accountable (Björkman and Svensson 2009, Reinikka and Svensson 2004). In this regard, the Government of Uganda, under the stewardship of the OPM, initiated community advocacy forums (or citizen barazas) in 2009 with the general objective of "enhancing public involvement in holding the government accountable for service delivery in relation to the resources spent" (OPM 2013).

Barazas have been implemented in Uganda for about 10 years by now. Barazas were first piloted in the financial year 2009/10 in eight communities.[1] Since then, efforts have been underway to roll out barazas in all sub-counties in the country. During the full-scale implementation phase in the financial year 2010/2011, 16 more sub-counties in 8 districts had held a baraza meeting. And, by the last quarter of 2011/2012, 267 out of the country's total of 1,340 sub-counties, spread over 112 districts had held a baraza meeting. At the beginning of the 2012/2013 financial year, however, changes in implementation were suggested: subsequent barazas would target district-level reporting to increase participation at a higher level and, at the same time, reduce implementation costs.

As barazas continued to be rolled out beyond the pilot communities, a rigorous impact study of their effectiveness was still outstanding. At the time of the proposal, the Government of Uganda shared the same aspiration so as to inform policy on program effects of service delivery to local communities (OPM 2013) since there had not been any formal study conducted to test the actual achievements of the baraza initiative so far against the set objectives. From a policy perspective, it was also important to assess if the switch from sub-county level barazas to district level barazas was cost-effective. Up to date, the OPM has been eager to learn about the results from the different components of the impact evaluations and (preliminary) results have been presented at various high-level meetings.

[1] The initial pilot barazas were undertaken in eight lower level local governments (generically referred to as sub-counties) of the four districts of Masaka, Bushenyi, Kumi and Nebbi, which are respectively located in the four geographical regions of Uganda: Central region, Western region, Eastern region, and Northern region.

There have been several studies that look at the impact of community involvement on public service delivery, many of them using Uganda as a case. A landmark study is Björkman and Svensson (2009), who look at the impact of a community driven local accountability project in primary health care provision in Uganda. They find that the intervention resulted in significant improvements in health care delivery, utilization, and health outcomes (most notably child mortality and weight-for-age z-scores) after one year, and confirm in Björkman Nyqvist, de Walque, and Svensson (2017) that these effects are still present more than four years after the initial intervention despite minimal follow-up. More recently, however, Raffler, Posner, and Parkerson (2018) come to more nuanced conclusions when testing an intervention closely modelled on the one of Björkman and Svensson (2009). The study, involving a three wave panel of more than 14,000 households and a factorial design to break down the intervention into its two most important components similar to what we use, validates the power of information provision to change the behavior of front-line service providers, but casts doubt on the ability to foster community monitoring or to generate improvements in health outcomes, at least in the short run.

Our study contributes to this literature in various ways. First, this study is one of the few that considers the role of administrative placement on the effectiveness of community monitoring. The level at which the intervention occurs may affect its effectiveness in opposing ways (Donato and Mosqueira 2016). On the one hand, interventions at a more local level may result in more relevant issues being scrutinized. However, qualitative explorations suggest that often, issues raised in lower level barazas fall under the responsibility of higher levels of government or other institutions that are beyond the operational jurisdiction of the participating officials (Van Campenhout et al. 2018). This may be less of a problem when barazas are organized at district level. Most other studies consider interventions that are placed at fairly local levels. For instance, the intervention in Raffler, Posner, and Parkerson (2018) is implemented in health centers and their associated catchment areas consisting of only a few villages.

Second, our study evaluates the impact of a government initiative, which may instigate an entirely different set of dynamics than interventions that are organized by local or international non-governmental organizations (NGOs). It has been argued that successful devolution can only happen in the context of a strong state, able to ensure consistent regulation, and a well-informed public backed up by a participatory political culture (Golooba-Mutebi 2005). Many of the actors involved may find that NGOs are not mandated when it comes to public services such as health or education. Furthermore, it is likely to be easier to re-allocate resources to problems identified during barazas if they are organized by the government. This is also consistent with suggestive evidence in Raffler, Posner, and Parkerson (2018), who find that the presence of sub-county officials during their community-based monitoring intervention boosted the impact of the intervention. However, effects may also work in the opposite direction. For example, an intervention to reduce absenteeism in government public health facilities in India was initially very successful but ceased to have any impact after the local bureaucracy started providing official excuses for most of the nurses' absences (Banerjee, Duflo, Glennerster 2008). Most of the other studies that are closest to our study partnered with NGOs for implementation (e.g. Björkman and Svensson 2009, Raffler, Posner, Parkerson 2018).

Third, baraza's take a comprehensive, multi-sector approach, enabling cross-sectoral planning and potentially allowing for re-allocations across sectors. Some of the problems most mentioned by users, such as hygiene in health centers or accessibility, involve cooperation between heads of different sectors (e.g. health and infrastructure to get access to water in health centers or

access roads). Bringing sector heads together and confronting them with the priorities of citizens may increase information sharing and cooperation between them (Van Campenhout et al. 2018). Most existing studies focus on a single sector; the health sector in particular seems to be a popular sector for community monitoring interventions (e.g. Arkedis et al. 2019, Björkman and Svensson 2009, Raffler, Posner, Parkerson 2018).

Finally, we evaluate a high-profile policy intervention that receives broad support within government and among citizens alike in Uganda. Evaluating policy interventions has it challenges, and this one is no exception. As a result, such research has become rare, as present day RCTs often bypass the political resistance to randomization among governments, development workers and beneficiaries, as the nature of the partners has changed (NGOs rather than governments) and the interventions have become “relatively trivial” (de Souza Leão and Eyal 2019).

In this report, we start by providing a brief overview of the government program we evaluated and explain the theory of change behind the components of the intervention. We then present the four main research questions and provide details on the cluster randomized control trial we used to answer these questions. This section also provides information on the sampling frame and presents detailed power simulations that account for the consequences of the implementation challenges. We then present the findings, starting with an explanation on how the implementation deviated from what was planned and the strategies that were used to diagnose and remedy the potential bias introduced by this deviation. Next, we report balance tables and results of a pre-registered analysis. We provide further details and also look at outcomes that were not pre-registered to explore some of the mechanisms behind the intervention. This part also includes an extensive analysis of sub-county level data that was collected from government officials. We then present heterogeneous treatment effects and reflect on the partial roll-out as a threat to study validity. We also provide a cost-benefit analysis. The penultimate section provides a discussion of the resultsa and a final section concludes.

2. Intervention

2.1. Description

Barazas are platforms for enhancing **information** sharing between policy makers (the client), public servants (the implementer), and beneficiaries of public goods and services (the users). In addition, it provides the opportunity for citizens to ask questions to policy makers and civil servants and **deliberate** among themselves. With barazas, citizens in particular have the opportunity to participate in the policy process by directly engaging with service providers, and to demand accountability for the use of public resources. It is expected that, ultimately, barazas will contribute to effective monitoring, and increase accountability and transparency among all stakeholders.

A typical baraza is initiated from the center, with the OPM mobilizing district and sub-county officials. These include the Chief Administrative Officer (CAO) as the head of public service delivery at the district level, the Resident District Commissioner (RDC) as a direct representative of the president, the District Local Council Chairperson (LC5) as the representative of political leadership at the district level, and the various sector heads (agriculture, education, infrastructure and health). Especially for barazas organized at the sub-county level, the sub-county level equivalents of the CAO (the sub-county chief) and the LC5, the sub-county

chairperson (LC3) also have important roles. OPM, in consultation with the district leaders (RDC, CAO and the LC5) and other stakeholders, agree on the date and a neutral venue in which to hold the baraza event. Again, in consultation with the district leaders, a viable moderator and an interpreter into the local language where applicable are identified to guide the baraza forum. Village mobilizers and community resource persons are used to publicize the event. These community mobilization efforts are further reinforced by adverts in the local media in the form of radio announcements, printed banners, posters and fliers, and mobile public address systems, a few days before the baraza event.

A baraza meeting is chaired by the Office of the RDC in each district. In front of the audience, including local citizens, invited opinion leaders, elders, and journalists, the RDC seeks accountability and feedback from each head of major sectors. Sector heads are required to present what services were planned to be delivered in the sub-county (or the entire district in case of a district level baraza); what was actually delivered and in what quantity and quality; and what issues and challenges have emerged and what is the way forward. The RDC then seeks reactions and feedback from citizens on whether what has been presented is what was planned for and actually implemented in different locations. Sector heads are then given another opportunity to clarify on or react to any issues raised by the citizens.

In our study, we do not only want to test if barazas work. We also want to learn which of the main components – the deliberation component or the information component – are responsible for most of the effect. Finally, we also want to directly compare the effectiveness of district level barazas to that of sub-county level barazas. We thus differentiate between four types of barazas: a sub-county level baraza, an information baraza, a deliberation baraza and a district level baraza.

The sub-county level baraza are basically the barazas as they were implemented by the OPM at the sub-county level. They have both an information and deliberation component. To study the relative importance of the information component and the deliberation component respectively, we used this baraza as a starting point and, either removed the information component or the deliberation component from the generic sub-county level baraza to test the relative importance of these components.

The information component of a baraza involves templates to gather information that were developed to be filled by officials and mounted at a central location in each parish of the district two weeks before the baraza. The template was designed to inform citizens about planned and actual public expenditures for the previous fiscal year, about achievements and challenges encountered during that year, and about planned expenditures and targets for the next fiscal year. This needed to be filled for each of the four sectors (agriculture, infrastructure, health and education) by the sub-county chief.

On the day of the baraza event, the CAO provided a brief presentation on overall budget/finances for the fiscal year, main achievements and challenges in service delivery, and introduced local officials. After a brief intervention by the OPM, local officials responsible for each sector then presented more or less the same as what was required for the templates. An information focused baraza allowed for only 10 clarifying questions to be asked, to be collected and asked by the facilitator.

For the deliberation component of the barazas, posters were also mounted in each parish of the sub-county, but only to announce that a baraza will be held at a particular date and place. At the baraza itself, after a brief introduction by the RDC, citizens are guided to break into 5 groups by sector, discuss problems they face and draw up a list of priority issues that need to be addressed. Facilitators in each group are required to anonymously collect these issues and concerns. Facilitators are expected to focus the discussion on what was done well, and what were the problems during the past year. The discussions should also result in agreement on what should be done in the next fiscal year. After the break-out sessions, officials are asked to react to the specific comments and requests.

District level baraza were very similar to sub-county level barazas (that is, with both an information and deliberation component), except for the fact that district level barazas are organized at the district headquarters and all sub-county chiefs and sub-county chairpersons (LC3's) of each sub-county within the district are expected to attend in case issues arise related to their sub-county.

2.2. Theory of Change

- The impact of (sub-county level) barazas

The baraza intervention fundamentally seeks to improve public services through improving accountability of local public decision makers and service providers. The baraza intervention as conceived by the OPM is a fairly standard community-based monitoring intervention that combines the provision of information with the possibility of citizens to engage with each other and with decision makers at a fairly local level. Such community-based monitoring has become a popular tool to increase service delivery. However, not all such interventions appear to be successful (Olken 2007). As the subcounty level baraza combines both information and deliberation components, it also works through the (combined) theories of change of these components.

- The Information Mechanism

In situation characterized by incomplete and asymmetric information, targeted efforts to fill knowledge gaps can make a big difference. Indeed, the relationship between citizens and elected officials is a classic example of the principle–agent problem. Hence, providing citizens with information about the performance of the agent is assumed to be an effective way in increasing the quality of public service delivery by allowing citizens to monitor and apply pressure on under-performing politicians and civil servants (Raffler, Posner, Parkerson 2018). Information increases knowledge for all stakeholders about what the beneficiaries want, what the client ordered and what the implementer delivered.

There is some evidence that channelling of information to citizens about the quantity, modality, and quality of public services, as well as about the investments and policy decisions made by politicians, bureaucrats, and service providers can increase the ability of the users to hold the leaders accountable to improve service provision. For example, Pandey, Goyal, and Sundararaman (2009) establish using a field experiment in India that community information campaigns about states' school management obligations had a positive impact on school performance. Gilens (2001) identifies a significant influence of providing policy facts on the public's political judgment. Grossman and Michelitch (2018) disseminate information about job performance for randomly selected Ugandan politicians. While this increases job performance

for the politicians on a range of criteria, they find no impact on public service provision. A recent review of 48 empirical studies on the impacts of information on governance and service delivery also suggests that the availability of information alone may not suffice. Information must be deemed relevant to its recipient, and individuals must have both the power and incentives to act on the information (Kosec and Wantchekon 2020).

- The Deliberation Mechanism

There are various ways in which deliberation increase the quality of public service delivery. Firstly, it has a legitimating effect on decisions arrived at in this fashion. Effective deliberation assumes equal voice of the arguments of both marginal and advantaged agents, and the role of evidence that support the positions articulated. Secondly, deliberation can more effectively distil social choice than simple voting and majoritarian rule, in part by building of consensus both among citizens and between public servants and citizens. Thirdly, deliberation has been found to positively impact on the vigour and breadth of subsequent citizen involvement in community affairs (Björkman Nyqvist, de Walque, Svensson 2017). Deliberation provides opportunities for citizens to confront their leaders with issues and threaten with social and political sections if it is deemed that they are not performing. Creating a platform where stakeholders can meet and interact may also increase mutual understanding and create a better relationship between them. However, when relationships are already poor, public fora that degenerate into name-and-shame sessions may make matters worse.

Deliberation also affects information flows. In a baraza, the information component is primarily designed to inform citizens about the activities of the service providers. To some extent, citizens are passive recipients of this information, and officials report what they consider relevant, or may even attempt to misrepresent the facts. If citizens can engage with policy makers and civil servants, they may request information that is relevant to them.

Impacts of deliberative processes have also been the subject of empirical analysis. For example, in addition to increasing community participation mentioned above, experimental evidence also shows that deliberative processes make decision outcomes less sensitive to the institution (e.g. voting) rules that bring them about (Goeree and Yariv 2011) or may reduce the prevalence of clientelism (Fujiwara and Wantchekon 2013).

- Administrative placement

The baraza intervention can also be distinguished by the administrative level at which it is implemented: Barazas had been originally planned to be implemented at the sub-county level but from 2012 onward, more and more barazas were implemented at the district level. This administrative placement dimension immediately points to a potential trade-off between attempting to achieve breadth of coverage (through the district-level barazas) and attending to depth and quality of coverage (through sub-county-level barazas). While conducting a district-level baraza may be cheaper than conducting sub-county-level barazas in all sub-counties of that district, it is not clear a priori how these cost savings justify potential reduction in effectiveness of district-level barazas in any given sub-county of the concerned district.

Which is more effective, placement at a higher or lower level, will depend on the outcome and the situation. For instance, it has been argued that engaging small groups can be more effective because they can be coordinated more easily, but large groups may make more sense if the desired outcome would be enjoyed by a broader group (Donato and Mosqueira 2016).

Furthermore, action may be more likely if an issue is brought by a large group instead of a small group of people complaining about a highly localized issue (Banerjee, Deaton, Duflo 2004). It may also be that issues highlighted at a local level fall under the responsibility of higher-level authorities and vice versa.

2.3. Intervention monitoring plan

After completion of the baseline, we trained local government officials and designated facilitators to ensure adherence to the intervention protocols. We agreed with OPM that for the barazas that were part of the study, facilitators would be selected from these trained facilitators. We developed detailed scripts that RDCs and facilitators were expected to follow. Furthermore, manuals for RDCs and facilitators were developed. Detailed information can be found in an online appendix.

Two full-time research assistants were also assigned to monitor program implementation. The research assistants worked very closely with the OPM staff tasked with the implementation of the barazas. One researcher accompanied OPM to all barazas that were part of the study. He also made sure that the information was disseminated in time for the information focussed barazas.

At the end of a baraza, the RDC is required to make a report to the OPM, indicating issues that arose in the baraza meeting. This report particularly points out policy and program implementation weaknesses and challenges, which is then expected to further feed into the general government performance management system. These reports were also collected to assess implementation and adherence to the intervention protocols ex-post.

3. Evaluation questions, design, methods, sampling and data collection

3.1. Primary and secondary evaluation questions

Primary evaluation questions look at the impact of the baraza programme and its key components on public service delivery. Individual outcomes cover a wide range, such as use, availability or delivery of services, quality,... Individual outcomes were then categorized into four broad sectors: agriculture, health, education, and infrastructure (mainly drinking water and roads). This is achieved through the construction of indices following Anderson (2008) to account for multiple hypothesis testing. The four indices are then in turn combined into an overall indicator of public service delivery.

Four comparisons are made, corresponding to the following evaluation questions:

- What is the impact of sub-county level barazas on public service delivery in general, at sector level, and for selected individual outcomes that were preregistered?
- What is the relative importance of the information component of a sub-county level baraza on public service delivery in general, at sector level, and for selected individual outcomes that were preregistered?
- What is the relative importance of the deliberation component of a sub-county level baraza on public service delivery in general, at sector level, and for selected individual outcomes that were preregistered?

- Are district level barazas more or less effective than sub-county level barazas in increasing public service delivery in general, at sector level, and for selected individual outcomes that were preregistered?

To answer these primary evaluation questions, we follow a strict pre-registered analysis plan that takes the form of a “mock report”. In December 2019, just before the endline data was collected, a report was written. This report contains the results of an analysis on simulated end-line data for the four primary research questions. This mock report was pre-registered at the American Economic Association's RCT registry with a time stamp.[2] Pre-registration and mock reports are effective tools against fishing and false-positive science (Humphreys, De la Sierra, Van der Windt 2013).

The mock report was prepared using Lyx, an open source Latex front-end. All Latex and R code to replicate the analysis was placed under revision control using Git. The R scripts are automatically executed when the Lyx document is compiled (using the R package knitr) and tables are populated. The Git repository can be found at [https://github.com/bjvca/baraza/]. The use of revision control further increases transparency and allows for easy replication (Ram 2013).

The report makes explicit the definitions of what variables will be used to assess impact, how they are combined into indices, and what transformations are used, referencing the actual names of the variables in the endline data collection application. In general, for continuous variables, 5 percent trimmed values were used (2.5 percent trimming at each side of the distribution). Inverse hyperbolic sine (IHS) transformations were used if skewness exceeded 1.96. Trimming was always done on end results. For example, if the outcome is yield at the plot level, then production was first divided by plot area, after which the inverse hyperbolic sine transformation is done, and the end result is trimmed. Outcomes for which 95 percent of observations have the same value within the relevant sample were omitted from the analysis to limit noise caused by variables with minimal variation.

Impact is assessed as a simple treatment-control comparison, implemented using an ANCOVA model that also controls for the region (as this was used for stratification) and the baseline outcome. When evaluating the relative importance of the deliberation and information components, we also include all interaction terms of the factorial design (Muralidharan, Romero, and Wüthrich 2019). Standard errors are clustered at the level of randomization: at the sub-county level for the first three hypotheses and at the district level for the last hypothesis.

Secondary evaluation questions are looking into the mechanisms through which the baraza project is assumed to affect public service delivery. These include interfacing with politicians and civil servants, political participation, contributions to the common good. We also investigate how perceptions may have changed as a result of a baraza.

3.2. Evaluation design and methods

- Study design and identification strategy

[2] https://www.socialscienceregistry.org/versions/60398/docs/version/document

This study proposed a nested, or two-step, randomization design, illustrated in Figure 1. In a first step, we randomly allocate eligible districts to treatment and control conditions. In particular, some of the eligible districts start receiving district level barazas that contain both the information component and the deliberation component (D^{ID}), while other districts do not receive a baraza at this level (D^0). In a second step, we proceed with all eligible sub-counties and randomly allocate each sub-county to one of four conditions in a 2 by 2 factorial design. In particular, about one quarter of all eligible sub-counties sampled from D^0 will serve as pure control and will not receive any baraza at any level (S_0^0). About one quarter will receive a sub-county level baraza that combines both information and deliberation treatment (S_{ID}^0). A third quarter will receive a sub-county level baraza that consists largely of officials providing information and limited opportunity for citizens to engage (S_I^0). A final quarter will receive a sub-county level baraza with a focus on citizens engaging with each other and with officials, without upfront information provision (S_D^0). We also take a random sample of sub-counties from the D^{ID} districts that received the district level baraza (S_0^{ID}). Within each sub-county, we sample a fixed number of households.

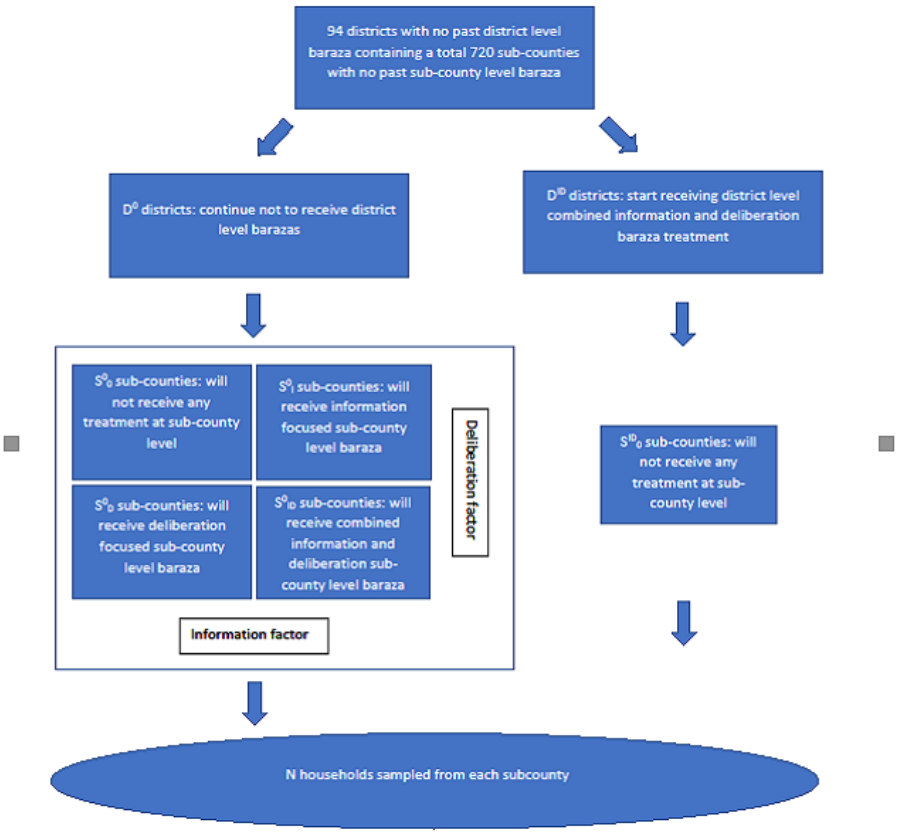

Figure 1 - Study Design

The above design allows us to answer the four research questions. First, to assess the impact of the sub-county baraza interventions as implemented by the government of Uganda, one can compare outcomes of households that were sampled from S_{ID}^0 to households that were sampled from S_0^0. Second, to inform the government on the consequences of the switch from sub-county to district level barazas, one can compare outcomes of households that were sampled from S_0^{ID} to outcomes of household that were sample from S_{ID}^0. Third, to assess the relative importance of

the information component of a baraza, one can compare outcomes of all households that were exposed to the information component (either as a stand-alone information baraza as implemented in S_I^0 or as part of a combined baraza as implemented in S_{ID}^0) to outcomes of all households that were not exposed to the information component of the baraza (either because they did not receive a baraza at all (S_0^0) or because they only received a deliberation focused baraza (S_D^0)). Similarly, to assess the relative importance of the deliberation component of a baraza, one can compare outcomes of all households that were exposed to the deliberation component (either as a stand alone deliberation baraza as implemented in S_D^0 or as part of a combined baraza as implemented in S_{ID}^0) to outcomes of all households that were not exposed to the information component of the baraza (either because they did not receive a baraza at all (S_0^0) or because they only received an information baraza (S_I^0)). Note that, because of the factorial design, much more information can be used to test the two last hypotheses than for the two first hypotheses.

Power and sample size calculations

To determine the number of districts, sub-counties and households to include in the study, the original research proposal contained an extensive series of power calculations that used data from the Uganda National Household Survey of 2009/10 and the Demographic and Health Survey of 2011 to estimate standard errors of the outcomes and inter-class correlations. Outcomes used to determine sample size included weight-for-age z-scores for children; number of days unable to work as percentage of days sick at the household level; number of years the average child within the household goes to school, proportion of children in the household currently attending school; the proportion of households that was visited by an extension worker in the previous year; maize yields; time to get drinking water (including waiting time); and share of households having access to improved drinking water sources. This resulted in the selection of a total sample size of 11,500 households distributed over 230 sub-counties in 40 districts throughout Uganda, on which baseline data was collected.[3] More details on the power calculations can be found in the original proposal, which is available as an online appendix.

The original power calculations assumed full roll-out of the intervention. However, due to implementation challenges that will be explained in detail in the section on intervention implementation fidelity below, a series of updated power calculations was performed prior to endline data collection. In particular, we simulated a new set of minimal detectable effects (MDEs) associated with the sample that we were about to collect[4]. We used baseline data to simulate MDEs for a selection of the outcomes we will use to judge effectiveness of the intervention (and are specified in the pre-registered report). We used a standard significance level of 0.05 (double sided).

Figure 2 plots MDEs against power for the first outcome variable that will be used to assess the impact of barazas on public service delivery in the agricultural sector (extension at home, measured as the percentage of households in our sample who report that they were visited by an expert in the previous year). On average, about 11 percent of households in our sample report during baseline data collection that they were visited by an extension officer in the year preceding the data collection. The grey solid line shows the power curve associated with the

[3] We added an additional 3 sub-counties in each of the five treatment groups to account for attrition.
[4] Sample size was now largely determined by the extent to which OPM implemented the interventions.

deliberation treatment, comparing the 1,900 households that received the deliberation treatment to the 3,450 households that did not receive a deliberation focused baraza[5]. The light blue dashed line closely tracks the grey line and shows power for different MDEs for the information component of the baraza intervention. Here, we compare the 2,450 households that live in sub-counties that received an information baraza to the 2,900 households that did not receive a sub-county information baraza. The dark blue dashed line compares effectiveness of barazas conducted at different levels, with the MDE defined as the difference in outcome between 1,000 households that received the combined information and deliberation sub-county level baraza and 2,000 households that were exposed to a district level baraza. Finally, we also investigate power for the comparison between pure control barazas and the sub-county level baraza (black dotted line). Here we compare 1,000 households that received the combined information and deliberation sub-county level baraza to the 2,000 households that did not receive any baraza. MDEs are estimated using a simple ANCOVA model that controls for the outcome at baseline.

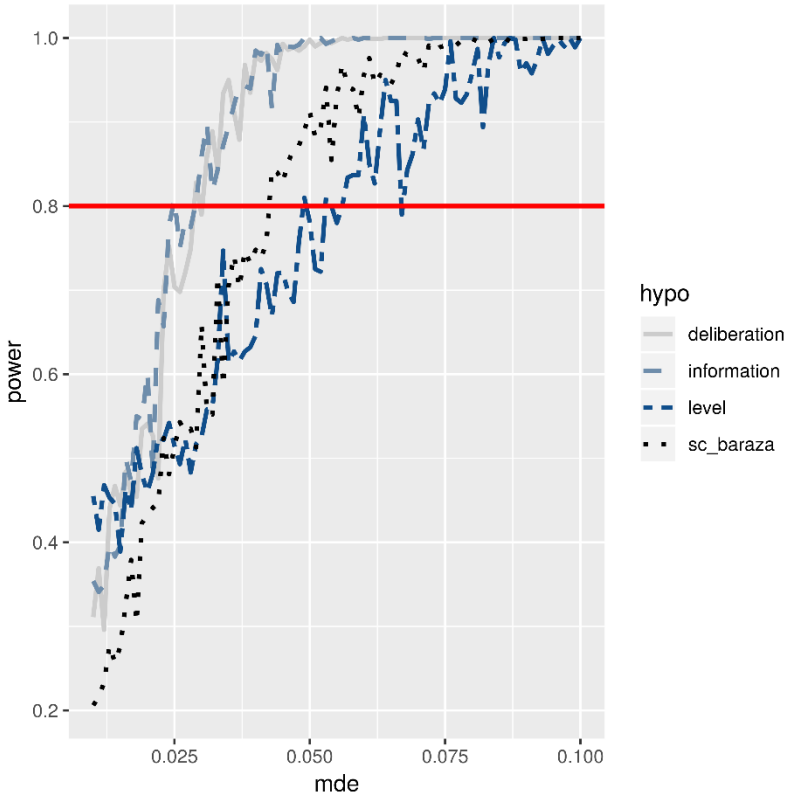

Figure 2 - Power curves for access to extension

Not surprisingly, we have most power for testing the information treatment. We see that the power curve hits the 80 percent threshold a first time at an MDE of about 2.5 percentage points. The deliberation experiment is similarly powered, and at 80 percent we can expect to identify effects of 3 percentage points or more. Due to the smaller sample size, comparing sub-county level barazas to pure control sub-counties seems harder. Here, the difference needs to be at least 4 percentage points. We have least power when comparing sub-counties level barazas

[5] While sample size in treated areas was dictated by what was achieved by OPM, we did have some degrees of freedom in terms of the sample size in control areas. How the sample size in the control areas was determined is also explained in more detail in the section on intervention implementation fidelity.

directly to district level barazas, even though for this comparison, we have the same number of observations in the sub-groups than for the previous comparison. This is because the unit of randomization is at a higher level (districts rather than sub-counties).

In Figure 3, we plot MDEs for an infrastructure related outcome: distance in kilometre (km) to the primary water source during the dry season. We find that for the information treatment and the deliberation treatment, we can detect a 4 percent difference at the standard 80 percent power level. As the average household lives about 900 meters from the primary water source, this means we can identify effects in excess of 36 meters. Also here, the MDE is highest when directly comparing the effect of district level barazas to sub-county level barazas. Then, MDEs correspond to about 70-90 meters for the average household in our sample. On GitHub results are provided for similar power simulations for all the variables that will be use to judge impact of the baraza intervention in Section 4.2.2.

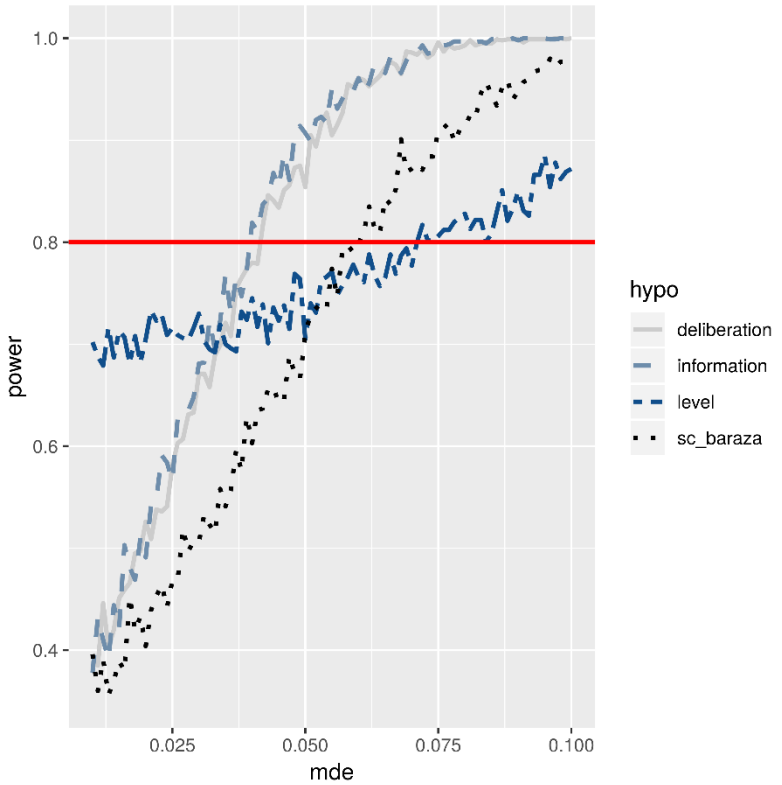

Figure 3 - Power curves for distance to water source

3.3. Ethics

This research was cleared by the Uganda National Council for Science and Technology (UNCST SS 5179), Makerere University School of Social Sciences Research Ethics Committee (MAKSS REC 05.19.291), as well as IPFRI's Institutional Review Board (DSG-19-1053).

3.4. Sampling and data collection

We designed the experiment to cover districts, sub-counties, and households across the four regional blocks (Northern, Western, Central and Eastern) of Uganda. Each regional block has somewhat unique characteristics in terms of ethnicity, geographical and agro-ecological conditions, as well as cultural history. As noted before, a small share of all sub-counties, albeit

located throughout all of Uganda's 112 districts across the four regions, had already received a sub-county level baraza intervention. We thus selected our sample of districts from among 'eligible districts', and our sample of sub-counties from 'eligible sub-counties'. An 'eligible district' was defined as a district in which a district level baraza was not already implemented prior to the start of the study. An 'eligible sub-county' was defined as a sub-county to which two conditions applied: (i) a sub-county level baraza had not yet taken place, and (ii) the sub-county was not located in a district in which a district-level baraza had already been implemented. Preliminary analysis of the baraza implementation data at the time of the start of the study indicated that there were 20 or more eligible districts per region, amounting to a total of 94 eligible districts. In each region, there were at least 147 sub-counties that had never been treated and were in eligible districts; the total of such eligible sub-counties was about 720.

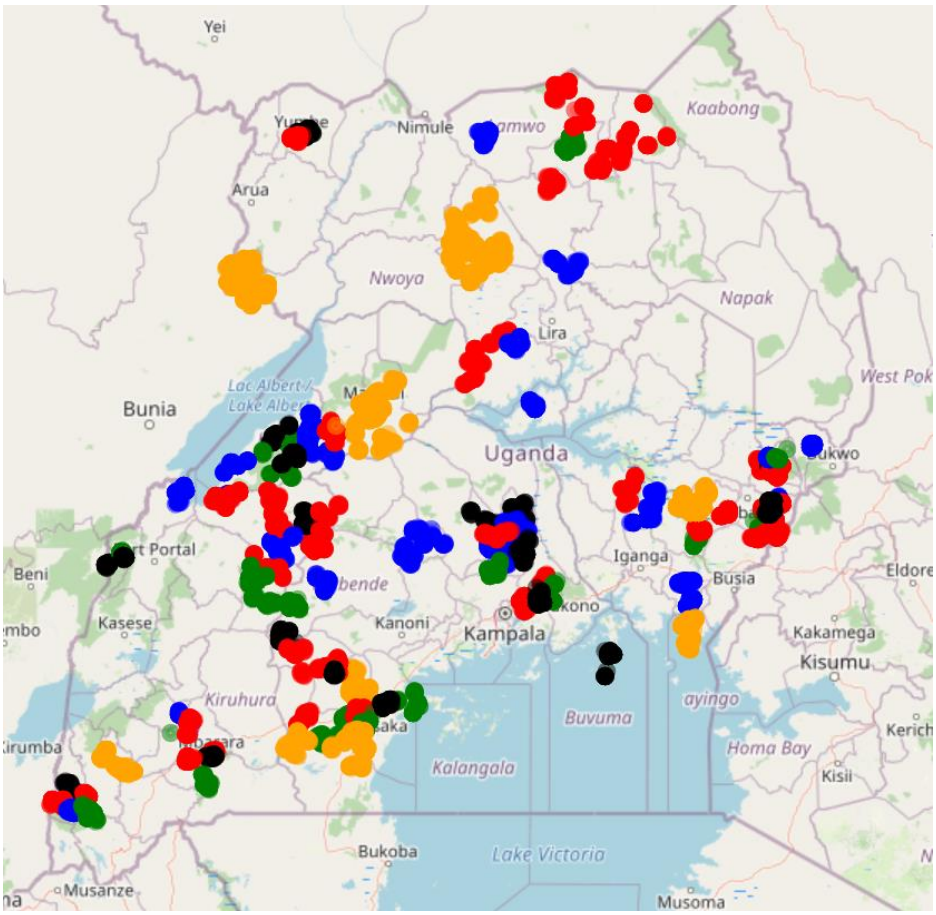

Figure 4 - Study area map

Figure 4 shows locations of households that were included in the study, clustered in sub-counties (blue, red, black and green) and in districts (orange). The colour codes denote the treatment to which the households were assigned. Blue denotes information only barazas, green deliberation only. Black are combined deliberation and information sub-county level barazas. Red are control sub-counties. Finally, the orange are sub-counties that are located in districts that received a district level baraza.

Data was collected using Open Data Kit. We developed and tested the tool in Bagezza sub-county in August 2019. We trained about 80 enumerators during a 3-day training in Kampala early January 2020 and rolled out the survey in the North, East and West simultaneously. Progress was tracked on a daily basis using GPS mapping to trace out best routes and make

sure areas were cleared. The fact that the ODK application already had many checks build in meant that little data cleaning was needed. Most of the code to run the analysis was ready, and as a result, a first report was ready by March 3rd.[6] Figure 5 provides a timeline.

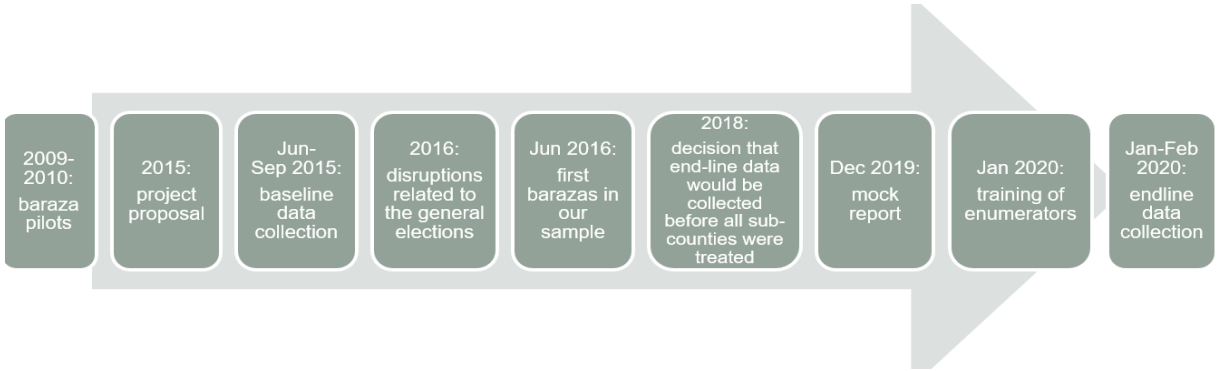

Figure 5 - Timeline

4. Findings

4.1. Intervention implementation fidelity

One of the main challenges was a slow roll-out of the Baraza intervention by the implementing partner. At the start of 2018, and almost two and a half years after baseline data was collected, only about 25 percent of the planned interventions had happened, and we needed to balance the costs and benefits of waiting until OPM finished all barazas or collecting baseline information after incomplete roll-out. At that time, we developed various scenarios, each with an adapted research design. After an additional six months, with still only 56 out of the 155 Barazas implemented, it appeared that the best scenario would be one whereby end-line data would be collected before all sub-counties were treated.

However, end-line data collection after partial roll-out may introduce selection bias. It may be that, from the randomly assigned sub-counties, particular sub-counties were selected to be treated first and others postponed. For instance, for logistical reasons, the implementing partner may have started with sub-counties that are close to the capital.

There are various ways in which we diagnose and remedy this potential problem. In the next section, we will present a series of balance tests. In particular, we will compare balance at baseline between subgroups as originally planned, and the final sample. We will also look at balance between households that were supposed to be treated but did not end up receiving treatment and households that were planned to be in the control group. This can be done for characteristics at both baseline and at endline. We also propose to check robustness of the findings using a matching estimator. In addition, as only part of the intervention was implemented, it will not be cost effective to collect end-line data on all sub-counties that did not receive a treatment (either because they were allocated to the control or because they ended up not being treated). This raises the question: from the potential control sub-counties (either

[6] This first version of the pre-registered report can be found here. However, later a coding mistake was found and corrected: For the comparison between full sub-county barazas to control barazas, we were reporting the interaction effect between information and deliberation instead of the combined information and deliberation effect. This was corrected on April 2nd in this commit (9f5afdbfdd6be766).

those that were allocated to the control or because they ended up not being treated), which control sub-counties should be included in the data collection? One reasonable suggestion would be to pick them randomly. However, if the roll-out was not random, such a strategy may lead to a biased estimate of the causal impact of the intervention. For example, it may be that the implementer prioritized sub-counties that were closer to the capital. Randomly selecting control sub-counties may mean that sub-counties closer to the capital are relatively under-represented and sub-counties that are further away may be relatively over-represented in the control group. A better strategy may be to match, ex ante, each treated sub-county to a control sub-county that is similar in a range of observable pre-treatment characteristics that the planner had access to when rolling out the intervention and are likely to affect his or her decision (Kasy 2016, Bertsimas, Johnson, and Kallus 2015). For example, based on GPS coordinates of a treated sub-county, a control sub-county that is relatively close to the treated sub-county can be selected from the different candidate control sub-counties. This would mitigate the bias that would be introduced by a planner that prioritizes sub-counties in a particular location (for instance, close to Kampala).

We decided to use a range of sub-county characteristics that were likely to be known to OPM staff and may have affected how the intervention was rolled out to match each treated sub-county to a control sub-county that was similar in terms of these characteristics. More in particular, we match on the following characteristics that were obtained at baseline from a survey of village chairs and CAOs of each sub-county: GPS coordinates of the sub-county, road infrastructure within the sub-county (km tarmac road and km all-weather (gravel) road), share of households with electricity, share of households with an iron roof or tiles, number of health centers in the sub-county, female primary school dropout rate, number of Universal Primary Education (UPE) schools in the sub-county, percent of farmers that use improved seed, and political connections of the sub-county (defined by having a minister or member of parliament coming from the sub-county). These characteristics are used in a probit regression to predict the likelihood that a sub-county was treated. For each treated sub-county, we then match a potential control sub-county with a likelihood of being treated that is similar to that of the treated sub-county[7].

Figure 6 summarizes the factorial design that underlies the assessment of the relative effectiveness of the information and deliberation components of sub-county level barazas. As already noted in Section 3.2. above, one of the main advantages of factorial designs (as opposed to parallel designs) is the fact that, to test main effects, all observations can be used. For instance, to test the impact of an information Baraza, we can compare outcomes of households in sub-counties that received the information treatment (either only the information treatment or the information + deliberation treatment) to outcomes of households that did not receive the information treatment (either because they received no treatment at all or because they only got the deliberation treatment). If the intervention had been implemented as planned, we would have followed the original power calculations and had 104 information sub-counties that could be compared to 102 control sub-counties (and as 50 households were interviewed in each sub-county, we would have 5,200 treated households and 5,100 control households).

[7] A greedy matching procedure was use where we first calculate an adjacency matrix for all treatment and control subcounty populations. All these elements from the matrix where then ranked and those that were closest (in terms of the predicted likelihood of being treated) were selected.

	Control	Information
Control	Planned: 51 Included: 20	Planned: 51 Treated: 29
Deliberation	Planned: 51 Treated: 18	Planned: 53 Treated: 20

Figure 6 - Factorial design

However, the incomplete roll-out resulted in the fact that only 67 of a total of 155 sub-counties that would have received any treatment were actually treated. Referring to Figure 6, we see that to test the impact of the information Baraza, 49 sub-counties that were treated can be used. This means that a total of 157 sub-counties that did not receive the information treatment can be used as control sub-counties. However, optimal power is obtained in designs where the number of treated units is about equal to the number of control units, so from a cost-efficiency perspective; we thus collected information on 49 sub-counties. As we wanted to formally test if the partial roll-out introduced selection bias by comparing planned control sub-counties to sub-counties that were not treated using end-line data (see next section), we made sure we selected half of these from the first column in table 2, and half from the second column. To test the impact of the deliberation treatment, we needed 38 control households. Also here, we made sure half were from the planned controls (first row in table 2) and half from sub-counties that were supposed to be treated, but were not (second row). Finally, as we also planned to directly test for the effect of a combined information and deliberation treatment, we needed at least 20 pure control sub-counties. Also here, we made sure half were selected from the upper left cell in table 2 and half from the sub-counties that were assigned to the treatment in the lower right cell of table 2 but did not get the treatment. Note that often, the same sub-county could be used to test different hypotheses. For instance, the 10 sub-counties in upper left cell needed to test if the deliberation intervention was effective could be taken from the 14 sub-counties that were needed in that cell to test the impact of the information treatment. We thus simply took the higher number in each cell, which was 14 sub-counties. To allow for attrition, we selected 16 control sub-counties in each treatment cell.

In practice, we started by matching 10 untreated sub-counties from the S_0^0 group to the treated sub-counties in the S_{ID}^0 group. We then matched a further 10 sub-counties from the S_{ID}^0 group that ended up not being treated to the treated sub-counties in the S_{ID}^0 group. Next, we looked at the information treatment. In this treatment, 49 sub-counties had been treated, either as information alone or as part of the combined information and deliberation treatment. This means we also needed 49 controls. We already had selected 20 pure controls in the previous step which we could use. Furthermore, 18 pure deliberation treatments could be used as controls for the information treatment as well. This meant we needed an additional 11 controls. As we want to investigate balance between control and planned but not treated controls, we selected these 11 controls from the sub-counties that were planned to receive the information treatment S_I^0 but ended up not receiving the treatment.

Finally, we looked at the deliberation treatment. In this treatment, 38 sub-counties had been treated, either as deliberation alone or as part of the combined information and deliberation treatment, so we also needed 38 controls. We already had the 20 pure controls and an additional 11 controls from the previous steps. So we needed an additional 7 controls. As we wanted to investigate balance between control and planned but not treated controls, we

selected these 7 controls from the sub-counties that were planned to receive the deliberation treatment S_D^0 but ended up not receiving the treatment.

4.2. Impact analysis

4.2.1. Descriptive statistics and balance tables

In Table 1, we test for balance between the treatment groups at baseline following the initial design of the experiment. Sample averages are reported in the first column (with standard errors in brackets below). For example, we see that the average household consists of about six household members, and about 30 percent of sampled households live in a house with a thatched grass roof. In the second column, we report differences between baseline characteristics of households that will receive a sub-county level combined information and deliberation baraza, and those that will not be exposed to any baraza. We cannot reject the null that households in these two groups are similar for all but one of the characteristics in Table 1. We do find that, at baseline, households assigned to a sub-county level baraza live farther from the nearest all weather road, and this difference is significant at the five percent significance level. When comparing households that were exposed to a sub-county level information baraza to households that did not receive a sub-county level information baraza (column 3), we see that that households are slightly larger in the former group, and the difference is significant at the 5 percent level. The average household has two to three children attending a public school. We also find a slight pre-treatment imbalance on this outcome for the information treatment, but the difference is only significant at the 10 percent level.

In the fourth column of Table 1, we report differences between households that were exposed to a sub-county deliberation baraza and households that were not. For this treatment, we cannot reject balance on any of the variables. In the last column, we report differences in outcomes between households that were exposed to a district level baraza and households that were exposed to a sub-county level baraza that combined both information and deliberation components. We see that household heads in the first group are slightly older than in the latter group. Furthermore, the share of households that report that there is a Village Health Team in their village is also slightly higher in the treatment group. In both cases, judged by the cluster robust standard errors (CRSE), the differences are significant at a 10 percent level. However, it is well-known that when the clusters are few in number (say 30 or less) the cluster robust standard error is downward biased and tends to over-reject the null of no effect. We indeed find that the differences are not significant when randomization inference is used. Overall, out of 40 comparisons, we find that two differences are significant at the 5 percent level and one is significant at the 10 percent level, which is what one would expect to find due to chance alone. As such, we conclude that the initial randomization was successful.

Table 1 - Orthogonality tests

	mean	sc baraza	info	delib	level
Household size	6.324	0.021	0.304*	-0.003	0.246
		(0.142)	(0.133)	(0.125)	(0.248)
Age of the household head (years)	46.501	0.736	0.464	0.725	1.427
	(14.615)	(0.681)	(0.594)	(0.714)	(0.802)
Head of household is woman (1=yes)	0.191	0.012	-0.014	0.004	-0.013
	(0.393)	(0.014)	(0.013)	(0.015)	(0.016)
Head finished primary education (1=yes)	0.213	-0.007	-0.02	-0.003	-0.026
	(0.410)	(0.017)	(0.020)	(0.020)	(0.027)
Thatched grass roof (1=yes)	0.298	-0.001	0.009	-0.032	0.011
	(0.457)	(0.026)	(0.025)	(0.023)	(0.036)
Traditional mud wall (1=yes)	0.424	0.021	-0.025	0.038	-0.034
	(0.494)	(0.043)	(0.040)	(0.039)	(0.104)
Distance to nearest all weather road (km)	0.906	0.167*	0.106	0.147	-0.192
	(0.915)	(0.106)	(0.095)	(0.092)	(0.138)
Access to extension (1=yes)	0.108	0.002	0.004	0.007	0.009
	(0.310)	(0.014)	(0.012)	(0.014)	(0.017)
Village Health Team in village (1=yes)	0.854	0.000	0.006	0.025	0.07
	(0.353)	(0.031)	(0.026)	(0.026)	(0.036)
Number of children in public schools	2.478	0.044	0.165+	0.038	0.139
	(2.074)	(0.095)	(0.091)	(0.089)	(0.155)
Number of observations	12,545	5,193	10,241	10,241	4,949

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

As mentioned in section 4.1, the implementing partner failed to fully roll out the intervention as planned. We therefore repeat Table 1, but for the sample on which endline data was collected. Results are in Table 2. Interestingly, the imbalance that was found in Table 1 for the information treatment on household size and the number of children in school has disappeared. Furthermore, while distance to the nearest all weather road was significantly higher in treated sub-counties, it seems to be significantly lower in this updated sample. We see that the likelihood that a Village Health Team was present at baseline was higher in the subsample that was allocated to the deliberation treatment. Also here, across 40 comparisons, we would expect to find 2 significant coefficients at 5 percent level and 4 at the 10 percent level. Hence, we conclude that also with this new sample we maintain balance between treatment and control on a range of baseline characteristics for the various hypotheses.

Table 2 - Orthogonality tests for final sample

	mean	sc baraza	information	deliberation	level
Household size	6.411	-0.186	0.065	-0.302	0.192
	(2.855)	(0.169)	(0.152)	(0.166)	(0.221)
Age of the household head (years)	47.009	1.096	-0.215	0.574	0.267
	(14.542)	(1.012)	(0.731)	(1.038)	(0.931)
Head of household is woman (1=yes)	0.191	0.025	-0.006	0.022	-0.012
	(0.393)	(0.017)	(0.018)	(0.024)	(0.016)
Head finished primary education (1=yes)	0.208	0.005	-0.016	0.014	-0.049
	(0.406)	(0.029)	(0.025)	(0.035)	(0.030)
Thatched grass roof (1=yes)	0.262	0.015	0.044	-0.007	0.04
	(0.440)	(0.030)	(0.030)	(0.022)	(0.051)
Traditional mud wall (1=yes)	0.444	0.086	0.031	0.062	-0.156
	(0.497)	(0.058)	(0.053)	(0.058)	(0.100)
Distance to nearest all weather road (km)	0.909	-0.279+	0.027	-0.104	0.063
	(0.912)	(0.136)	(0.140)	(0.135)	(0.127)
Access to extension (1=yes)	0.105	0.011	0.000	0.012	0.007
	(0.307)	(0.014)	(0.012)	(0.020)	(0.021)
Village Health Team in village (1=yes)	0.865	0.020	0.019	0.090*	0.101
	(0.342)	(0.051)	(0.036)	(0.039)	(0.050)
Number of children in public schools	2.507	-0.089	0.001	-0.188	0.19
	(2.072)	(0.118)	(0.097)	(0.111)	(0.133)
Number of observations	6,703	2,949	5,298	5,298	2,950

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

In section 4.2.4 we provide additional balance tests to investigate whether the partial roll-out of the intervention introduced selection bias.

During both baseline and endline, we collected some data at a more aggregate level. We visited sub-county headquarters and interviewed one politician and one civil servant there. For completeness, we also provide a balance table for this data. Results are in Table 3. Despite the small sample size, also here the various subgroups seem to be balanced on a range of characteristics.

Table 3 - Balance table for sub-county level data

	mean	sc baraza	info	delib	level
frequency of executive committee meetings	0.983	-0.03+	0.00	-0.03+	0.003
	(0.128)	(0.016)	(0.002)	(0.016)	(0.02)
proportion of health budget that has not been received	17.236	-6.836	-3.403	1.168	-0.726
	(26.086)	(4.475)	(4.807)	(4.796)	(4.913)
lengths of other all-weather roads	65.244	-14.968	-16.807	-13.466	-8.139
	(69.357)	(12.366)	(10.76)	(12.133)	(11.795)
proportion of households with electricity	17.154	4.259	2.132	1.862	-5.823
	(19.552)	(3.349)	(2.556)	(3.25)	(4.192)
number of male crop extension staff/agents	0.913	0.259	-0.08	0.031	-0.098
	(0.583)	(0.167)	(0.119)	(0.136)	(0.076)
proportion of households using improved seeds	41.293	-0.964	0.167	2.171	-5.102
	(26.748)	(3.534)	(3.889)	(3.758)	(3.314)
number of HC2s	3.428	0.039	0.458	-0.3	-0.846
	(3.34)	(0.757)	(0.777)	(0.63)	(0.604)
number of nurses/nursing assistants in-place in HC2s	6.015	0.322	1.262	0.924	3.003**
	-3.734	(0.7)	(0.983)	(0.74)	(0.839)
student enrolment in government secondary schools	733.866	29.312	178.374	106.592	-72.357
	(694.694)	(142.906)	(178.474)	(145.499)	(97.122)
Number of observations	262	102	168	168	102

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

4.2.2. Research analyses

In this section, we provide results for the four main hypotheses outlined in Section 3.1. Main results are presented in two parts. In a first part, we strictly follow a pre-registered analysis plan, and focus on a subset of carefully selected and declared variables that are combined in indices – one overall index, and four indices corresponding to the sectors. This confirmatory part of the paper will allow us to assess the overall impact of the baraza intervention.

A second part of the analysis is more exploratory in nature and looks at individual outcomes. For each of the four key sectors – agriculture, infrastructure, health and education – a sets of outcomes will be compared between the different groups using ANCOVA models. We also explore if the baraza programme affected various aspects that are at the core of community-based monitoring, such as participation in election of local leaders, interfacing with politicians and civil servants, perceptions of service quality and prioritization, and contributions to public goods (both cash and in-kind). Finally, in this part we also report results for the analysis of sub-county level data that was collected from government officials.

Confirmatory analysis

Figure 7 provides a graphical representation of the overall impact on service delivery of the baraza, as well as on the different sectors. It shows the impact of the four main hypotheses–the impact of the sub-county baraza (sc baraza; indicated in grey), the relative effectiveness of the

information component (info; light blue), the relative effectiveness of the deliberation component (delib; dark blue), and a comparison between sub-county and district level barazas (level; black) – on the four sectors we consider – agriculture, infrastructure, health, and education. The graphs are based on indices that are composed of individual outcomes in each sector, which are discussed in detail in the next section. We also combine the four indices into one overall index that assesses the impact on public service delivery in general.

The figure provides point estimates for the difference between treatment and control, estimated in an ANCOVA framework with controls for baseline outcome and region dummies. Confidence intervals are obtained following the permutation method explained in Gerber and Green (2012). This method first reconstructs a complete schedule of potential outcomes by adding and subtracting the average treatment effect for control and treated units respectively. These potential outcomes are then used to simulate all possible random allocations. For each allocation, average treatment effects are estimated and 2.5th and 97.5th percentiles are then taken as the lower and upper limits of the 95 percent confidence interval. This provides a conservative estimate of the confidence interval.

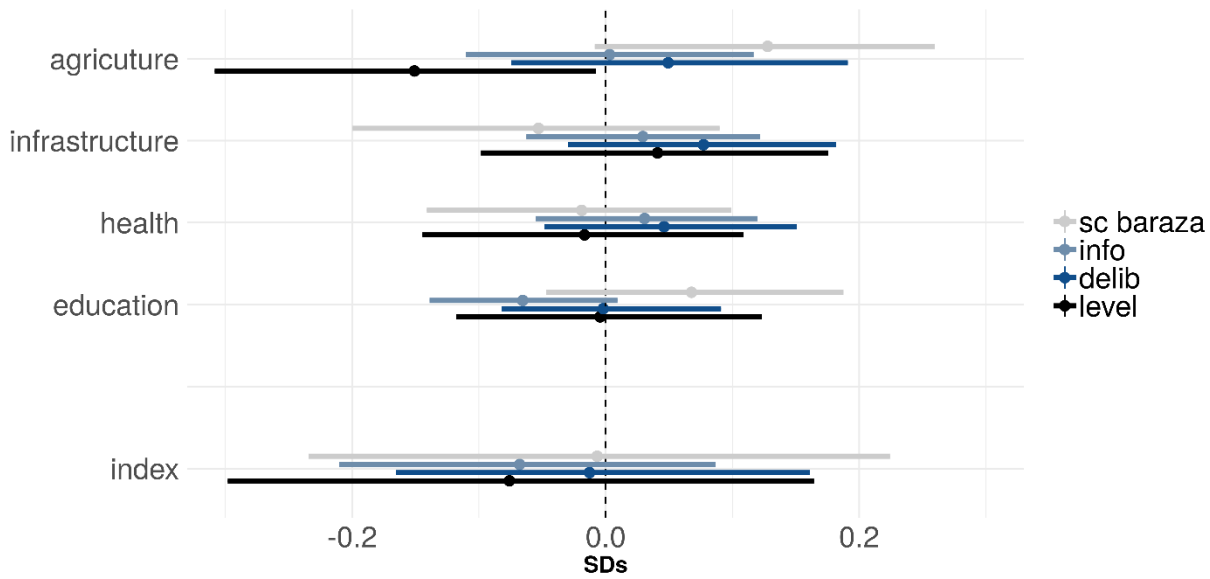

Figure 7 - Summary of baraza impact

We find no significant impact of the baraza programme on overall public service delivery. There are some indications that sub-county level baraza did make a difference in the agricultural sector, but the difference is only significant at the 10 percent level. We do find that public service delivery in the agricultural sector was significantly worse in areas that were exposed to a district level barazas than in areas that were exposed to a sub-county level baraza.

Detailed analysis

The indices combine various outcomes, some of which the expected direction of the effect is unclear a-priori. For instance, an information baraza may increase the quality of services in a hospital or health centre when judged by an objective measure such as waiting time. However, the information may also result in higher expectations from the part of the user. As such,

perceptions of quality may have reduced as a result of an information baraza. It is therefore also interesting to look beyond the indices and consider outcomes individually.

- Agriculture

We first zoom in on the outcomes that are used to assess the effectiveness of barazas in changing service delivery in agriculture. Results are reported in Table 4.

We start by looking if the baraza programme affected the use of modern inputs in agriculture. A first outcome looks at whether the household used inorganic fertilizers (DAP, Urea, NPK, Foliar, TSP, SSP, MOP) during the last 12 months. The first column reports baseline averages, with standard deviation in brackets below. We find that about 23 percent of households in the sample give an affirmative answer to this question. In the second column, we report differences in outcomes between households that received a typical sub-county level baraza (i.e. the crossed treatment of a sub-county information baraza and a sub-county deliberation baraza; the bottom right in Figure 6) and households that did not receive any baraza (pure control; the top left in Figure 6). We see that the proportion of households that reports using inorganic fertilizer is 1.5 percentage points lower among the sub-group of households that were exposed to a sub-county level baraza that consists of both the information and the deliberation component than among households that did not receive any baraza (second column). However, this difference is not statistically significant.

In the third column, we report differences between outcomes of households that live in areas where an information baraza was organized (either only an information baraza or a crossed information and deliberation baraza; top and bottom right of Figure 6) and outcomes of households that live in areas that were not exposed to an information baraza (either pure control or only deliberation baraza; top and bottom left of Figure 6). We see that adoption of inorganic fertilizer is 3.4 percentage points higher among households that were exposed to an information baraza. However, also here, the difference is not significant. In the fourth column, we report differences between outcomes of households that live in areas where a deliberation baraza was organized (either only a deliberation baraza or a crossed information and deliberation baraza; bottom left and right of Figure 6) and outcomes of households that live in areas that were not exposed to a deliberation baraza (either pure control or information only baraza; top left and right of Figure 6). We also do not find differences in terms of inorganic fertilizer use.

Finally, in the fifth column, we directly compare households that received a sub-county level baraza (i.e. the crossed treatment of a sub-county information baraza and a sub-county deliberation baraza; the bottom right in Figure 6) to households that live in sub-counties that were exposed to a district level baraza. Again, no difference between the two types of baraza is found on this outcome.

The second outcome is related the use of improved seed. This input seems to be used more widely than inorganic fertilizer: 36 percent of households report that they have been using improved seed during the last year. This percentage is 4.3 percentage points higher among households that reside in areas where a sub-county level baraza took place as opposed to in areas where no baraza was conducted, but the difference is not significant. We find negative point estimates for the relative effects of both the information and the deliberation component, but effects are imprecisely estimated. Finally, we find adoption of improved seed seems lower in

areas where a district level baraza was conducted than in communities exposed to sub-county level barazas, but the difference is not significant. Adoption of improved seed and inorganic fertilizer was included in the index presented in the previous section.

Next, we find that about 12 percent of households report that they received improved seed from the government extension system (that is through an extension agent, from the National Agricultural Advisory Services (NAADS) or through Operation Wealth Creation (OWC) that replace NAADS). We find that this is 5.1 percentage points higher in areas where a sub-county level baraza took place, and this difference is significant at the 5 percent level. We also see that, when directly comparing sub-county level barazas to district level barazas, there is a significant difference is the share of households that report to have received these inputs from government.

We then check if household changed with respect to the use of agro-chemicals. This includes the use of pesticides, herbicides, fungicides and acaricides during the last 12 months. Overall, almost half of all households in the sample report using some form of agro-chemical. We do not find evidence that the baraza intervention affected the use of this input. Finally, we consider the use of modern inputs and methods in livestock rearing over the last 12 months. This includes improved animal breeds, the use of modern feeds, drugs, and artificial insemination. 22 percent of households report that they used such inputs and this proportion is similar across different experimental groups.

We then turn to advisory services. We first investigate if the barazas have affected access to extension at home. We estimate the percentage of households in our sample who report that they were visited by an expert (e.g. crop or livestock extension agent, or community-based facilitator or another experienced farmer) at the home in the last 12 months. We find that access to extension is low, with only about 18 percent of households reporting that they received such a visit. Interestingly we find that this percentage is significantly higher among households that were affected by a sub-county level baraza. The effect is large, amounting to a 30 percent increase over the sample mean. We also find that this effect is absent among households that receive the district level baraza. Furthermore, the effect seems to come from a combination of the information and deliberation components; the components in itself do not seem to affect the outcome enough to render if significant.

Home visits by extension officers are not the only way in which households have access to information. Extension offices, demonstration sites and model farmers are also an integral part of the Ugandan agricultural advisory system. Especially after the establishment of NAADS, such a demand-led service component that can be consulted by farmers when the need arises became more important than the more supply-driven component of training and visit. We thus also enquire if anyone in the household visited an extension office, demonstration site, or model farmer in the past year. We find that about 28 percent of households in our sample report access to extension in this modality. While the results are in line with extension visits at home, differences are not significant. Access to extension, both at home or though extension offices and demonstration sites, was also included in the agriculture index.

We find that three quarters of households in our sample mention that there are agricultural enterprises, improved technologies or inputs you would like to adopt, indicating significant scope for advisory services. We also find that, according to citizens, service providers and policy makers are not always aware of this demand. The table shows that only 26 percent of

households is of the opinion that officials are aware of which services farmers need. While we do not see that this percentage differs between treatment and control for sub-county level barazas, we do see that a district level baraza reduced this percentage. Apparently, a district level baraza makes the mismatch between what farmers need and what officials think farmers need more salient.

Related to the previous outcome, we ask how decisions related to what topics to cover in agricultural extension are made. We define this outcome in a negative way, that is, the indicator is true if decisions are made without consultation. We see that about 30 percent of households indicate that no consultation happens, and the content of extension advisory services is decided upon by experts at the central level. We do not find that the baraza intervention increased participation in extension service planning.

About 40 percent of households report the presence of farmer groups or cooperatives in their village. In the agricultural sector in Uganda, such groups are very important. They are actively promoted by the government. In fact, to be able to receive inputs from the government, farmers need to be a member of such a group. We find that sub-county level barazas increase the likelihood that farmer cooperatives or groups are formed in the villages in Uganda. Interestingly, it seems that the deliberative component is the main driver behind this result. We also find that this effect is specific to interventions at the sub-county level. We further find that a higher share of farmer groups in areas that received a sub-county level baraza received support from government.

The final two questions focus more on marketing. Connecting farmers to markets is also an important strategy outlined in the Agriculture Sector Strategic Plan (ASSP). The first outcome relates to the likelihood that farmers are supported by government through the village procurement committee. In the sample, about 7 percent of households report that they were assisted by government. A second questions is similar but looks at the role of cooperatives. We generally find no effects of the baraza, except perhaps for an increase of almost 4 percentage points in the likelihood that cooperatives assist with marketing in areas that received a sub-county baraza. Both of these outcomes were also included in the index to assess overall impact.

Table 4 - Impact of baraza on agricultural outcomes

	mean	Sc baraza	info	delib	level
Household used inorganic fertilizers?†	0.229	-0.015	0.034	0.001	0.006
	(0.42)	(0.033)	(0.035)	(0.049)	(0.039)
Household used improved seed? †	0.364	0.043	-0.03	-0.037	-0.084
	(0.481)	(0.033)	(0.038)	(0.038)	(0.049)
Received improved seeds from govt?	0.121	0.051*	0.004	0.056	-0.071*
	(0.326)	(0.024)	(0.025)	(0.043)	(0.027)
Household used agro-chemicals?	0.469	-0.028	-0.007	-0.005	0.027
	(0.499)	(0.05)	(0.035)	(0.046)	(0.066)
Household used improved livestock inputs?	0.221	0.029	0.021	0.03	-0.019
	(0.415)	(0.031)	(0.028)	(0.034)	(0.044)
Did an agricultural expert visit your home? †	0.178	0.056**	0.037	0.036	-0.075**
	(0.383)	(0.018)	(0.03)	(0.048)	(0.017)
Visited extension office/demo site/model farm? †	0.285	0.040	0.036	0.045	-0.025
	(0.452)	(0.028)	(0.035)	(0.044)	(0.026)
Are officials aware of extension demand?	0.264	-0.006	0.017	-0.001	-0.061+
	(0.441)	(0.024)	(0.027)	(0.035)	(0.03)
Not consulted for extension content?	0.316	0.034	-0.041	-0.031	-0.068
	(0.465)	(0.033)	(0.027)	(0.034)	(0.041)
Are farmer associations/groups in this village?	0.403	0.06+	0.04	0.087*	-0.065*
	(0.491)	(0.03)	(0.038)	(0.041)	(0.027)
Farmer groups supported by govt? †	0.173	0.070*	-0.015	0.053	-0.083*
	(0.378)	(0.028)	(0.03)	(0.04)	(0.033)
Received help in marketing from govt? †	0.069	0.018	-0.013	0.016	-0.016
	(0.254)	(0.022)	(0.017)	(0.017)	(0.028)
Received help in marketing from coop? †	0.062	0.037	-0.021	-0.001	-0.033
	(0.241)	(0.024)	(0.016)	(0.021)	(0.03)
Number of observations	6,703	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

- Infrastructure

A second important area in which we expect to see an impact of the baraza programme is in infrastructure. We primarily focus on drinking water infrastructure. Results, similarly formatted as results in the previous section, are in Table 5.

A first outcome we consider is whether the household uses an unprotected water source during dry season. This is measured as the share of households that report that the main source of drinking water during the dry season is surface water, an unprotected dug well or an unprotected spring. We find that about 16 percent of households in the sample report that they are using an unprotected water source. The baraza intervention does not seem to affect this proportion. This outcome is included in the infrastructure index.

A second outcome we look at (and is also included in the index) is the distance to the primary water source during the dry season. This was measured in km, but trimmed and transformed

using the inverse hyperbolic transformation. We find that, on average, households have to walk about 1 km. While this distance seems to reduce in all comparisons, it is never significantly different from zero.

The third outcome, also part of the index, is the time that one must wait at the water source, measured in minutes. This continuous variable was also trimmed and transformed. We find that households must wait on average about 37 minutes. We find a significant reduction in waiting time in areas that were exposed to the sub-county level baraza intervention, and some indication that the deliberation component is mostly responsible for this reduction.

The fourth outcome variable assesses changes in the presence of a water user committee in the village. Overall, about 60 percent of households report that such a committee is present in their village. We do not find that this share varies between the different experimental groups. Similarly, we do not find that households are more or less likely to participate in such committees, nor that these committees hold more or less public meetings.

Households were also asked if they were satisfied with the quality of the water that is available at the source during the dry season. About 62 percent respond that they are satisfied or very satisfied with the drinking water. We do not find that households that are exposed to the baraza intervention are more or less likely to report that they are (very) satisfied with the quality of drinking water during the dry season. Half of the households report that they treat drinking water before drinking it, either by boiling it or treating it with chlorine. The likelihood that households treat water reduces somewhat for the information treatment. Potentially, better access the clean water reduces the necessity to treat water before drinking it.

Table 5 - Impact of baraza on infrastructure

	mean	Sc baraza	info	delib	level
Household uses unprotected water source†	0.159	0.031	0.005	0.01	-0.041
	(0.366)	(0.042)	(0.036)	(0.037)	(0.053)
Distance to water source (km) †	0.748	-0.026	-0.04	-0.049	-0.01
	(0.576)	(0.046)	(0.041)	(0.061)	(0.049)
Waiting time at source (min) †	3.198	-0.286+	-0.006	-0.287	0.18
	(1.638)	(0.152)	(0.117)	(0.193)	(0.159)
Is there a Water User Committee in the village?†	0.598	-0.021	0.033	0.032	0.013
	(0.49)	(0.046)	(0.037)	(0.04)	(0.058)
Is member of Water User Committee?	0.163	0.022	0.001	0.04	-0.016
	(0.37)	(0.021)	(0.017)	(0.025)	(0.022)
Water User Committee holds public meetings?	0.474	-0.005	0.043	0.060	0.022
	(0.499)	(0.044)	(0.036)	(0.042)	(0.055)
Satisfied with quality of drinking water?	0.624	0.031	-0.009	-0.062	0.01
	(0.484)	(0.052)	(0.044)	(0.044)	(0.052)
Treat water before drinking? (boil or treat)	0.5	-0.025	-0.087*	-0.02	-0.029
	(0.5)	(0.045)	(0.037)	(0.046)	(0.066)
Distance to nearest all weather road (km) †	2.849	0.388	-0.129	-0.286	-0.188
	(1.788)	(0.314)	(0.306)	(0.313)	(0.336)
Number of observations	6,700	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

We include one question related to road infrastructure. We ask how far the household is located from the nearest all weather road. We find that in the full sample a household lives on average 26 km from a road. We do not find that the baraza programme reduces the distance to the nearest all weather road.

- Health

We now look at outcomes in the health sphere (Table 6). One problem with public health related outcomes is that some will only be available for households that have visited government health facilities, reducing sample size too much to maintain acceptable power.

The first two outcomes we consider attempt to assess changes in access or use of public health facilities. A first indicator measures the use of public health facilities for illness. In particular, we construct an indicator that is true if the household head responds that treatment would be sought in a health center 2, 3, 4 or in a regional referral hospital if a member of his/her household had fever. We find that 70 percent of households respond that they would seek treatment in a government health facility. This proportion is independent of the treatment groups.

A similar indicator attempts to assess the use of the public health system for maternal health care, and asks if treatment would be sought in a health center 2, 3, 4 or in a regional referral

hospital if a member of the household was to give birth. This percentage is even higher then just for illness: more than 80 percent would go to a government health facility to give birth. Again, this proportion is not affected by the baraza programme. Both outcomes are included in the health index.

Next, we ask if a Village Health Team (VHT) is present in the village. VHTs are very important in front-line health care in Uganda. They also have prominent roles in government health interventions, such as immunization campaigns or the distribution of bed nets. We find that overall, nearly 90 percent of households report that a VHT is present in their village. The presence of a VHT is not impacted by the baraza intervention.

As the baraza tries to increase citizen engagement, we also check if households that were exposed to a baraza are more likely to participate in VHTs. We thus asked if any member of the household was a member of a VHT. We see that in about 10 percent of our sample, at least one household member is part of a VHT. The baraza intervention does not increase the likelihood that individuals participate as VHT members. Furthermore, the baraza intervention attempts to encourages sharing of information. As such, we expect that being exposed to a baraza may encourage VHTs to organize more public meetings. We find that overall, 43 percent of households state that VHTs have organized a public meeting in the last year. We find that this proportion is significantly higher in areas that were exposed to a sub-county level baraza. This effect seems driven by the deliberative component of a sub-county baraza.

We also consider distance to the nearest government health facility, measured in km. Overall, average distance to the nearest government health facility is almost 50 km. We do not find that barazas reduce this distance.

We then turn to health outcomes. We start by asking if any member of the household has been sick during the last year. This was the case in two thirds of the households in our sample. The intervention did not reduce morbidity in our sample. We then ask for each sick person in the household to record how many days he or she was ill, and use this to calculate the total number of sick days at the household level in the last year. The average household recorded almost 50 sick days according to this definition. We also do not find that the intervention affected the (trimmed and transformed) number of sick days. Finally, we look at the number of days household members were unable to go to school or to work, which provides an indication of the severity of illness. Calculated similarly to the previous outcome, we find that in the average household about 35 school- or workdays are missed due to illness. Again, there is no significant reduction in this (trimmed and transformed) number. This last health outcome measure was included in the health index.

We then ask how long one had to wait before being attended to (in minutes). We find that the sample mean for this outcome is about 90 minutes. While we see that waiting time reduces for most comparisons, the differences are never significant. Potentially, the reduced sample size resulted in too little power to detect a difference. This outcome was also included in the health index.

A final question that was included in the index was again asked to all households. In particular, we inquire if a traditional health practitioner was consulted in the last year. In one in four households in our sample, this was the case. The baraza intervention did not affect this percentage.

One problem that often crops up in the health sector is absenteeism. To assess this, we ask who examined the patient in the health center. Ideally this should be the doctor or in-charge. If this person is absent, patients are generally examined by nurses or lab technicians. We thus construct an indicator that is one if the household responds that the patient was investigated by the doctor or the in-charge, and zero otherwise. Only in 40 percent of the cases, a qualified person appears to do the examination. The baraza does not seem to lead to less absenteeism. We also look at the time that the examination takes. The average examination in our sample took about 22 minutes. When comparing answers of households in areas where a sub-county baraza took place to answers of households that were exposed to a district level baraza, we find that examination takes significantly less time in the latter sub-group.

Health care in Uganda is supposed to be free. However, corruption is widespread and often patients are required to make payments to receive care. We find that almost 20 percent of households report that payment was required the last time they visited a government health facility. There is no impact of the intervention. Related, users often complain about a lack of drugs in government health facilities. We asked if, during the last visit to a government health centre, drugs were received (indicating that drugs were available). We also asked if drugs had to be purchased from outside of the hospital (indicating that at least some drugs were missing). While 70 percent of households report that they received medicines in the health centre, almost all of them also mentioned that they had to also buy drugs outside of the hospital. For neither indicator, the intervention seems to make a difference.

We further probe for a subjective assessment of the overall quality of care at the health facility. Most households report that they are satisfied or very satisfied with services received at the government health facility. This seems to increase in areas where a sub-county level baraza took place and there is also a sizable difference in outcomes when comparing sub-county level baraza outcomes to district level baraza outcomes. However, none of the differences are significant.

Table 6 - Impact of baraza on health sector

		Sc			
	mean	baraza	info	delib	level
Seek treatment for fever in public health facility †	0.691	-0.008	-0.007	0.025	0.032
	(0.462)	(0.033)	(0.033)	(0.040)	(0.062)
Go to public health facility to give birth†	0.813	-0.029	-0.033	-0.016	-0.03
	(0.390)	(0.034)	(0.029)	(0.035)	(0.060)
Is there a VHT in village? †	0.881	0.022	0.005	0.029	-0.024
	(0.323)	(0.031)	(0.025)	(0.025)	(0.026)
Member of VHT?	0.113	0.022	0.003	-0.001	-0.043
	(0.317)	(0.017)	(0.014)	(0.015)	(0.016)
VHT organizes any public meetings?	0.429	0.076+	-0.018	0.058	-0.115
	(0.495)	(0.041)	(0.033)	(0.040)	(0.043)
Distance to nearest govt health facility (km) †	3.875	0.256	-0.162	-0.252	-0.196
	(1.377)	(0.219)	(0.233)	(0.263)	(0.299)
Any members sick?	0.658	0.003	0.024	0.037	0.018
	(0.475)	(0.023)	(0.028)	(0.033)	(0.028)
Number of days ill?	2.576	-0.005	-0.04	0.004	0.079
	(2.189)	(0.091)	(0.149)	(0.166)	(0.119)
Number of days school/work missed due to illness†	2.273	-0.081	0.076	-0.006	0.094
	(2.027)	(0.106)	(0.134)	(0.145)	(0.097)
Waiting time before being attended (min) †	4.744	-0.04	-0.133	-0.151	-0.009
	(1.012)	(0.093)	(0.108)	(0.135)	(0.094)
Has visited traditional health practitioner? †	0.257	-0.017	0.016	0.034	-0.014
	(0.437)	(0.032)	(0.029)	(0.03)	(0.029)
Patient was examined by in-charge/doctor	0.411	0.044	-0.049	-0.070	-0.086
	(0.492)	(0.041)	(0.032)	(0.042)	(0.040)
Time of examination	3.403	0.048	-0.099	0.015	-0.158*
	(0.761)	(0.066)	(0.070)	(0.091)	(0.065)
Paid anything	0.179	0.01	-0.008	-0.013	-0.026
	(0.384)	(0.023)	(0.025)	(0.042)	(0.022)
Received meds in hospital	0.709	0.000	-0.003	0.000	-0.008
	(0.454)	(0.036)	(0.023)	(0.033)	(0.049)
Had to buy meds outside of hospital	0.946	0.013	-0.024	0.009	-0.002
	(0.227)	(0.02)	(0.027)	(0.024)	(0.021)
Satisfied with services at hospital	0.682	0.048	-0.026	-0.038	-0.059
	(0.466)	(0.033)	(0.031)	(0.038)	(0.034)
Number of observations	6,703	1,434	2,417	2,417	1,423

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

We considered several other health related outcomes that feature prominently in other studies. One key outcome in Björkman and Svensson (2009) is immunization. However, we already find close to 100 percent immunization rates in our baseline data. Another outcome is child

mortality. Child mortality rates at baseline were estimated at 38 per 1000 live births, which was deemed too low to include in the endline analysis. Raffler, Posner, and Parkerson (2018) find similar child mortality rates at baseline and speculate that the fact that they do not find an effect while Björkman and Svensson (2009) do is due to differences in baseline conditions: child mortality at baseline in Björkman and Svensson (2009) was 117 per 1000 live births.

Education

Education outcomes to assess impact of the intervention suffers from a similar problem as the one encountered with health outcomes: not all households in the sample have children in school, and so for many of the outcomes related to education, sample size becomes small. This also affects the indices. Results are presented in Table 7.

If the quality of public education is poor, households will be less likely to send their children to public schools. A first obvious outcome is thus to simply compare the number of children within the households that attend public school (either Universal Primary Education or Universal Secondary Education). We find that the average household in our sample had almost two children in government schools, but that enrolment rates are not affected by the baraza intervention.

Access to public education is also influenced by the distance to a public school. We thus recorded distance to primary or secondary school (or the average if both are reported). We find that on average, households live about 3 km from a government operated school. Also for this outcome, the baraza program did not make an impact.

We also look at school infrastructure. First, we ask households if the primary or secondary school attended by any of their children has a complete boundary fence. In the complete sample, it was reported that only about 35 percent of schools have such a fence[8]. We also ask if the school has electricity and if there is a water source available in the school. We find that overall, about 34 percent of schools have electricity and about 70 percent have a water source. We find that sub-county level baraza seem to improve school infrastructure. We considered many other infrastructure related outcomes, such as the number of classrooms and availability of functioning toilets for both girls and boys, but baseline data suggested there were generally no issues related to these outcomes.

We also look at how the school is managed, and how parents are involved. For instance, we look at whether the school has a Parent Teacher Association (PTA) and a School Management Committee (SMC). Almost all schools have a PTA. We further find that 91 percent of households state the primary or secondary school attended by any of their children has a SMC. However, not all households are informed about SMC meetings. The baraza intervention does not seem to affect how schools are managed, how parents can participate, or how information is shared. Finally, we ask households if an inspector had visited the school in the year before the survey. We find that about 64 percent of households indicate that schools were inspected. Surprisingly, this proportion reduces as a result of the information component of a baraza.

[8] The lack of a fence was a frequent complaints from parents during qualitative work.

Table 7 - Impact of baraza on education

	mean	Sc baraza	info	delib	level
Number of children in UPS or USE†	1.797	0.149	-0.168	-0.078	0.000
	(1.914)	(0.139)	(0.101)	(0.109)	(0.138)
Distance to public school (km) †	1.42	0.025	-0.047	-0.044	0.004
	(0.763)	(0.057)	(0.067)	(0.071)	(0.05)
Has complete boundary fence? †	0.347	0.064	-0.061	-0.057	-0.061
	(0.476)	(0.048)	(0.046)	(0.049)	(0.068)
Has electricity?	0.338	0.165**	-0.04	-0.017	-0.091+
	(0.473)	(0.049)	(0.042)	(0.049)	(0.048)
Has water facility? †	0.703	0.106*	-0.023	0.026	-0.033
	(0.457)	(0.041)	(0.048)	(0.05)	(0.035)
Parent Teacher Association (PTA)?	0.945	-0.007	-0.029	0.000	0.001
	(0.227)	(0.014)	(0.019)	(0.028)	(0.014)
Has School Management Committee? †	0.915	0.008	-0.034	0.002	0.035
	(0.279)	(0.024)	(0.023)	(0.033)	(0.028)
Informed about SMC?†	0.882	0.021	-0.036	-0.042	-0.025
	(0.323)	(0.023)	(0.024)	(0.032)	(0.025)
Inspectors visited schools?†	0.639	-0.004	-0.075+	-0.035	-0.012
	(0.48)	(0.051)	(0.043)	(0.048)	(0.042)

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

Other outcomes:

- Contact with policy makers and service providers

As mentioned, one of the main aims of the community forums is to increase communication between politicians, civil servants and the citizens. We thus try to assess if citizens interact more with politicians and service providers as a result of the meetings. In particular, we ask how long it has been since the respondent spoke personally to various officials for reasons related to service provision in agriculture, health, education, water or roads. Based on the answer, we construct an indicator variable that denotes if the household had a meeting or not. The time frame changes depending on the official. For instance, for the LC1 chairperson, the indicator takes the value of one if the respondent spoke to him within the last month. For the head teacher, the reference period is 6 months. For the other officials (sub-county chief, health management unit member and water committee member), the indicator is true if contact was sought in the past year. Results are presented in Table 8.

Table 8 - Impact of baraza on meetings

	mean	Sc baraza	info	delib	level
Did you speak personally with […], for a reason relating to service provision in agriculture, health, education, water or roads?					
LC1 chairperson	0.426	0.001	0.03	0.035	-0.014
	(0.495)	(0.025)	(0.035)	(0.048)	(0.036)
Sub-county Chief	0.196	0.031	0.035	0.053	-0.054+
	(0.397)	(0.02)	(0.035)	(0.052)	(0.031)
Head teacher/ SMC member	0.486	0.038	0.058*	0.048	0.009
	(0.5)	(0.028)	(0.028)	(0.037)	(0.024)
HUM Committee Member	0.155	0.040	0.020	0.061	-0.064*
	(0.362)	(0.024)	(0.036)	(0.051)	(0.024)
Water Committee Member	0.382	-0.016	0.060+	0.044	0.032
	(0.486)	(0.040)	(0.034)	(0.051)	(0.045)
Contact index	0.000	0.037	0.089	0.107	-0.046
	(0.649)	(0.036)	(0.059)	(0.094)	(0.04)
Number of observations	6,700	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

We find that about 43 percent of households in our sample have met with the LC1 chair in the month before the endline data was collected. The baraza intervention did not affect the likelihood that citizens meet with the LC 1 using this definition. About 20 percent of respondents report that they met with the sub-county chief in the last year. There are some indications that sub-county level barazas increase the likelihood of such meetings. When comparing outcomes for district level barazas directly to outcomes of sub-county level barazas, the difference becomes significant at the 10 percent level.

Furthermore, we see that the information component of the baraza increases the likelihood that citizens interface with the head teacher or with members of the school management unit. We also see that the information component of the sub-county level baraza increases the likelihood of meetings with water committee members. Finally, and similar to meetings with sub-county chiefs, few citizens report meeting with health unit management committee members. But all coefficients on sub-county level interventions are positive and the difference between sub-county level barazas and district level barazas is significant. The index also shows that the largest effect on meetings is due to the information component, but the effect is not significant.

- Participation in elections

A second key aim of the baraza programme is to increase citizen empowerment. One way in which citizens can influence policy is through political participation. We thus expect that the baraza intervention will affect the likelihood that citizens participate in elections at various levels.

We also ask if any of the household members hold any political or traditional position. Results are in Table 9.

Table 9 - Impact of baraza on participation in elections

	mean	Sc baraza	info	delib	level
Hold any political/traditional positions?	0.303	0.018	-0.028	-0.017	-0.051*
	(0.46)	(0.019)	(0.021)	(0.03)	(0.023)
Voted in LCI elections?	0.926	-0.014	0.000	0.011	-0.017
	(0.261)	(0.017)	(0.013)	(0.014)	(0.019)
Voted in LC3 elections?	0.884	0.025	0.016	0.027	-0.014
	(0.32)	(0.028)	(0.02)	(0.024)	(0.031)
Voted in LC5 elections?	0.898	-0.002	0.011	0.004	0.008
	(0.302)	(0.024)	(0.017)	(0.025)	(0.029)
Voted in the Presidential elections?	0.932	-0.008	0.003	0.003	0.018
	(0.252)	(0.018)	(0.012)	(0.016)	(0.018)
Voted in Parliamentary election?	0.922	-0.011	0.001	0.002	0.032
	(0.269)	(0.022)	(0.014)	(0.019)	(0.027)
Voted in Party leaders elections?	0.752	-0.01	-0.043	-0.01	-0.003
	(0.432)	(0.039)	(0.033)	(0.039)	(0.056)
Political Participation Index	0.000	0.006	-0.034	0.004	-0.043
	(0.646)	(0.053)	(0.041)	(0.049)	(0.066)
Number of observations	6,700	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

Results show fairly high overall participation in elections at various levels, and no impact of barazas. About 30 percent of households report that at least one member holds a political or traditional position. When comparing outcomes for areas that were exposed to a sub-county level baraza to areas that received a district level baraza, we see that political participation is significantly higher in the former.

- Cash and in-kind contributions

The baraza programme also attempts to increase a sense of community engagement. One way in which citizens can participate is though contributing to common goods such as public infrastructure, education of health services. We differentiate between cash contributions and in-kind contributions.

Table 10 shows that about 32 percent of households indicate that they made in-kind contributions to public schools in their community in the last two years. Overall, most in-kind contributions are targeted towards drinking water facilities, and least in-kind contributions were going to a dam or irrigation facility, which is consistent with the difference in public nature of

these two facilities. Cash contributions are distributed similarly, except for the fact that contributions to bridges and roads generally take the form of labour contributions.

We find that the information component of the sub-county baraza reduces in-kind contributions but increases cash contributions. We further find that cash contributions are significantly higher in areas that were exposed to a district level baraza than in areas that were subjected to a sub-county level baraza. For in-kind contributions, these reductions in contributions are especially for schools and for government or community buildings. The increase in cash contributions as a result of the baraza intervention is especially for drinking water infrastructure.

Table 10 - Impact of baraza on Contributions

		Sc			
	mean	baraza	info	delib	level
In-kind contributions to the school?	0.321	0.006	-0.085**	-0.019	-0.04
	(0.467)	(0.032)	(0.032)	(0.035)	(0.039)
In-kind contributions to the health centre?	0.126	0.011	-0.03	-0.031	-0.048
	(0.332)	(0.023)	(0.025)	(0.021)	(0.039)
In-kind contributions to the road/ bridge?	0.384	0.025	-0.039	-0.011	-0.087*
	(0.486)	(0.043)	(0.037)	(0.037)	(0.036)
In-kind contributions to the drinking water facility?	0.452	0.047	-0.01	0.059	-0.048
	(0.498)	(0.046)	(0.042)	(0.038)	(0.056)
In-kind contributions to the dam/irrigation facility?	0.093	0.022	-0.024	-0.028	-0.045
	(0.291)	(0.031)	(0.020)	(0.029)	(0.035)
In-kind contributions to any government structure?	0.233	0.04	-0.073*	0.012	-0.046
	(0.423)	(0.034)	(0.029)	(0.034)	(0.046)
In-kind Contribution Index	0.000	0.063	-0.107+	-0.016	-0.132
	(0.609)	(0.068)	(0.057)	(0.058)	(0.085)
Cash contributions to the school?	0.382	-0.005	0.053	0.021	0.121**
	(0.486)	(0.026)	(0.035)	(0.039)	(0.027)
Cash contributions to the health centre?	0.121	-0.023	0.053	0.051	0.02
	(0.326)	(0.024)	(0.035)	(0.040)	(0.024)
Cash contributions to the road/ bridge?	0.097	-0.017	0.001	0.021	0.019
	(0.296)	(0.022)	(0.015)	(0.031)	(0.023)
Cash contributions to the drinking water facility?	0.37	-0.044	0.107*	0.057	0.141*
	(0.483)	(0.034)	(0.043)	(0.048)	(0.051)
Cash contributions to the dam/irrigation facility?	0.04	0.001	0.008	0.001	-0.005
	(0.197)	(0.015)	(0.012)	(0.014)	(0.015)
Cash contributions to any government structure?	0.26	0.008	-0.027	0.007	0.042
	(0.439)	(0.030)	(0.026)	(0.039)	(0.042)
Cash Contribution Index	0.000	-0.033	0.076*	0.063	0.123*
	(0.536)	(0.041)	(0.037)	(0.056)	(0.049)
Number of observations	6,700	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

- Perceptions and prioritization

In this section, we provide results on changes in the perception of citizens on a range of problems. Respondents were given a statement, and using a 10 point likert scale, had to indicate how much they disagreed (1) or agreed (10) with the statement. The statements were

based on extensive qualitative work where various stakeholders were interviewed and asked about the key problems surrounding public service provision in the different sectors.

Table 11 shows that households tend to agree more that access to drinking water sources is a serious problem as a result of the information component of a sub-county baraza. We also find a positive effect (that is, agreeing more that it is a serious problem) of the deliberation component for this outcome. Interestingly, when information and deliberation is combined in a full baraza, the effect disappears. Households that received a deliberation focussed sub-county level baraza are also more likely to agree that drinking water is usually dirty.

In the area of public health provision, households that were exposed to a sub-county level information baraza are more likely to agree that access to a health centre or hospital is a serious problem. Households that were exposed to a district level baraza are also more likely to indicate access to a health facility as a problem relative to households that were exposed to a sub-county level baraza. We further find that households that were exposed to a sub-county level baraza indicate that lack of medicines at health centers or hospitals is less of a problem than in control areas. A direct comparison for this outcome between sub-county level barazas and district level barazas also yields a significant difference. We also ask about perceptions related to friendliness of staff and absenteeism. We find that households that live in areas that received the district level treatment are more inclined to say that absenteeism is a problem then households that live in an area that received the sub-county level treatment.

Table 11 - Impact of baraza on perceptions

	mean	Sc baraza	info	delib	Level
Access to a drinking water source is a serious problem	5.151	0.048	0.606**	0.41+	0.181
	(3.264)	(0.265)	(0.223)	(0.227)	(0.308)
Drinking water is usually dirty	4.428	0.072	0.057	0.442+	-0.064
	(3.129)	(0.232)	(0.199)	(0.229)	(0.289)
Access to a government health centre or hospital is a problem	5.819	-0.193	0.365+	0.016	0.576*
	(3.092)	(0.273)	(0.218)	(0.261)	(0.211)
Government health centres or hospitals do not have relevant medicines	6.495	-0.412+	-0.027	0.018	0.701**
	(3.024)	(0.204)	(0.182)	(0.206)	(0.188)
Staff at government health centres or hospitals are rude to patients	5.04	-0.048	0.015	0.096	0.127
	(2.913)	(0.224)	(0.155)	(0.205)	(0.222)
Medical staff at government health centres or hospitals are often absent	4.776	0.032	0.081	0.127	0.319+
	(2.757)	(0.173)	(0.142)	(0.202)	(0.163)
Access to a government primary school is a serious problem	4.93	0.032	0.046	0.021	-0.121
	(2.905)	(0.246)	(0.205)	(0.21)	(0.263)
Teachers in government schools are often absent	4.847	-0.074	0.011	-0.061	0.144
	(2.72)	(0.182)	(0.17)	(0.211)	(0.192)
Children's learning outcomes in government schools are poor	6.36	-0.194	0.166	0.14	0.066
	(2.918)	(0.18)	(0.155)	(0.187)	(0.184)
Availability/access to all-weather roads is a serious problem	5.157	-0.348	-0.023	-0.18	0.374
	(3.14)	(0.289)	(0.225)	(0.229)	(0.236)
Agricultural inputs supplied by the government are of poor quality	5.845	0.227	-0.027	-0.105	-0.09
	(2.788)	(0.16)	(0.129)	(0.16)	(0.198)
There is lack of transparency in how farmers are selected to receive agricultural inputs from govt.	6.352	-0.351	0.22	0.042	0.399
	(3.165)	(0.229)	(0.25)	(0.259)	(0.246)
Agricultural extension agents rarely visit.	6.372	-0.189	-0.001	0.103	0.422
	(3.218)	(0.268)	(0.301)	(0.344)	(0.277)
Agricultural extension agents are not aware needs of farmers.	6.098	-0.01	0.082	0.13	0.502*
	(3.074)	(0.224)	(0.254)	(0.321)	(0.18)
Perception Index	0.000	-0.033	0.035	0.026	0.071+
	(0.514)	(0.039)	(0.033)	(0.037)	(0.035)
Number of observations	6,700	2,390	4,266	4,266	2,379

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

We then look at perceptions in the area of education. We see that households are generally most concerned about poor quality learning outcomes, but think absenteeism is less of a problem. For none of the school related perceptions, we find a significant difference between the various groups. We also do not find that the perception of access to roads as a serious problem changes as a result of the barazas.

Respondents seem to perceive agricultural service delivery as the most problematic area. Averages on the likert scales are fairly high when asked if farmers agree extension officers visit

rarely, and that there is a lack of transparency in how farmers are selected to receive inputs from government. We see that the issue of transparency reduces somewhat after a sub-county level baraza, but the effect is not significant. A perception index that combines all outcome indicates only a significant difference between sub-county level barazas and district level barazas.

Sub-county level analysis

In addition to household surveys, we conducted surveys with government officials as respondents. Obviously, sample sizes are much smaller here, and so results should be interpreted with this caveat in mind. In each sub-county, we interviewed two officials: the highest-ranking politician (the LC3) and the highest ranking civil servant (sub-county chief). Sometimes, the deputy was interviewed. We have 261 observations in this dataset.

Agriculture

We start again with agriculture. We report results in Table 12. As in previous tables, the first column shows sample averages, with standard deviations in brackets below. In the second column, we report differences in outcomes between sub-counties that received a typical sub-county level baraza and sub-counties that did not receive any baraza. In the third column, we report differences between outcomes of sub-counties where an information baraza was organized and outcomes of sub-counties that were not exposed to an information baraza. In the fourth column, we report differences between outcomes of sub-counties where a deliberation baraza was organized and outcomes of sub-counties that were not exposed to a deliberation baraza. Finally, in the fifth column, we directly compare sub-counties that received a sub-county level baraza to sub-counties that were exposed to district level baraza.

Government officials report that on average 14.3 percent of the agricultural budget was not received. We do not find evidence that the baraza intervention affected this percentage.

We then look at perceptions of problems in the agricultural sector by officials. Over the past year, officials received on average 2.9 complaints related to agricultural service provision. The number of complaints seemed to reduce after a sub-county level baraza took place. As in the household questionnaire, officials were also asked to rate their agreement with various statements. We do not find that barazas affect perceptions on input quality. However, officials in sub-counties with deliberation barazas report that there is increased transparency in how farmers are selected to receive agricultural inputs. Officials in sub-counties with information barazas agree less with the assertion that extension agents rarely visit. Officials in sub-counties with deliberation barazas are also more of the opinion that extension agents are aware of what their customers want. The above seems to suggest perceptions became more positive in the agricultural sector after sub-county level barazas, but it is unclear if it is the information or deliberation component that is driving this result.

Turning to outcomes, we investigate the effect of barazas on access to extension at home as reported by officials. Recall that when analysing the household data we found that significantly more households in areas that received a sub-county level baraza were visited by an expert at home. Analysing the responses of government officials, we find that the number of male crop extension agents is about one person higher in areas where a deliberation baraza took place. There is also a significant difference in the number of male crop extension agents when directly comparing sub-county level barazas to district level baraza, with more staff available after a district level baraza. The number of female crop extension staff/agents was not affected by the

baraza intervention. We also find substantial reductions in the number of demonstration sites as a result of sub-county level barazas. This is surprising, given that in the household level data there is some evidence of increased visits to extension offices, demonstration sites and model farmers, especially after matching to reduce potential bias introduced by the partial roll-out (Table 19).

Looking that the use of modern inputs, we find that for both fertilizers and improved planting material, there is a negative and significant difference between areas exposed to a district level baraza and areas exposed to a sub-county level baraza. We also see that the percentage of households in the sub-county that reportedly used improved seed or fertilizer is higher in areas that received a sub-county baraza as opposed to control sub-counties, but the difference is not significant.

Using household survey data, we find that the proportion of households that received improved seed from the government extension system is significantly higher in areas where a sub-county level baraza took place. Asking government officials about the frequency of improved seed distribution, we do not find a significant difference between sub-counties with a sub-county level baraza and control sub-counties. However, we do see that the frequency of improved seed distribution is about 0.4 higher in areas where an information baraza took place. We also see that the frequency of improved breeds of cattle, goat, pig, poultry distribution is higher in areas that were exposed to a sub-county level baraza. Grievances related to the distribution of seed and livestock (goats and milk cows) were often encountered during qualitative work.

Table 12 - Impact on agriculture (sub-county level analysis)

	mean	Sc baraza	info	delib	level
Political effort					
agricultural budget that has not been received‡ (in %)	14.284	-3.446	-1.991	7.389	-6.375
	(29.046)	(6.443)	(5.41)	(9.309)	(3.906)
Perception					
number of complaints‡	2.945	-2.874+	-1.565	-1.44	0.824
	(7.686)	(1.636)	(1.751)	(1.781)	(0.81)
"Agricultural inputs supplied by the government are of poor quality."	5.669	0.254	-0.24	1.088	-0.313
	(3.179)	(0.666)	(0.659)	(0.867)	(0.667)
"Lack of transparency in how farmers are selected to receive ag inputs from govt."	5.225	-0.76	0.054	-1.423+	0.201
	(3.244)	(0.611)	(0.684)	(0.781)	(0.886)
"Agricultural extension agents rarely visit."	5.199	0.895	-1.355+	-1.063	-0.313
	(3.194)	(0.665)	(0.76)	(0.766)	(0.469)
"Agricultural extension agents are not aware of needs relevant to farmers."	4.483	-0.125	-0.792	-1.527+	-0.402
	(3.069)	(0.557)	(0.72)	(0.799)	(0.41)
Outcomes					
number of male crop extension agents‡	1.123	-0.207	0.248	1.047+	0.205*
	(1.233)	(0.133)	(0.309)	(0.517)	(0.089)
number of female crop extension agents‡	0.36	0.382	0.206	0.357	-0.321
	(1.049)	(0.236)	(0.235)	(0.39)	(0.24)
number of demonstration sites‡	3.157	-2.249*	-1.276	-2.461*	2.977*
	(6.235)	(1.029)	(1.257)	(1.071)	(1.244)
HH using purchased fertilizers‡ (in %)	28.11	5.129	-1.79	-8.809	-19.808*
	(29.98)	(7.588)	(7.367)	(7.905)	(7.195)
HH using improved seeds‡ (in %)	44.136	5.288	5.393	-2.399	-14.907*
	(29.9)	(5.316)	(6.45)	(7.193)	(5.63)
HH using pesticides/herbicides/fungicides‡ (in %)	46.195	3.096	7.286	-9.217	-5.65
	(29.289)	(6.205)	(5.916)	(7.779)	(7.302)
HH using improved livestock breeds‡ (in %)	23.131	2.499	0.394	-7.672	-15.533
	(25.196)	(10.283)	(6.568)	(6.279)	(11.049)
frequency of improved seed distribution‡	1.932	0.000	0.393+	0.496	0.879*
	(1.776)	(0.223)	(0.219)	(0.293)	(0.378)
frequency of improved breed distribution	1.053	0.602+	0.097	0.492	-0.668*
	(1.112)	(0.33)	(0.179)	(0.328)	(0.282)
frequency of fertilizer/manure distribution	0.524	-0.1	0.284	-0.215	0.316
	(1.399)	(0.178)	(0.542)	(0.201)	(0.291)
frequency of pesticide/herbicide/fungicide distribution	0.557	0.634	-0.036	-0.174	-0.447
	(1.206)	(0.389)	(0.156)	(0.185)	(0.408)
Number of observations	262	102	168	168	102

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. ‡ indicates that missing observations were interpreted as zeros. † indicates that we did not control for the baseline value.

Infrastructure

We now turn to infrastructural related outcomes as reported by sub-county officials (Table 13). We start with perceptions. Also for infrastructure, we recorded the number of complaints. We find a reduction of -5.1 water related complaints after a sub-county level baraza. It seems that the deliberative component is the main driver behind this result. Moreover, government officials were asked to report their agreement with two water infrastructure related statements. When asked whether “Access to a drinking water source is a serious problem”, government officials in sub-counties that received a sub-county level baraza agreed significantly more with this statement. We find a similar effect for the statement: “Drinking water is usually dirty”. Perhaps, sub-county level baraza made officials more sensitive to this issue.

We also include some questions related to road infrastructure. Looking at the household data, we do not find that the baraza programme reduces the average distance of households to the nearest all weather road. This is in line with our findings from surveying government officials. However, when officials were asked to report their agreement with the statement “Availability/ Access to all-weather roads is a serious problem.”, officials in sub-counties that received a typical sub-county level baraza agreed significantly less with this statement.

In the household level analysis, we learned that the difference in distance to the primary water source during the dry season is never significantly different from zero, but that there is a significant reduction in the time that one has to wait at the water source in areas that were exposed to the sub-county level baraza intervention. Government officials reported on a range of different water sources. We find that there are 14 more boreholes in sub-counties where an information baraza was organized. We further find a reduction of the number of protected springs in sub-counties that were exposed to a sub-county level baraza. At the same time, we see an increase in the number of protected springs in areas that were exposed to a district level baraza, resulting in a difference of 7.3 which is significant at the 1 percent level.

The increase in the number of boreholes in sub-counties where an information baraza was organized and the decrease in the number of protected springs in sub-counties that received a sub-county level baraza could be the reason why the difference in distance to the primary water source of households during the dry season is never significantly different from zero because the two effects offset each other. Because the positive impact on the number of boreholes is much larger than the negative impact on the number of protected springs, this could be an explanation for the significant reduction in time that households report to wait at the water source in areas that were exposed to the sub-county level baraza intervention.

Table 13 - Impact on infrastructure (sub-county level analysis)

	mean	Sc baraza	info	delib	level
Perception					
number of complaints‡	4.966	-5.144*	-0.943	-5.17+	1.12
	(9.145)	(2.449)	(2.256)	(2.51)	(1.267)
"Access to a drinking water source is a serious problem."	5.953	1.623*	0.203	0.702	-0.854
	(3.057)	(0.719)	(0.688)	(0.817)	(0.697)
"Drinking water is usually dirty."	5.025	1.729*	-0.164	1.166	-2.373*
	(3.116)	(0.687)	(0.675)	(0.914)	(0.85)
"Availability/Access to all-weather roads is a serious problem."	6.784	-1.137+	-0.502	0.177	-0.296
	(2.774)	(0.558)	(0.542)	(0.648)	(0.887)
Outcomes					
lengths of tarmac roads‡	3.393	-4.317	-4.182	-5.61+	-0.988
	(9.545)	(2.817)	(2.578)	(3.257)	(0.678)
lengths of other all-weather roads‡	50.255	8.485	1.654	40.143	6.108
	(74.271)	(11.343)	(10.359)	(30.295)	(12.236)
number of boreholes‡	16.763	2.601	14.467**	7.371	1.133
	(26.371)	(2.843)	(5.079)	(4.808)	(3.602)
number of protected springs‡	9.275	-5.287+	1.943	1.918	7.334**
	(19.549)	(2.767)	(3.304)	(4.727)	(2.1)
number of protected dug/shallow wells‡	3.585	-2.046	-0.152	1.824	2.462+
	(7.965)	(1.729)	(1.397)	(3.116)	(1.268)
number of unprotected dug/shallow wells‡	8.513	-0.094	1.885	8.02	-4.073
	(18.575)	(3.589)	(3.569)	(7.406)	(3.315)
number of piped/gravity flows†	12.234	7.473	2.04	-4.963	-18.955+
	(37.886)	(11.924)	(13.147)	(7.795)	(10.346)
number of observations	262	102	168	168	102

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. ‡ indicates that missing observations were interpreted as zeros. † indicates that we did not control for the baseline value.

Health

We now study health related outcomes and report them in Table 14. We find that, on average, 14.1 percent of the health budget has not been received and that this proportion is independent of treatment groups. While we see that the number of health related complaints reduces for most comparisons, the only significant difference is the one between sub-counties with a deliberation baraza and sub-counties without, the former receiving on average 2 complaints less. For perceptions, absenteeism seems to be less of a problem in areas that experience a district level baraza than in areas that were exposed to a sub-county level baraza.

We then investigate outcomes related to VHTs. Using the household data we find that the share of households that reports that a VHT is present in their village and the likelihood that individuals participate as VHT members is not impacted by the baraza intervention. Responses of government officials are line with household responses. In fact, the number of VHT members

reduces by 14.6 in sub-counties with a sub-county level baraza. The number of VHT members is independent of the other treatment groups.

Using household data, we found that access to public health facilities was independent of the treatment groups. Also, we did not find that barazas reduced the distance to the nearest government health facility. Here, we look at the number of health centres in the sub-counties as reported by the officials. The number of Health Centres 2 (HC2s) is not significantly different for comparisons of the different sub-county level barazas. However, when directly comparing sub-counties that received a sub-county level baraza to sub-counties that were exposed to district level baraza, we do find a significant increase of 0.3 centers. Furthermore, the number of Health Centers 3 (HC3s) increases by 0.3 in sub-counties that were exposed to a sub-county level baraza. Both are significant at the 5 percent level.

After looking at the number of HC2s and HC3s, we want to take a closer look at the situation inside these public health facilities. We start with strafing in HC2s, differentiating between clinical officers, nurses and birth attendants. Interestingly, we find that nurses and birth attendants are present in higher numbers after a district level barazas then after a sub-county level barazas. In fact, there are some indications that a sub-county level baraza leads to a reduction in staff.

Equipment of HC2s matters for service delivery. The number of HC2s with a safe drinking water source, with laboratory tests, with a medical waste pit, or with HIV/AIDS guidance and counselling services is independent of the treatment groups. In sub-counties that received a sub-county level baraza, the number of HC2s with immunization facilities, the number of HC2s with out-patient services, and the number of HC2s with family planning services all increase, while the number of HC2s with in-patient care reduces. Administrative placement also seems to matter for equipment of HC2s. If we compare sub-counties that received a sub-county level baraza to sub-counties that were exposed to district level baraza, there are 0.1 more HC2s with electricity, 0.4 percentage points more with staff houses for all relevant employees and 0.2 more with in-patient care in areas that were exposed to a higher level baraza.

We also look at staffing in HC3s. The number of doctors, clinical officers, medical assistants, nurses, nursing assistants and laboratory technicians on payroll in HC3s are all independent of the treatment groups. The number of midwives on payroll in HC3 is lower in sub-counties that received a district level baraza compared to sub-counties that were exposed to sub-county level baraza. The numbers of in-patient care beds in HC3s, the number of HC3s with electricity and with a mortuary/cold room are independent of the treatment groups. In sub-counties that received a sub-county level baraza, HC3s are more likely to have a safe drinking water source, are more likely to provided laboratory tests, are more likely to provide immunization services, provide more out-patient services, provide more family planning services and antenatal care. Sub-counties that received a baraza are also more likely to have appropriate medical waste disposal facilities and offer HIV/AIDS guidance and counselling services. These outcomes seem to be mostly driven by the information component.

Table 14 - Impact on health sector (sub-county level analysis)

	mean	Sc baraza	info	delib	level
Political effort					
proportion of health budget that has not been received‡	14.089	-1.429	8.521	5.522	-6.923
	(28.051)	(6.472)	(6.868)	(9.498)	(4.753)

Perception					
number of complaints‡	1.75	-1.641	-1.016	-1.986+	0.545
	(5.719)	(1.363)	(1.285)	(1.115)	(0.623)
“Access to a government health centre or hospital is a serious problem.”	6.64	-0.426	0.194	-0.761	-0.378
	(3.026)	(0.895)	(0.62)	(0.657)	(0.781)
“Government health centres or hospitals do not have relevant medicines.”	6.826	0.553	-0.127	0.505	-0.434
	(2.818)	(0.52)	(0.644)	(0.627)	(0.37)
“Staff at government health centres or hospitals are rude to patients.”	4.394	0.797	-0.047	-0.664	-0.597
	(2.821)	(0.605)	(0.61)	(0.66)	(0.739)
“Medical staff at government health centres or hospitals are often absent.”	4.411	0.757	-0.049	-0.976	-1.683*
	(2.943)	(0.565)	(0.587)	(0.685)	(0.666)
Outcomes					
number of villages with VHTs‡	43.225	-8.924	-4.327	-1.829	-1.831
	(24.644)	(6.351)	(6.282)	(6.739)	(3.768)
number of VHT members‡	73.907	-14.644+	-5.301	11.937	-2.738
	(40.67)	(7.936)	(8.061)	(11.889)	(10.935)
number of HC2s‡	1.097	-0.124	0.112	0.14	0.34+
	(1.229)	(0.181)	(0.154)	(0.162)	(0.153)
number of clinical officers on payroll in HC2s‡	0.343	-0.174	-0.052	0.024	0.135
	(0.925)	(0.22)	(0.148)	(0.262)	(0.121)
number of nurses/nursing assistants on payroll in HC2s‡	2.047	-1.273*	0.002	-0.873	1.409**
	(3.103)	(0.49)	(0.493)	(0.594)	(0.417)
number of birth attendants on payroll in HC2s‡	0.445	-0.32*	0.088	0.615	0.269**
	(1.142)	(0.146)	(0.165)	(0.478)	(0.072)
number of HC3s‡	0.801	0.307*	0.333*	-0.016	-0.292
	(0.67)	(0.125)	(0.127)	(0.117)	(0.208)
number of in-patient care beds in HC3s‡	5.839	-0.451	0.472	0.01	-1.609
	(7.359)	(1.6)	(1.721)	(1.871)	(1.636)
number of doctors on payroll in HC3s†	0.063	-0.048	-0.015	-0.044	0.053
	(0.312)	(0.096)	(0.097)	(0.118)	(0.066)
number of clinical officers on payroll in HC3s‡	1.042	0.193	0.228	0.164	-0.238
	(1.122)	(0.224)	(0.271)	(0.297)	(0.257)
number of medical assistants on payroll in HC3s‡	0.39	-0.158	-0.048	-0.104	0.012
	(0.937)	(0.18)	(0.172)	(0.226)	(0.202)
number of nurses/nursing assistants on payroll in HC3s‡	2.826	0.579	1.063	0.951	-0.625
	(3.072)	(0.687)	(0.826)	(0.997)	(0.793)
number of midwives on payroll in HC3s‡	1.691	-0.194	-0.063	-0.529	-0.745**
	(2.205)	(0.403)	(0.432)	(0.458)	(0.218)
number of laboratory technicians on payroll in HC3s‡	0.936	0.497	0.339	-0.236	-0.508
	(1.126)	(0.309)	(0.251)	(0.227)	(0.293)
number of HC2s with electricity‡	0.237	0.243	-0.183+	0.151	0.136*
	(0.533)	(0.24)	(0.104)	(0.156)	(0.056)
number of HC2s with safe drinking water source‡	0.564	0.738	0.122	0.246	-0.394
	(1.084)	(0.47)	(0.21)	(0.251)	(0.266)
number of HC2s with staff houses for all relevant employees‡	0.72	0.945	0.135	0.17	0.359+
	(1.587)	(0.642)	(0.229)	(0.145)	(0.16)
number of HC2s with laboratory tests‡	0.53	-0.128	-0.007	-0.313	0.268
	(1.008)	(0.086)	(0.178)	(0.197)	(0.204)

number of HC2s with immunization facilities‡	0.886	0.823**	0.117	-0.139	0.26
	(1.156)	(0.264)	(0.166)	(0.174)	(0.263)
number of HC2s with in-patient care‡	0.242	-0.169+	-0.071	-0.089	0.235*
	(0.712)	(0.088)	(0.11)	(0.107)	(0.103)
number of HC2s with out-patient services‡	1	0.661*	0.221	0.187	0.034
	(1.203)	(0.243)	(0.134)	(0.172)	(0.161)
number of HC2s with family planning services‡	0.911	0.576*	0.098	0.136	0.113
	(1.169)	(0.238)	(0.155)	(0.207)	(0.188)
number of HC2s with medical waste pit‡	0.826	0.401	0.33	0.08	0.326
	(1.174	(0.355)	(0.205)	(0.233)	(0.362)
number of HC2s with HIV/AIDS guidance and counselling‡	0.856	0.375	-0.018	-0.305	0.092
	(1.169)	(0.32)	(0.176)	(0.216)	(0.226)
number of HC3s with electricity‡	0.525	0.299	0.13	0.009	-0.04
	(0.635)	(0.402)	(0.139)	(0.163)	(0.098)
number of HC3s with safe drinking water source‡	0.568	0.997*	0.216	0.005	-0.116
	(0.632)	(0.176)	(0.141)	(0.146)	(0.136)
number of HC3s with staff houses for all relevant employees‡	0.525	-0.025	-0.203	-0.226	-0.289*
	(1.128)	(0.752)	(0.266)	(0.228)	(0.103)
number of HC3s with laboratory tests‡	0.797	0.827**	0.165	-0.133	0.113
	(0.821)	(0.106)	(0.155)	(0.139)	(0.257)
number of HC3s with immunization facilities‡	0.818	0.659**	0.463*	0.022	-0.059
	(0.838)	(0.127)	(0.199)	(0.114)	(0.299)
number of HC3s with in-patient care‡	0.674	0.037	0.29+	-0.066	0.177
	(0.69)	(0.14)	(0.158)	(0.169)	(0.206)
number of HC3s with out-patient services‡	0.775	0.632*	0.317**	0.022	-0.089
	(0.694)	(0.136)	(0.105)	(0.12)	(0.314)
number of HC3s with family planning services‡	0.839	0.786*	0.125	-0.141	-0.066
	(0.825)	(0.097)	(0.162)	(0.149)	(0.31)
number of HC3s with antenatal care‡	0.792	0.659**	0.275*	0.000	-0.032
	(0.687)	(0.127)	(0.105)	(0.119)	(0.289)
number of HC3s with maternity wards‡	0.763	0.221	0.343+	-0.054	0.047
	(0.705)	(0.179)	(0.171)	(0.171)	(0.272)
number of HC3s with placenta pit‡	0.725	0.608*	0.158	-0.038	0.104
	(0.669)	(0.135)	(0.104)	(0.134)	(0.248)
number of HC3s with medical waste pit‡	0.742	0.66*	0.254*	0.035	0.019
	(0.712)	(0.131)	(0.113)	(0.144)	(0.192)
number of HC3s with HIV/AIDS guidance and counselling‡	0.78	0.586*	0.322**	0.073	-0.058
	(0.71)	(0.145)	(0.109)	(0.122)	(0.26)
number of HC3s with mortuary/cold room‡	0.097	0.018	0.217	0.005	-0.011
	(0.572)	(0.065)	(0.173)	(0.061)	(0.072)
number of HC3s with isolation room for special cases‡	0.191	0.136	0.29+	-0.023	0.000
	(0.805)	(0.143)	(0.171)	(0.072)	(0.176)
number of observations	262	102	168	168	102

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, *

and + denotes significance at the 1, 5 and 10 percent levels. ‡ indicates that missing observations were interpreted as zeros. † indicates that we did not control for the baseline value.

Education

Now we assess the impact of the baraza intervention on education outcomes as reported by sub-county government officials. Like other sectors, about 14 percent of the budget has not been received and this proportion did not change as a result of the baraza intervention. The number of education related complaints also remains stable over subgroups.

We find that student enrolment in government primary schools and student enrolment in government secondary schools are also not affected by the baraza intervention, which is in line with the household level analysis. However, there seems to be an effect on dropout rates. The dropout rate for girls in primary schools is 13.2 percentage points lower in sub-counties where an information baraza was organized and 12.1 percentage points lower in sub-counties that received a district level baraza, compared to sub-counties that were exposed to sub-county level baraza. Also, the dropout rate for boys in primary schools is 6.8 percentage points lower in sub-counties with an information baraza, compared to sub-counties without.

From the household data, we learned that the baraza program did not have an impact on the distance to a government operated primary or secondary school. Looking at the government officials' data, we see that the baraza program did not affect the number of government primary schools or the number of government secondary schools, which could explain why the baraza program did not impact the distance to government operated schools.

The number of teachers on payroll in government primary schools in not affected by the baraza intervention. The number of teachers on payroll in government secondary schools is: There are on average 8.6 more secondary school teachers on payroll in government secondary schools in sub-counties that received a sub-county level baraza and this effect seems to come mostly from the participation component. Comparing sub-counties that received a sub-county level baraza to sub-counties that were exposed to district level baraza, we find that secondary schools in the latter group had significantly less teachers. However, care needs to be taken when interpreting these results because of a limited number of observations.

According to the household level data, the baraza intervention does not seem to affect whether the school has a SMC. In line with this result, the number of government schools (primary or secondary) with an active SMC is not affected by the baraza intervention, according to government officials.

Finally, government officials were asked about their opinion on four problems that were often mentioned by stakeholders. The intervention does not significantly affect agreement with the statements "Access to a government primary school is a serious problem" and "Children's learning outcomes in government schools are poor". When government officials were asked whether "Teachers in government schools are often absent", they agreed significantly more in sub-counties that received a sub-county level baraza. Officials in sub-counties that were exposed to district level barazas were less of the opinion that absenteeism was a problem than officials in sub-counties that were exposed to district level barazas.

Table 15 - Impact on education sector (sub-county level analysis)

	mean	Sc baraza	info	delib	level
Political effort					
number of government schools with active SMC‡	7.398	-0.986	1.595	-3.395	-1.913
	(7.595)	(2.005)	(1.749)	(2.029)	(1.529)
proportion of education budget that has not been received‡	13.881	1.339	6.384	4.831	-2.378
	(27.959)	(6.539)	(5.463)	(7.896)	(3.619)
Perception					
number of complaints‡	2.411	-0.247	1.190	-0.24	-0.441
	(4.495)	(0.929)	(1.139)	(0.883)	(0.644)
"Access to a government primary school is a serious problem."	4.225	-0.380	0.203	-1.054	-0.496
	(2.996)	(0.708)	(0.683)	(0.895)	(0.441)
"Teachers in government schools are often absent."	4.318	1.119+	0.331	0.63	-1.96**
	(2.767)	(0.654)	(0.536)	(0.639)	(0.556)
"Children's learning outcomes in government schools are poor."	7.542	-0.256	0.403	-0.005	-0.077
	(2.383)	(0.533)	(0.556)	(0.612)	(0.553)
Outcomes					
dropout rate for girls in primary schools	35.045	1.085	-13.228**	-8.808	-12.104+
	(22.047)	(6.169)	(4.478)	(5.346)	(5.658)
dropout rate for boys in primary schools	26.247	-0.088	-6.827+	-6.069	-6.938
	(19.533)	(4.799)	(4.013)	(4.849)	(4.564)
number of government primary schools‡	8.737	-1.099	-0.443	0.194	-0.747
	(6.31)	(1.008)	(1.039)	(1.09)	(1.095)
student enrolment in government primary schools‡	4458.78	-2860.48	-531.81	-2814.12	341.71
	(9512.47)	(2952.79)	(2561.43)	(3333.18)	(572.89)
number of teachers on payroll in government primary schools‡	58.386	6.690	17.379	9.720	5.919
	(60.045	(11.897)	(15.201)	(16.079)	(9.742)
number of government secondary schools‡	0.996	-0.328	0.163	-0.320	0.064
	(1.472)	(0.314)	(0.342)	(0.339)	(0.121)
student enrolment in government secondary schools‡	388.453	81.974	67.362	27.858	-41.100
	(546.069)	(147.351)	(116.486)	(125.191)	(122.726)
number of teachers on payroll in government secondary schools‡	8.737	8.616*	0.313	6.141+	-8.896*
	(13.826)	(3.963)	(2.633)	(3.487)	(2.969)
Number of observations	262	102	168	168	102

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. ‡ indicates that missing observations were interpreted as zeros. † indicates that we did not control for the baseline value.

4.2.3. Heterogeneity of impacts

The slow roll-out of the intervention over an extended period also introduces variation in the time that passed between treatment administration and end-line data collection. For instance, the first barazas were held around June 2016 (about one year after the baseline) and so more than 3 years will have passed between treatment administration and end-line data collection.

For the most recent barazas, there will only be a few months between treatment administration and end-line data collection. One may argue that sub-counties or districts that were treated early on have been exposed to the program much longer and hence one may expect larger effects on a range of outcomes for these sub-counties or districts than areas that only recently received treatment.

We find that the OPM organized quite a few barazas in may 2019. We expect that by the time of the endline survey, too little time has passed for many of the outcomes to materialize. We thus reran the analysis deleting, somewhat arbitrarily, observations from households in sub-counties or districts where a baraza was held in the last one and a half years. Results are summarized in Figure 8 below. It displays average treatment effects for the four hypotheses on the four families of outcomes, and one overall index, similar to the summary in Figure 7.

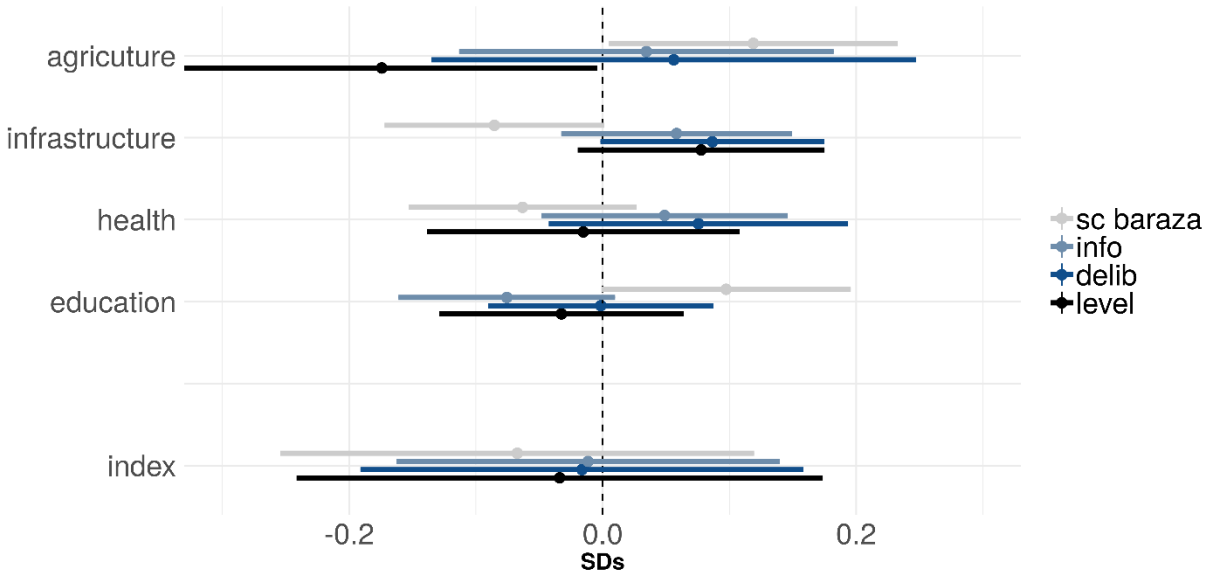

Figure 8 – Heterogeneity at SC level – effects more than one and a half years after implementation

Comparing this figure to Figure 7, we notice some interesting things. For the agricultural sector, results stay largely the same. This is also the case for outcomes in the health sector. For infrastructure, we see that the deliberation component of the sub-county baraza increased public service delivery in this sector: The opportunity to challenge leaders seems to significantly reduce waiting time at the water source. We also find indications that for infrastructure, district level barazas may actually be more effective than sub-county level barazas (although the difference is associated with a p-value of 0.104). This result is driven by a significant reduction in the distance to the nearest water source during the dry season, and to a lesser extent, by a reduction in the proportion of households that reports using an unprotected water source. The fact that we do find effects on infrastructure when restricting our sample to cases where sufficient time has passed between the baraza and endline data collection makes sense, as these works take time. Furthermore, it also seems reasonable that district level barazas are

more effective for infrastructure, as interventions in this sector depend on availability of resources, most of which need to be obtained from the central government. We also find that sub-county barazas result in lower public service delivery in this sector, which is somewhat surprising. However, when looking at the individual variables underlying the index, none is significant.

There are also differences between Figure 7 and Figure 8 for public service delivery in the education sector. The difference in outcomes of households that were exposed to a sub-county level baraza and households that reside in a control area now becomes significant. This seems to be driven by a significant increase in the number of children in public schools, and to a lesser extent by the likelihood that the school has a water facility. The information component, on the other hand, seems to reduce public service delivery somewhat. We find that households that were exposed to the information component are less likely to report that the school was inspected in the last year. Also here, it makes sense that we only find the increase in enrolment rates when restricting our sample to cases where sufficient time has passed between the baraza and endline data collection.

Our treatment indicator is based on information from the implementing partner. However, we also asked officials at sub-county headquarters if they recall if a baraza took place in the last five years. We also use this variable to check for heterogeneous treatment effects. Results are in Figure 9.

Even though restricting to households that live in a sub-county in which officials recall that the baraza took place in treatment areas reduces sample size by only about 25 percent, we find substantial changes in the results. For the agricultural sector, differences with the full sample are minor. If anything, the positive effect of sub-county barazas on public service delivery in agriculture stands out even more. For infrastructure, the deliberation component seems to increase service provision, driven by a significant reduction in distance to water source. We also find that district level barazas are more effective for infrastructure. This seems to be driven by the fact that in areas where a district level baraza took place, distance to all weather road is lower than in areas where a sub-county level baraza was held.

Interestingly, we now also find significant results for the health sector. The deliberation component of a sub-county baraza increases the likelihood that households seek treatment in government health facilities when ill. The information component is associated with increased use of government health facilities for maternal health, and also increases the likelihood that a VHT is present. Both components also reduce waiting time before being attended to. There are no effects on education service delivery.

The generally larger impacts that we find in this sub-sample, particularly for the health sector, are intriguing. Potentially, officials that recall the baraza are intrinsically more motivated and thus more receptive to community-based monitoring. Alternatively, it may be that the information we received from the OPM is inaccurate and some sub-counties that they indicated as being treated were, in fact, not.

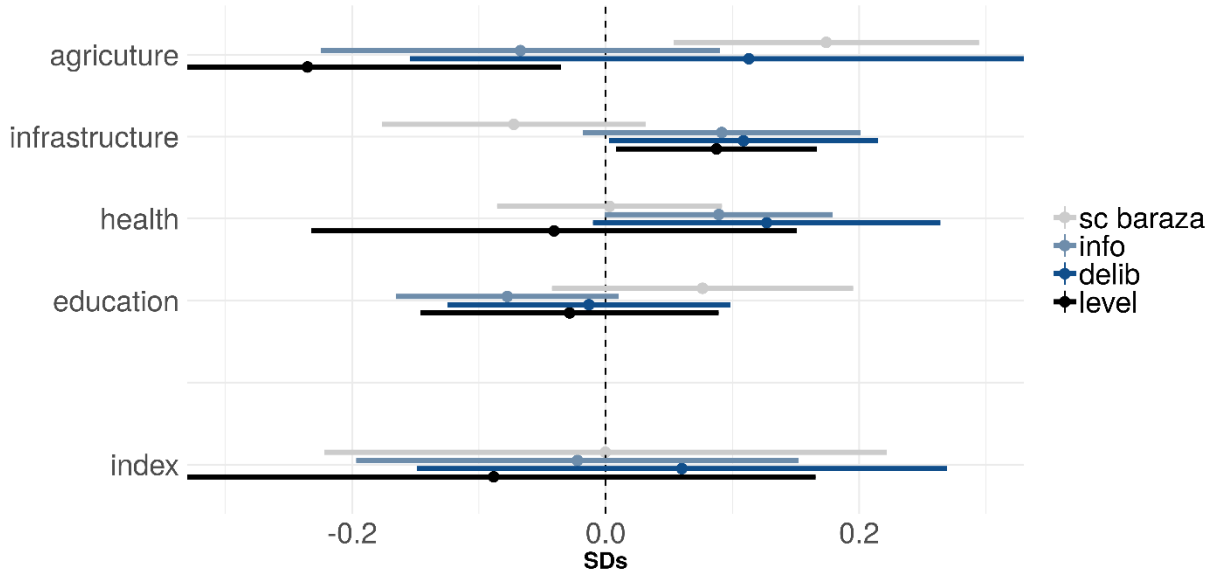

Figure 9 - Heterogeneity at SC level – officials recall baraza

Differences in the timing of the treatment and the fact that an official recalls the baraza introduces heterogeneity at the treatment level. However, heterogeneity may also depend on household characteristics. As outcomes are likely to be correlated within sub-counties, we will have more statistical power to assess heterogeneity related to household characteristics than heterogeneity that originates at the treatment level.

One potential source of treatment heterogeneity at the household level is related to remoteness. Indeed, during discussions with stakeholders, it was often argued that barazas may have different effects on households that live close to the sub-county headquarters versus those that live in remote areas. At baseline, we collected data on the distance between the homestead of the household and the sub-county headquarter. We find that this median distance is 5 km, and rerun the regressions but only for households that live 5 or more km away from the district headquarter. Results are summarized in Figure 10.

We see that, when we restrict analysis to households that live 5 or more km from the sub-county headquarters, differences between the various treatment groups become insignificant for outcomes in the agricultural sector: The impact of sub-county level barazas in terms of higher access to extension does not persist in more remote areas. However, we do find a significant effect from the deliberation component of the sub-county baraza for infrastructure. This effect is driven by a significant reduction in waiting time at the water source. We also find a reduction in the distance to the nearest water source. We further find some indication that the information component increases infrastructure (p=0.117) and also that district level barazas are more effective (p=0.123). In both cases, most of the impact should be attributed to a reduction of the distance to the nearest water source during the dry season.

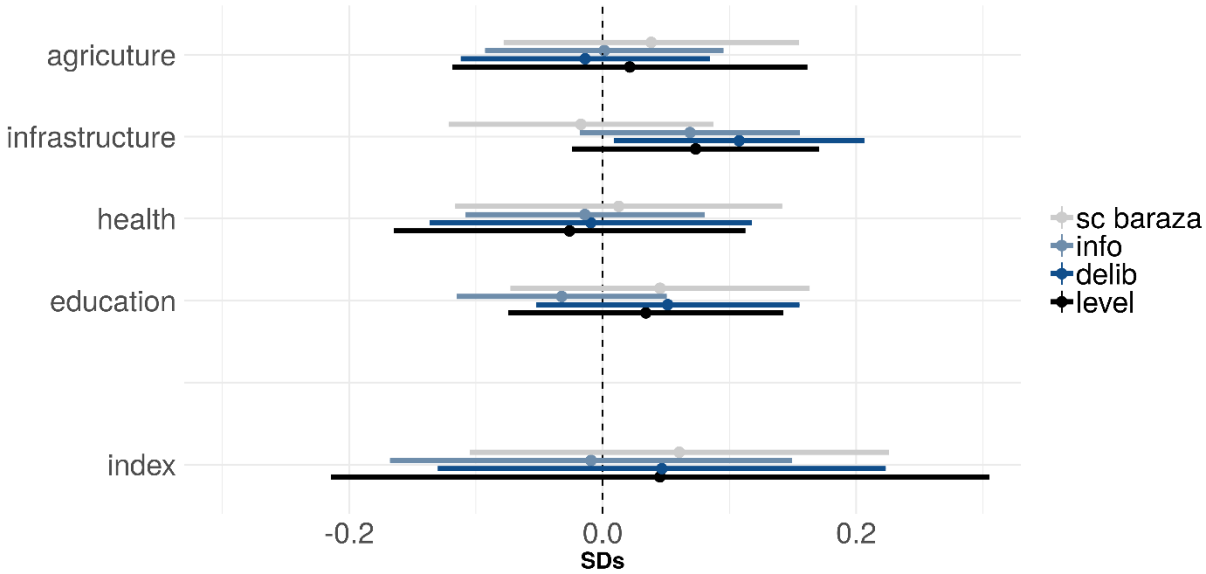

Figure 10 - Heterogeneity at individual level – living >5 km from SC HQ

Out of the total sample of 6,700 households, we find that about 3,160 households respond that they are aware of the concept of baraza (and about 1,750 report that they remember that in the last 5 year such a meeting was held in their sub-county). Being aware of the concept of baraza may indicate that one is better informed or more interested in governance and public service delivery, which may also be an important source of heterogeneity at the individual level. We thus reran the analysis, but only for the subset of households that indicated that they are aware of the concept of barazas. Results are in Figure 11.

We find that the positive impact of sub-county level barazas on agriculture becomes stronger. The effects are driven by more extension officers visiting and an increase in the support of NAADS/Operation Wealth Creation in the village. This suggests especially households that are well informed and interested in public service provision are able to cash in on the baraza. We also see a clear effect of sub-county level barazas on the education sector. While this effect is caused by increased enrolment in public schools, we also see significant positive effects on school infrastructure such as fencing and access to water on the school premises. The information component of the baraza significantly reduces outcomes. Potentially, providing only information (but no voice) to people that are receptive to participatory governance may lead to frustration, causing them to view some of the outcomes in a more negative light. This explanation is consistent with the results of the underlying individual outcomes. While outcomes such as enrolment rates and school infrastructure are not different between households exposed to information and those not, we do find that the former group complains significantly more about not being informed about the School Management Committee.

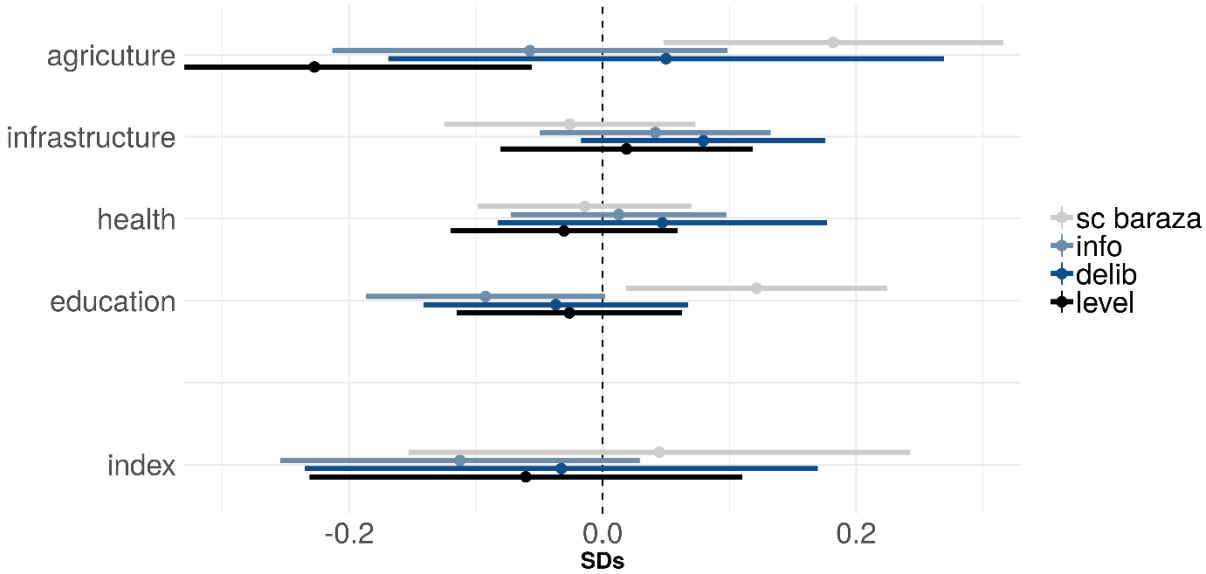

Figure 11 - Heterogeneity at individual level – knows baraza

4.2.4. Threats to validity/Robustness

In this study, the primary treat to validity is the possibility that the partial roll-out introduced selection bias. We already showed in Table 2 that the updated balance table that compares a range of baseline characteristics of actual treated households to control areas displays similar balance than the original balance table comparing planned treatment areas to planned control areas. While this is reassuring, in this section, we present additional balance checks to further explore if the roll out of the intervention was not random.

First, we can investigate if selection bias was introduced by comparing outcomes in control sub-counties to outcomes in sub-counties that were allocated to receive treatment but did not end up receiving treatment.[9] The idea is that if the roll-out was random, sub-counties that were allocated randomly to a particular treatment at the design stage but did not end up receiving treatment can be interchanged with sub-counties that were randomly selected at design stage to function as control sub-counties. Finding no significant differences in outcomes between these two groups would support the hypothesis that the partial roll-out did not introduce selection bias. If the incomplete roll-out introduced selection bias, comparing these two groups may also be informative to assess the direction and magnitude of the bias.

Table 16 presents the original balance table (Table 1), but after dropping sub-counties that were treated. Thus, instead of comparing pre-treatment characteristics between treatment sub-counties and control sub-counties, the table compares sub-counties that were allocated to a particular treatment (but did not end up receiving the treatment) to the (planned) control sub-counties for that particular treatment. The table seems to suggest that the roll-out did not introduce imbalance, at least as judged by the pre-treatment characteristics that were in the

[9] All district level barazas were implemented, so we only focus on sub-counties here and in the following sections.

original balance table. We find that, out of 30 comparisons, we reject the null hypothesis of no difference at the 1 percent significance level once, at the 5 percent level once, and at 10 percent level once. Also here, this would be expected by pure chance alone, and so we conclude that the partial roll-out did not seem to have introduced selection bias.

Table 16 - Balance between planned but not treated sub-counties and planned controls

		sc		
	mean	baraza	information	deliberation
Household size	6.324	0.012	0.388*	0.022
	(2.825)	(0.171)	(0.170)	(0.140)
Age of the household head (years)	46.501	0.357	0.698	0.553
	(14.615)	(0.714)	(0.663)	(0.808)
Head of household is woman (1=yes)	0.191	0.008	-0.019	-0.003
	(0.393)	(0.017)	(0.016)	(0.017)
Head finished primary education (1=yes)	0.213	-0.007	-0.007	-0.003
	(0.410)	(0.019)	(0.027)	(0.022)
Thatched grass roof (1=yes)	0.298	-0.002	0.000	-0.036
	(0.457)	(0.029)	(0.024)	(0.027)
Traditional mud wall (1=yes)	0.424	0.007	-0.057	0.044
	(0.494)	(0.049)	(0.047)	(0.044)
Distance to nearest all weather road (km)	0.906	0.284**	0.010	0.187
	(0.915)	(0.131)	(0.100)	(0.110)
Access to extension (1=yes)	0.108	0.005	0.008	0.007
	(0.310)	(0.015)	(0.016)	(0.015)
Village Health Team in village (1=yes)	0.854	-0.007	-0.01	-0.015
	(0.353)	(0.035)	(0.028)	(0.028)
Number of children in public schools	2.478	0.043	0.249+	0.076
	(2.074)	(0.112)	(0.115)	(0.100)
Number of observations	12,545	4,293	7,842	8,391

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

It should be noted that pre-treatment characteristics were collected some time ago and results may be different if more recent data is used and/or if selection happened on characteristics that change over time. Therefore, it would be interesting to also look at differences between planned but not treated and planned controls for endline outcomes. With this in mind, adapted endline data collection, exchanging some planned controls for planned treatment but not treated areas, as explained in detail in section 4.1. Table 17 compares end-line outcomes between households that were planned to receive a particular treatment but did not end up receiving the treatment to outcomes of households that were assigned to serve as a control for the particular treatment. In the table, we present results for the indices that are also used to summarize impact in Figure 7.

Table 17 - Difference between planned but not treated sub-counties and planned controls at endline

	sc baraza	information	delib
Agriculture index	0.174**	0.152*	0.042
	(0.057)	(0.065)	(0.064)
Infrastructure index	0.026	-0.115	-0.078
	(0.073)	(0.081)	(0.081)
Health index	0.026	-0.066	-0.064
	(0.047)	(0.067)	(0.081)
Education index	0.093	-0.09	0.044
	(0.057)	(0.056)	(0.065)
Public service delivery index	0.161+	-0.131	-0.03
	(0.083)	(0.109)	(0.113)
Number of observations	1,637	2,352	2,798

Note: First column reports difference (and standard errors below) of the sub-county level baraza intervention; Column 2 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 3 reports the effect (and standard errors below) of the deliberation component of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels.

We find some imbalance between households in sub-counties that were assigned to the crossed treatment but did not end up receiving it due to the partial roll out and households in sub-counties that were planned as control. The imbalance is caused by outcomes in the agricultural sector. In particular, we find that households in areas where a sub-county baraza was planned but not held reported a 10 percent higher incidence of visits to extension offices, demonstration fields or model farmers than farmers in areas where no sub-county level baraza was planned. We also find visits by extension workers is higher in the former group than in the latter. This may indicate that OPM prioritized areas with weaker agricultural advisory services.

We also find some imbalance when investigating the relative importance of the information component. Here, the imbalance is cause by the two variables that measure assistance in marketing. Also here, OPM may have prioritized where cooperatives and village marketing committees are less active[10].

Our pre-analysis plan prescribed that if we find evidence of imbalance between planned but untreated sub-counties and planned control sub-counties using end-line information, we would try to recover unbiased impact estimates using a matched difference-in-difference estimator. However, we find baseline outcomes do not predict endline outcomes very well. When autocorrelations are low, there are large improvements in power to be had from using ANCOVA

[10] Note that in all cases, the bias is in the conservative direction, likely to lead to an underestimate of the treatment effect. We would be more worried if we found for example that households that were planned to receive a treatment but did not end up getting it had 10 percent lower incidence of visits by extension workers. This may indicate that OPM selected areas where extension was already stronger than in average areas, and this higher incidence of extension visits would erroneously be attributed to the baraza intervention.

instead of difference-in-differences (McKenzie 2012). Therefore, we deviate from our pre-analysis plan and use matching and estimate ANCOVA models on this pre-processed data.

For the matching, we use Mahalanobis distance with coarsened exact matching, an extremely powerful method of matching (Iacus, King, Porro 2012). We match on (baseline values of) household size, sex of the household head, age of the household head, whether the household head finished secondary education, the logarithm of farm size, housing conditions (iron roof and improved wall), phone ownership, latitude, and longitude. For the coarsened exact matching, custom cut points were defined to construct 3 age categories, six farm size categories and a five-by-five grid based on GPS coordinates. For the comparison between sub-county level barazas and district level barazas, we did not match on GPS coordinates, as this resulted in too many observations that could not be matched. End-line data is then merged to the matched data-set, and standard ANCOVA models such as those used in the main analysis are estimated.

Figure 12 below provides a summary similar to Figure 7. We see that matching does not change the main conclusions. However, there are some differences between the matched and unmatched results when looking at individual outcomes. We provide detailed results similar to those in Table 4 up to Table 7 in Appendix Table 19 to Table 22, and provide a brief discussion of the most striking differences here.

For agriculture, comparing Table 4 to Appendix Table 19, we see that after matching, the positive impact of the sub-county baraza on the likelihood of receiving seed from the government has disappeared. The positive effect of sub-county barazas on on-farm visits of extension workers is very similar. However, after matching, we also find a significant and positive effect of sub-county level barazas on the likelihood that a member of the household visited an extension office, demonstration field, or model farmer. This is consistent with the imbalance that we found above: that households in areas where a sub-county baraza was planned but not held reported a 10 percent higher incidence of visits to extension offices, demonstration fields or model farmers than farmers in areas where no sub-county level baraza was planned. We also find that it is more likely that farmer associations and cooperatives are present when a sub-county baraza was held. After matching, both information and deliberation components seem equally important in spurring the formation of cooperatives and associations. The analysis confirms that district level barazas are less effective than sub-county level baraza on a range of agriculture related outcomes.

For infrastructure, the reduction in waiting time at the water source as a result of sub-county barazas seizes to be significant after matching (Appendix Table 20). The negative impact of the information component on the likelihood that households treat drinking water also disappears. We now do find a positive and significant effect of the baraza intervention on citizen participation in water user committees. The effect seems to be driven by the deliberation component.

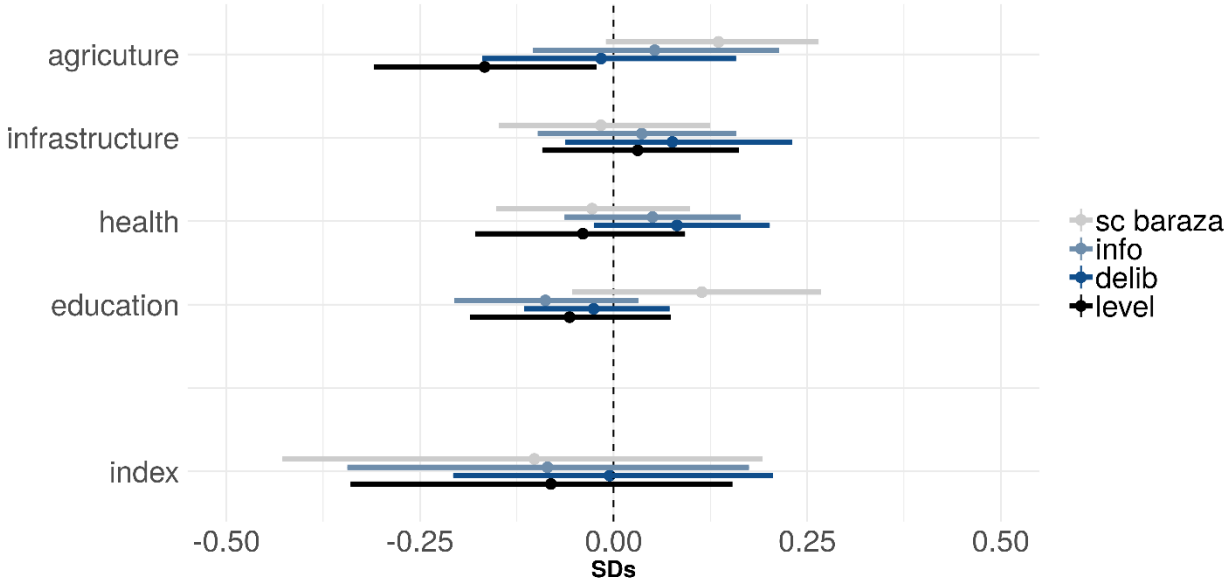

Figure 12 - Summary of baraza impact (matched ANCOVA)

Further comparing Table 6 to Appendix Table 20, we see that the effect of sub-county level barazas on the likelihood that village health teams organized public meetings persists. We also see that the somewhat puzzling negative effect of the information component on the likelihood that there is a functioning health management unit at the government health facility disappears after matching. This negative effect is replaced by a positive impact associated to a sub-county level baraza. Finally, we compare Table 7 to Appendix Table 22 to assess the potential impact of non-random roll-out on the results for public service delivery in the education sector. Results are very similar. The negative effect of the information component on the likelihood that inspectors visit the school disappears after matching. March 3rd.

5. Cost analysis

5.1. Cost information

Cost information was provided by the OPM and is reported in Table 18. OPM implemented 74 of 155 planned baraza forums. As such, the estimation provided here covers only the cost of the 74 barazas that were reported to have been implemented.

In total, implementing 74 barazas cost the Ugandan government about 968,762,500 Uganda shillings (UGX)[11]. A large share (39%) of this cost originated from sub-county information barazas. Due to the incomplete rollout and the distribution of the target sites from the center, and the resulting large differences in the number of barazas implemented for each type, the different types of barazas vary widely in total costs. However, the average cost of implementing different kinds of sub-county barazas does not differ a lot.

Table 18 - Baraza costs in absolute terms

[11] One US dollar corresponds to 3800 UGX.

	number of barazas	average cost (UGX)	total cost (UGX)	min cost (UGX)	max cost (UGX)
district baraza	7	15,325,000	107,275,000	13,900,000	18,500,000
sub-county baraza	20	12,837,500	256,750,000	11,200,000	14,000,000
information baraza	29	12,962,500	375,912,500	11,300,000	13,800000
deliberation baraza	18	12,712,500	228,825,000	11,100,000	14,200,000
total	74		968,762,500		

5.2. Cost effectiveness analysis

A key objective of this study is to compare the effectiveness of barazas organized at lower administrative levels (the sub-county) to the effectiveness of barazas organized at a more aggregate level (the district). The level of administrative placement is an important determinant of the cost-effectiveness of the policy intervention: implementing a district level baraza affects far more people than implementing a sub-county level baraza, yet a district baraza costs only a little more than a sub-county baraza (Table 18). As such, organizing a district level baraza could be more cost effective, even though the sub-county level baraza seems to have a larger impact at first sight.

For instance, in the area of infrastructure, we find that households have to wait on average about 37 minutes. A baraza intervention at the sub-county level reduces this time by about 29 percent, which corresponds to a reduction of about 11 minutes per household. Assuming a member of the household visits the water source once a day, the intervention saves 3,862 minutes (64 hours) per year per household. On average, 5,100 households live in one sub-county (Uganda Bureau of Statistics 2017, pp. 37-38), such that this sub-county intervention saves 19,698,393 minutes (328,306 hours) per year per sub-county. For a district level baraza, the impact is -11 percent, corresponding to 4 minutes every time a member of the household goes to the water source, totalling 1,431 minutes (24 hours) saved per household per year. However, an average 60,840 households live in one district (Uganda Bureau of Statistics 2017, pp. 37-38), such that this district intervention saves 87,094,285 minutes (1,451,571 hours) per year. The district intervention thus saved 1,123,265 hours more than the sub-county intervention. To attach a monetary value to this time difference, we consider the average hourly wage rate of 750 UGX. This results in a difference in impact of 842,448,750 UGX, while the district level baraza was only 2.487.500 UGX more expensive.

We now consider an example from the agricultural sector, namely access to extension visits at home. About 18 percent of households report that they were visited by an expert. A sub-county baraza increases this by about 6 percentage points, such that about 24 percent have access to extension at home, which corresponds to 1,224 households. However, the intervention at the district level decreases the access to extension at home by 2 percentage points. This means that the sub-county level intervention is more effective, as long as its benefits outweigh its costs. The 6 percentage points increase corresponds to 306 more households having access. From our baseline data we know that the average household farms 5.8 acres of land, which means that 1,775 acres are affected by the intervention. We use maize in our calculation because maize is an important crop in Uganda, both for home consumption and as a traded commodity because of its relatively high value-to-weight ratio. Average maize yields are at about 618 kg per acre for the main growing season, according to the Uganda National Household Survey 2005/06. Assuming that access to extension raises yields by 10 percent (Van Campenhout, Spielman, Lecoutere 2020), this results in 109,683 kg more maize produced due to the sub-

county intervention. Assuming a bag of 100-kg of maize is sold at a median price of UGX 60,000, the monetary benefit of a single sub-county baraza, only considering access to extension, amounts to 65,809,584 UGX, while its average cost is 12,837,500 UGX.

For education, we consider the number of children in public schools to be an important outcome. As we can only find an effect on public service delivery in the education sector after deleting observations from households in sub-counties or districts where a baraza was held recently, we use this part of the analysis to compare the cost-effectiveness between sub-county and district barazas. We find that households have on average 1.79 children in school. A baraza intervention at the sub-county level increases this number by about 0.37 children per household. On average, 5,100 households live in one sub-county, such that this sub-county intervention leads to an additional 1,887 children in school. For a district level baraza, the impact is 0.07 additional children per household. However, as on average 60,840 households live in one district, this district intervention leads to an additional 4,259 children in public schools. The district intervention resulted in 2,372 children more than the sub-county intervention.

Finally, we look at the health sector, in particular at the waiting time before being attended. The previous three examples it depends on the outcome whether a subcounty baraza is superior to a district baraza or not. We now also compare the cost effectiveness of the information and deliberation components. Both reduce waiting time. Households must wait for 90 minutes, on average. The information treatment reduces this time by about 19 percent, which corresponds to a reduction of about 17 minutes per household, every time a member of the household visits a public health facility. Looking at our baseline data, we see that a member of the household visits this kind of facility 6 times a year, such that the information intervention saves 102 minutes per year per household. On average, 5,100 households live in one sub-county such that this information intervention saves 523,260 minutes (8,721 hours) per year per sub-county. For a deliberation baraza, the impact is -29 percent, corresponding to 26 minutes every time a member of the household goes to a public health facility, so 157 minutes saved per household per year. As 5,100 households live in one sub-county, this deliberation intervention saves 798,660 minutes (13,311 hours) per year. The deliberation intervention thus saved 4,590 hours more than the information intervention. To attach a monetary value to this time difference, we consider the average hourly wage rate again. This results in a difference of 3,442,500 UGX, while both types of baraza are similar in costs (12,962,500 UCX vs. 12,712,500 UGX).

6. Discussion

6.1. Introduction

While we do not find that the baraza impacts public service delivery in general, we do find a variety of interesting effects when we look at individual outcomes and consider heterogeneity in the treatment effects. In light of this, our results confirm some of the likely explanations why Raffler, Posner, and Parkerson (2018) fail to find significant results on health outcomes in their study. For instance, we find indications that it may take some time for effects to materialize. The endline data in Raffler, Posner, and Parkerson (2018) was collected after 20 months, hence their results may only apply in the short run. In addition, the fact that our results are somewhat more encouraging than those found in Raffler, Posner, and Parkerson (2018) may also be related to the fact that our intervention is organized by the government. Raffler, Posner, and Parkerson (2018) find indications that presence of sub-county officials during the programming

boosted the impact of the intervention on treatment quality in health centers. In line with this, community-based monitoring interventions organized by government may be more effective. This confirms that top-down monitoring may be more important in changing behaviour of civil servants than bottom-up monitoring by citizens.

This report focusses most on the analysis of the endline data of the quantitative component of the impact evaluation. A previous report also provides a less ambitious qualitative exploration of the likely impact of the baraza (Van Campenhout et al. 2018). In that report, we find that stakeholders think barazas are useful at improving public service delivery across all sectors, especially if the barazas took place at the sub-county level. Stakeholders had no difficulty providing examples of changes they felt were the direct result of the baraza being held: projects that were previously dragging were finished or taken up afresh; sub-standard work was redone; and in some instances, priorities were changed to better align with citizens' needs. A substantial part of these outcomes seemed to derive from the baraza's potential to fix information asymmetries. Focus group discussions suggested civil servants responded to the consequences of the increased likelihood of sub-standard work being exposed, and politicians responded to electoral considerations, suggesting barazas increased bottom-up pressure. There were also indications that barazas increased community involvement, as well as top-down monitoring.

The diverging results from the qualitative and quantitative analysis may be due to the fact that the baraza intervention is a broad intervention that attempts to address a range of issues in a heterogenous setting. It may be that the baraza is effective for some, but not for others. However, if a simple average treatment effect is estimated, the effect may turn out insignificant because it averages over subgroups. For instance, access to water is likely to be more of a problem in remote areas. Even if a baraza increases access to water and reduces waiting times, this may not show up if there is a large group close to the sub-county center that already has access to water and no additional boreholes were constructed in these areas.

This is illustrated when we link the endline data back to what we learned in the qualitative fieldwork (Van Campenhout et al. 2018). In Bagezza subcounty in Mubende District, drinking water was mentioned as a serious problem, and it was discussed extensively during the baraza. When we went back to the sub-county to test the endline tool, it appeared that the government made whole on their promises and the sub-county now had access to drinking water. To check this, we used baseline and enline data and simply compared means between Bagezza and a random control sub-county in the neighbourhood (Bwanswa in Kibaale district). Results are presented in the Figure below (Figure 13).

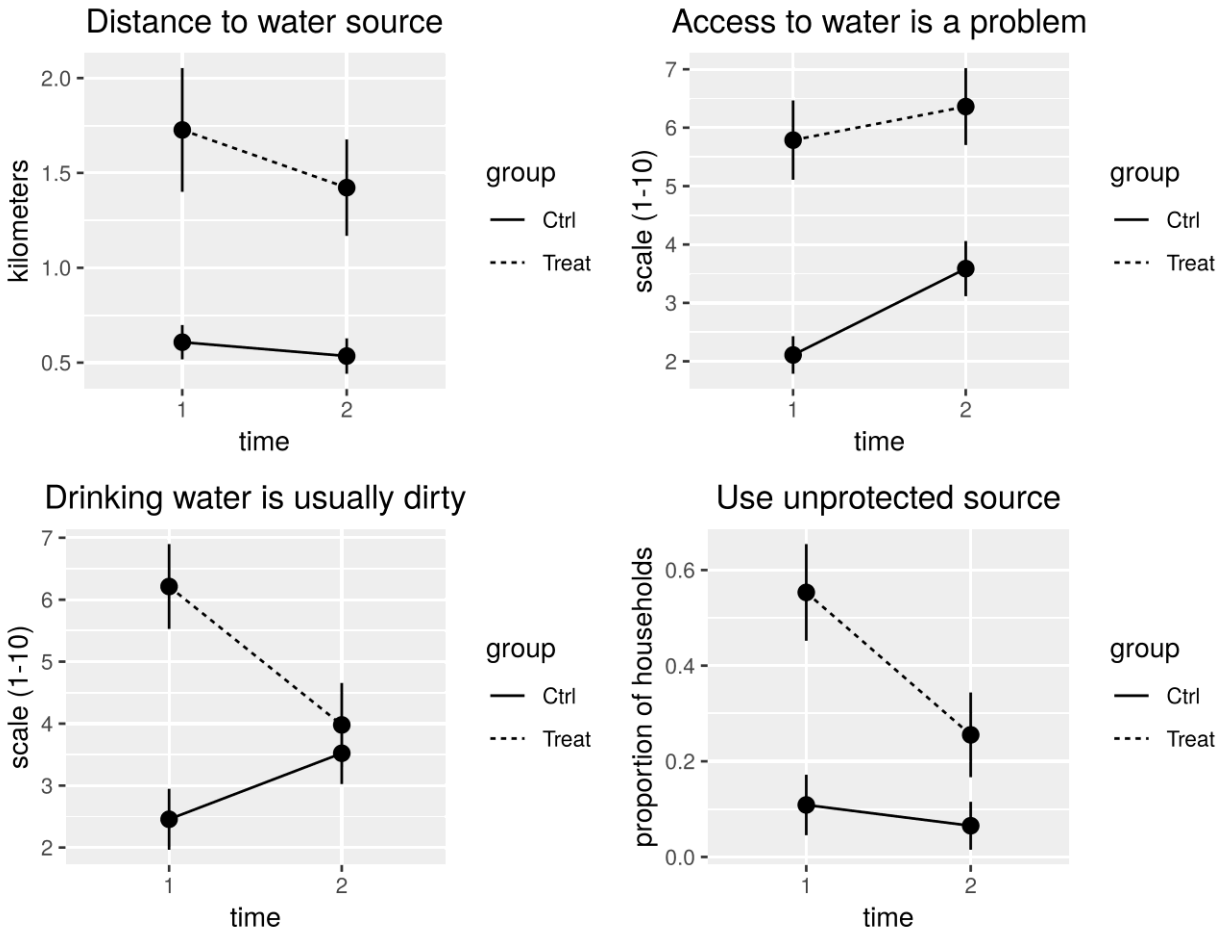

Figure 13 - Access to water in two sub-counties

The figure shows that on all four of the water related outcomes, Bagezza scored significantly worse when compared to the control sub-county. For instance, in Bagezza, average distance to the nearest water source was 1.75 km, while this only about 650 meter in the Bwanswa. The average score on the likert scale used to measure perceptions on the cleanness of drinking water is more than 6 in Bagezza, while this is only 2 in the Bwanswa. In Bagezza, more than half of all households rely on unprotected drinking water sources. In Bwanswa, this is only about 10 percent.

More importantly, we see that the difference between Bagezza and Bwanswa has reduced after the baraza happened in Bagazza. While still significantly higher than in Bwanswa, distance to the water source had reduced to about 1.35 km. Perceptions on access to water became more negative as a result of a general drought in East Africa, but less in Bagezza than in Bwanswa. The most impressive progress was made in terms of the quality of water. At the time of the endline, there is no difference between Bagezza and Bwanswa anymore. Use of protected water source increased over time in both sub-counties, but most dramatically in Bagezza.

Results from the section on heterogenous impacts are consistent with this explanation. For instance, we find that distance to water source is affected by the baraza intervention, but only if we restrict the sample to households that live 5 or more km from the sub-county district headquarters. Households living close to the headquarters may already have good access to

water, and so a baraza may not affect their situation. Not taking this into account may lead to the conclusion that barazas do not influence access to water.

6.2. Policy and programme relevance: evidence uptake and use

At the time of writing of this report, we already presented preliminary findings at the National Monitoring and Evaluation Technical Working Group Workshop on march 13th at OPM, Kampala, Uganda. The response was very encouraging and OPM was very happy with the work so far. The meeting was attended by 80 persons, with representative from OPM, Kampala City Authority, Economic Policy Research Center of Makerere University, National Planning Authority, SDG Secretariat, Ministry of Finance, Planning and Economic Development, Ministry of Gender, Labour and Social Development, and about 10 other government authorities/departments. It is clearly too early to know how the evidence generated will be used, but we do feel that the study is held in high esteem by OPM.

6.3. Challenges and lessons

The mixed results are puzzling, especially given the fact that qualitative research prior to endline data collection suggested real effects from the intervention (Van Campenhout et al. 2018). We suspect that the lack of impact in the quantitative part of the study may be due to the nature of the intervention. Different sub-counties face different challenges, which is reflected in what transpires at the baraza event. For instance, in districts where there are issues related to water, the baraza will mainly revolve around poor service delivery in the infrastructure sector and how this can be improved. In these sub-counties, barazas may impact service delivery in infrastructure, but leave outcomes in other sectors unaffected. In other sub-counties, problems may concentrate in the agricultural sector, and impact on infrastructure may be minimal. In other words, the true treatment received by subjects may become hard to discern and may in fact be far from the standardized treatments given in randomized controlled trials (RCTs) in biophysical scientists. As a result, a focus on the average treatment effect may fail to identify a significant effect, as the impact is averaged over many sub-counties that in reality received a “different” type of baraza. Heterogeneity in the treatment will also introduce selection bias, as barazas will tend to focus most on areas that are most problematic (Barrett and Carter 2010). Issues related to non-standardized treatments are confirmed when looking at heterogeneous treatment effects and a case study of access to water in Bagezza sub-county.

2. Conclusions and recommendations

To improve governance and public service delivery, the Government of Uganda organizes community forums – popularly known as barazas – where citizens receive information from government officials and get the opportunity to directly engage with them. In 2015, we designed a study aimed at evaluating the effectiveness of community advocacy forums, also known as barazas, in Uganda. The evaluations set out to answer four research questions: (1) what is the impact of the baraza as implemented by the OPM; (2) what is the relative effectiveness of the information component of a baraza; (3) what is the relative effectiveness of the deliberation component of a baraza; and (4) how does a baraza organized at the district level compare to one organized at the sub-county level. Baseline data on more than 12,500 households spread over almost 250 sub-counties in about 40 districts throughout Uganda was collected and OPM started implementing barazas following our protocol.

OPM faced various complications that affected the timely roll-out of the barazas, including budgetary constraints and disruptions related to the general elections of 2016. This resulted in the decision to collect end-line data after partial roll-out. Various strategies were followed to diagnose, and reduce the consequences of, potential selection bias introduced by this partial roll out.

To answer the four questions mentioned above, we analysed a set of carefully selected variables, declared in a pre-registered analysis plan, and combined in indices. In this confirmatory analysis, we focus on five indices corresponding to the four main sectors – agriculture, infrastructure, health and education – and one overall index. We do not find a significant impact of the baraza programme on overall public service delivery. There are some indications that sub-county level barazas affected the agricultural sector, but the difference is only significant at the 10 percent level. Public service delivery in the agricultural sector is significantly worse in areas that were exposed to a district level baraza when compared to areas that were exposed to sub-county level barazas.

In the second part of our analysis, which is more exploratory in nature, we analyse individual responses of households and government officials. We find that in the agricultural sphere, sub-county level barazas significantly increase access to extension. We also see an increase in the likelihood that farmers received seed from government. This is consistent with the positive effect sub-county barazas seem to have on the likelihood that cooperatives or farmer groups are formed in the village, and an increase in such institutions that is assisted by NAADS/OWC. We also find some improvements in public school infrastructure after a sub-county baraza, and a small reduction in waiting time at the water source.

Analysing whether citizens interact more with politicians and service providers, we find mixed results. Furthermore, we find no impact of barazas on participation in elections. When comparing the share of households with a member holding a political or traditional position in areas with a sub-county level baraza to areas with a district level baraza, we see that the proportion is significantly higher in the former. We find that the information component of the sub-county baraza reduces in-kind contributions, but increases cash contributions. We further find that cash contributions are significantly higher in areas that were exposed to a district level baraza than in areas that were subjected to a sub-county level baraza. Furthermore, the baraza intervention changed citizens' perception of a range of problems.

In light of qualitative research prior to endline data collection that suggested real effects from the intervention (Van Campenhout et al. 2018), we run a series of robustness checks. One explanation for the limited impact may be that sub-counties or districts that were treated only recently have not been exposed to the program long enough. After deleting these recently treated observations and rerunning the analysis, we see that the deliberation component now also increased public service delivery in infrastructure. This stands to reason as infrastructure works take time. Furthermore, district level barazas seem to be more effective than sub-county level barazas which is also reasonable as interventions in infrastructure depend on the availability of resources, most of which need to be obtained from the central government. Also with respect to public service delivery in the education sector, the difference between households that were exposed to a sub-county level baraza and households that reside in a control area now becomes significant.

Some officials residing in treatment districts did not recall a baraza taking place. This could be a second explanation for the lack of significant results. Officials that do recall the baraza could be intrinsically more motivated and thus more receptive to community-based monitoring.

Alternatively, it may be that the information we received from the OPM is inaccurate and that some sub-counties that were indicated as being treated were not. That is why we restricted our analysis to sub-counties with officials who recall that a baraza took place in treatment areas. We now also find significant results for the health sector, with effects on the likelihood that treatment is sought in government health centers and reductions in waiting time before being attended to.

Another source of heterogeneity may be remoteness. That is why we rerun the regressions only for households that live further away from the sub-county or district headquarter. As a result, differences between the various treatment groups become insignificant for outcomes in the agricultural sector. However, the differences between various treatment groups now become significant for the infrastructure index.

Finally, we provide an extensive investigation into the possibility that the results (or lack thereof) are driven by selection bias introduced through the partial roll out. While we find some evidence that OPM may have been targeting areas that were disadvantaged in the area of extension, we do not find that this drives the results.

As the baraza programme is designed to impact a broad range of public services, cost-effectiveness of the different interventions and associated rates of return vary depending on what area is prioritized. For instance, if the focus is on infrastructure or education, we find that a district level baraza is most cost effective. However, if the focus in on agriculture, sub-county level barazas may be more cost-effective. The same holds for comparisons between the cost-effectiveness of the deliberation and information component. For example, in the health sector, we find the deliberation component to be slightly more effective in reducing waiting time. In general, though, we find that since baraza interventions impact large numbers of households and cost relatively little, the rate of return is generally substantial, even if treatment effects are small in size.

Appendixes

Table 19 - Impact of baraza on agricultural outcomes (matched ANOVA)

	mean	Sc baraza	info	delib	level
Household used inorganic fertilizers?†	0.314	0.004	0.061	-0.03	-0.021
	(0.464)	(0.038)	(0.053)	(0.066)	(0.044)
Household used improved seed? †	0.441	0.006	-0.019	-0.097+	-0.106+
	(0.497)	(0.043)	(0.058)	(0.048)	(0.052)
Received improved seeds from govt?	0.146	-0.001	0.011	0.024	-0.063+
	(0.353)	(0.032)	(0.041)	(0.056)	(0.032)
Household used agro-chemicals?	0.577	0.048	0.011	-0.007	-0.042
	(0.494)	(0.057)	(0.058)	(0.06)	(0.06)
Household used improved livestock inputs?	0.27	0.07	0.053	-0.006	-0.046
	(0.444)	(0.044)	(0.046)	(0.043)	(0.042)
Did an agricultural expert visit your home? †	0.212	0.054+	0.023	0.038	-0.107**
	(0.409)	(0.031)	(0.05)	(0.064)	(0.029)
Visited extension office/demo site/model farm? †	0.306	0.077+	0.087	0.036	-0.088*
	(0.461)	(0.043)	(0.053)	(0.062)	(0.038)
Are officials aware of extension demand?	0.832	0.024	0.03	-0.021	-0.006
	(0.374)	(0.03)	(0.032)	(0.034)	(0.033)
Not consulted for extension content?	0.295	0.007	0.032	-0.005	-0.083+
	(0.456)	(0.032)	(0.042)	(0.048)	(0.04)
Are farmer associations/groups in this village?	0.394	0.012	-0.04	-0.033	-0.108+
	(0.489)	(0.052)	(0.036)	(0.042)	(0.056)
Farmer groups supported by govt? †	0.381	0.090*	0.07	0.073	-0.085
	(0.486)	(0.04)	(0.059)	(0.053)	(0.048)
Received help in marketing from govt? †	0.194	0.082+	0.037	0.013	-0.099*
	(0.396)	(0.04)	(0.049)	(0.051)	(0.04)
Received help in marketing from coop? †	0.073	0.029	-0.006	0.003	0.011
	(0.26)	(0.028)	(0.023)	(0.023)	(0.029)
Number of observations	6,703	666	1,568	1,584	1,517

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

Table 20 - Impact of baraza on infrasctructure (matched ANOVA)

	mean	Sc baraza	info	delib	level
Household uses unprotected water source†	0.195	-0.006	0.035	0.036	-0.056
	(0.396)	(0.051)	(0.055)	(0.047)	(0.057)
Distance to water source (km) †	0.778	-0.056	-0.036	-0.061	0.031
	(0.572)	(0.06)	(0.058)	(0.076)	(0.069)
Waiting time at source (min) †	3.188	0.002	-0.003	-0.303	0.126
	(1.638)	(0.207)	(0.18)	(0.227)	(0.145)
Is there a Water User Committee in the village?†	0.579	0.043	0.056	0.007	-0.005
	(0.494)	(0.06)	(0.046)	(0.057)	(0.061)
Is member of Water User Committee?	0.168	0.080**	0.018	0.063*	-0.047
	(0.374)	(0.026)	(0.029)	(0.025)	(0.035)
Water User Committee holds public meetings?	0.431	0.028	0.051	0.044	0.012
	(0.495)	(0.057)	(0.047)	(0.056)	(0.051)
Satisfied with quality of drinking water?	0.594	0.02	0.043	-0.095	-0.006
	(0.491)	(0.066)	(0.058)	(0.058)	(0.05)
Treat water before drinking? (boil or treat)	0.593	-0.005	-0.08	-0.024	-0.028
	(0.491)	(0.054)	(0.059)	(0.055)	(0.071)
Distance to nearest all weather road (km) †	3.102	0.211	-0.167	-0.268	-0.262
Number of observations	6,703	578	1,461	1,440	1,400

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

Table 21 - Impact of baraza on the health sector (matched ANOVA)

		Sc			
	mean	baraza	info	delib	level
Seek treatment for fever in public health facility †	0.696	-0.018	0.015	0.007	0.061
	(0.460)	(0.046)	(0.044)	(0.051)	(0.076)
Go to public health facility to give birth†	0.828	-0.007	-0.013	-0.016	-0.046
	(0.377)	(0.048)	(0.039)	(0.043)	(0.069)
Is there a VHT in village? †	0.891	0.007	0.034	0.033	-0.026
	(0.312)	(0.033)	(0.024)	(0.034)	(0.027)
Member of VHT?	0.127	0.007	0.001	0.002	-0.052+
	(0.333)	(0.026)	(0.024)	(0.019)	(0.024)
VHT organizes any public meetings?	0.415	0.090+	0.031	0.025	-0.103+
	(0.493)	(0.051)	(0.047)	(0.053)	(0.052)
Distance to nearest govt health facility (km) †	4.033	0.149	-0.144	-0.172	-0.341
	(1.283)	(0.202)	(0.263)	(0.241)	(0.318)
Any members sick?	0.646	0.025	0.004	0.061	0.018
	(0.478)	(0.036)	(0.042)	(0.048)	(0.036)
Number of days ill?	2.486	0.044	-0.148	-0.04	0.033
	(2.157)	(0.190)	(0.214)	(0.260)	(0.125)
Number of days school/work missed due to illness†	2.176	0.08	-0.086	0.023	0.031
	(1.987)	(0.166)	(0.180)	(0.239)	(0.098)
Waiting time before being attended (min) †	4.763	-0.128	-0.24	-0.278+	0.014
	(0.987)	(0.107)	(0.152)	(0.144)	(0.112)
Has visited traditional health practitioner? †	0.283	-0.051	0.013	0.044	-0.001
	(0.450)	(0.049)	(0.039)	(0.036)	(0.037)
Patient was examined by in-charge/doctor	0.432	0.093	0.087	-0.088	-0.056
	(0.496)	(0.061)	(0.052)	(0.066)	(0.054)
Time of examination	3.415	0.054	-0.022	0.001	-0.12
	(0.758)	(0.095)	(0.122)	(0.099)	(0.092)
Paid anything	0.2	0.033	0.004	0.025	-0.018
	(0.401)	(0.039)	(0.036)	(0.061)	(0.032)
Received meds in hospital	0.677	0.021	-0.038	0.053	0.024
	(0.468)	(0.041)	(0.037)	(0.040)	(0.064)
Had to buy meds outside of hospital	0.955	0.002	-0.007	0.015	-0.042*
	(0.207)	(0.026)	(0.046)	(0.035)	(0.017)
Satisfied with services at hospital	0.642	0.047	-0.078	-0.069	-0.055
	(0.480)	(0.039)	(0.048)	(0.053)	(0.036)
Number of observations	6,703	326	786	789	771

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

Table 22 - Impact of baraza on education (matched ANOVA)

	mean	Sc baraza	info	delib	level
Number of children in UPS or USE†	1.696	0.253	-0.078	0.045	0.041
	(1.842)	(0.159)	(0.143)	(0.136)	(0.143)
Distance to public school (km) †	1.424	-0.018	-0.031	-0.055	0.066
	(0.707)	(0.114)	(0.118)	(0.09)	(0.081)
Has complete boundary fence? †	0.416	0.106	-0.085	-0.096	-0.054
	(0.493)	(0.07)	(0.075)	(0.062)	(0.087)
Has electricity?	0.352	0.195**	0.004	-0.045	-0.091
	(0.478)	(0.058)	(0.052)	(0.061)	(0.054)
Has water facility? †	0.677	0.094	-0.029	0.032	-0.103*
	(0.468)	(0.067)	(0.079)	(0.082)	(0.039)
Parent Teacher Association (PTA)?	0.959	0.005	-0.033	-0.054	0.003
	(0.198)	(0.01)	(0.023)	(0.049)	(0.016)
Has School Management Committee? †	0.934	0.050+	-0.011	-0.054	0.027
	(0.248)	(0.029)	(0.027)	(0.052)	(0.037)
Informed about SMC?†	0.877	-0.028	-0.029	-0.067	-0.028
	(0.328)	(0.047)	(0.04)	(0.059)	(0.022)
Inspectors visited schools?†	0.730	0.078	-0.024	-0.054	0.058
	(0.444)	(0.065)	(0.055)	(0.076)	(0.067)
Number of observations	6,703	285	582	625	612

Note: First column reports sample means (and standard deviations below); Column 2 reports effect (and standard errors below) of the sub-county level baraza intervention; Column 3 reports the effect (and standard errors below) of the information component of the baraza intervention; Column 4 reports the effect (and standard errors below) of the deliberation component of the baraza intervention; Column 5 reports the effect (and standard errors below) of the administrative placement of the baraza intervention. **, * and + denotes significance at the 1, 5 and 10 percent levels. † indicates that outcome was included in index.

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