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Impacts of key provisions in Ghana's Petroleum Revenue Management Act

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About this report

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Impact Evaluation Report 94

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Summary

In 2007, Ghana discovered oil and gas in commercial quantities and subsequently enacted the Petroleum Revenue Management Act (PRMA) 2011 (Act 815) to govern the management of the revenues to accrue from the new-found resource in a transparent and accountable manner. Two provisions of the PRMA were the Public Interest and Accountability Committee (PIAC) and the Annual Budget Funding Amount (ABFA). The establishment of these two transparency and accountability mechanisms in the PRMA was founded on the concept of social accountability, which is an umbrella term that encapsulates a range of transparency and accountability initiatives, including: citizen monitoring and oversight of public and/or private sector performance; user-centred public information access/dissemination systems; public complaint and grievance redress mechanisms; and participation in actual resource allocation decision-making, such as participatory budgeting.

Central to PIAC's mandate is its work to provide timely and reliable information on oil and gas revenues to the public, which is critical for enabling citizens to exercise their voice, to effectively monitor and hold government to account, and to enter into informed dialogue about decisions that affect their lives. To what extent has PIAC been able to discharge this mandate since its establishment and what outcome(s) have there been? We evaluated the effectiveness of PIAC's information dissemination and engagement efforts in a randomised field experiment covering 120 districts throughout Ghana. PIAC ran three interventions in a 2x2 factorial design, with one control group:

1. District-level meetings, attended by local District Assembly members (DAMs) and representatives of the district's Unit Committees and other local stakeholders (Treatment 1 – T1);
2. A district-level information and communications technology (ICT) platform for citizen information and engagement (Treatment 2 – T2); and
3. District-level meetings and a district-level ICT citizen information and engagement platform (joint treatment – T1+T2).

In the first intervention (T1), PIAC organised meetings in collaboration with the District Assembly and/or a local organiser selected by PIAC in 30 districts. One meeting (PIAC information dissemination forum) was held per district in the district capitals in community public meeting places during the study timeframe. During the meeting, PIAC provided information on: its own activities and mandate; oil and gas revenue management, including the PRMA in general, with a particular focus on ABFA funding and ABFA-funded projects in the district; citizens' rights with respect to natural resource governance; and so forth. A total of 30 stakeholders drawn mainly from the District Assemblies, Unit Committees, traditional authorities, other civil society organisations and the media were invited to attend each of the meetings.

The second intervention (T2) entailed the use of an ICT platform to disseminate information on the quantum and use of oil revenue management to local political leaders, traditional authorities and ordinary citizens in a total of 30 districts and provide them with the opportunity to share their views on how oil revenue is managed in Ghana. PIAC engaged VOTO Mobile, a Ghana-based technology start-up and social enterprise, to develop and run an interactive voice response and SMS citizen information and engagement platform. Using the VOTO platform and technology, PIAC sent out

interactive voice response and SMS messages to respondents on subjects ranging from the petroleum law, the ABFA and ABFA-funded projects, to how oil and gas revenues are distributed at the local level. A total of eight messages were sent to respondents/participants using interactive voice response and SMS technologies in the T2 and T1+T2 treatment arms, over a five-week period between 25 January and 1 March 2017.

The citizen information and engagement platform offered the option of listening to the messages in four different languages – English, Twi, Hausa and Ewe. Two pre-recorded messages on oil and gas revenues and expenditures, as well as citizens' right to demand sound use of petroleum revenues, were sent out every week to respondents in 30 districts. Each of the messages was followed by an SMS summarising the key points in the pre-recorded voice message. The information relayed mimicked that given during T1 by PIAC.

The third intervention combined the two treatments (T1+T2). This group of districts (30 in total) were visited by PIAC for a meeting as in T1, and had the possibility of receiving more information and the opportunity to interact with PIAC directly for a longer timeframe by receiving information from the ICT platform as in T2. The ICT platform and PIAC meetings were designed as partial substitutes for information dissemination to the population and the possibility of receiving comments and suggestions and responding to queries concerning petroleum revenue management. In the joint treatment, we expected them to reinforce each other and to increase the effects observed at Levels 2 and 3, in particular. The entire experiment was implemented over a 14-month period beginning in June 2016 and ending in August 2017.

We measured information retention, attitude and behavioural changes among the treated population and compared these with the control group using baseline and endline survey data. We measured these effects at three levels: among DAMs as representatives of the district authority (Level 1); among Unit Committee members (UCMs) as the most immediate intermediaries between citizens and the authorities above (Level 2); and among the general population (Level 3). Level 1 is where we expected the strongest impact, particularly in the behaviour of DAMs. We were interested in Levels 2 and 3 to gauge the diffusion effects of PIAC's information dissemination strategy among ordinary citizens and their lowest-level political representatives, the UCMs.

Causal effects have been identified through random assignment. Randomisation took place mainly at district level. The 120 districts selected to participate in the study were randomly assigned in groups of 30 to each of the four study arms. A total of 3,600 DAMs, UCMs, traditional authorities and ordinary citizens participated in the study.

Our findings indicate the PIAC leaders' information dissemination forum (T1) had a positive effect on the knowledge and awareness levels of both DAMs and UCMs, although the effect on UCMs was found to be more conclusive than that on DAMs. However, we do not observe any effect of T1 on ordinary citizens who did not participate directly in the meetings, a phenomenon we surmise could be the result of the lengthy or perhaps imperfect trickle-down of information from the DAMs/UCMs to the general public.

On the other hand, we find that the citizen information and engagement platform (T2) had a positive effect on all the levels, which we find quite encouraging because the T2 intervention explicitly targeted all the sub-groups in the experiment. Just as in the case of T1, we find the effects on the UCMs to be more conclusive than those on Level 1 (DAMs) and Level 3 (ordinary citizens). There is, however, no evidence of positive reinforcement of knowledge and awareness creation by the joint treatment (T1+T2), even though it had some positive (albeit insignificant) effect on knowledge and awareness of DAMs.

Similarly, we observe positive effects of the citizen information and engagement platform (T2) on the willingness of all sub-categories to demand accountability. The effect on DAMs and ordinary citizens is significant, while the effect on UCMs is weakly significant and thus inconclusive. Also, the PIAC leaders' information dissemination forum (T1) seems to have had some positive effect on the willingness to demand transparency on the part of DAMs, even though the effect is rather small and therefore inconclusive. There is, however, no indication of positive reinforcement of the effects of the joint treatment (T1+T2) for willingness to demand transparency at all three levels.

We do not, however, observe any effect of the treatments on the feeling of entitlement towards natural resource revenues (attitudes outcome) on the part of either the DAMs, UCMs or ordinary citizens; nor do we observe any effect of the treatments on efforts by the District Assemblies and Unit Committees to create more transparency around natural resource revenues (promoting transparency outcome).

In light of the findings, we recommend, among other things, that PIAC intensifies and scales up its citizen engagement activities by using a citizen information and engagement platform type of initiative, given that the ICT-based platform turned out to be the more cost-effective. However, any such scale-up should be preceded by an evaluation of the piloted citizen information and engagement platform, to better understand its challenges, especially as to why the majority of the participants dropped their pre-recorded interactive voice response messages only after selecting their preferred language. Scaling up PIAC's citizen engagement would undoubtedly necessitate a significant increase in PIAC's budgetary allocation. We therefore call on Parliament and other key stakeholders to prevail on the Ministry of Finance to make more money available to the oversight committee.

We further recommend for inclusion in the regulations being developed on the PRMA a provision that stipulates that PIAC public engagements ought to be carried out at the district level as much as possible to compel PIAC to decentralise its public engagements. Finally, we think the rather inexplicable absence of evidence of positive reinforcement of knowledge and awareness creation by the joint treatment (T1+T2) warrants further research to provide further insight into why we do to observe the phenomenon. Also, we believe the study design could be implemented over a much longer timeframe to see what the outcomes might be.

Contents

List of figures and tables

Abbreviations and acronyms

ABFA	Annual Budget Funding Amount
CIEP	Citizen information and engagement platform
DA	District Assembly
DAM	District Assembly member
EA	Electoral area
FDR	False discovery rate
GIIF	Ghana Infrastructure Investment Fund
GOGIG	Ghana Oil and Gas for Inclusive Growth
ICT	Information and communications technology
IVR	Interactive voice response
KITE	Kumasi Institute of Technology and Environment
MD	Mining district
MMDA	Metropolitan, Municipal and District Assemblies
MP	Member of Parliament
NDC	National Democratic Party
NPP	New Patriotic Party
OD	Oil district
PIAC	Public Interest Accountability Committee
PRMA	Petroleum Revenue Management Act
RSD	Randomly selected district
SD	Standard deviation
T1	Treatment 1
T2	Treatment 2
T1+T2	Treatment 1 and Treatment 2 combined
TAI	Transparency and Accountability Initiative
UC	Unit Committee
UCM	Unit Committee member

1. Overview

1.1 Introduction

Historically, the economic record of low- and middle-income countries endowed with natural resources has generally tended to be quite disappointing. Mining and oil exporting economies, in particular, have performed badly compared with resource-poor countries over the past few decades, especially when one considers the huge revenues that have accrued to these countries. The poor socio-economic development of several resource-rich countries has given rise to a phenomenon known as the 'resource curse'.[1] At the heart of the 'resource curse paradox' is weak or poor governance and systematic corruption.

A major reason why corruption is so pervasive in the extractives industry is lack of transparency in the management of revenues that governments in resource-rich countries receive. Enhancing transparency and accountability in the management of petroleum revenues is therefore seen as the key to addressing corruption and other resource curse-related problems. Consequently, transparency and accountability initiatives (TAIs) are increasingly being promoted globally as effective ways to tackle corruption and promote efficient and prudent management of resource revenues.

According to McGee and Gaventa (2011), the transparency and accountability movement that has emerged since the beginning of the 21st century has led to thousands of initiatives worldwide, all working to tackle corruption, close democratic deficits and correct development failures. In the extractive sectors, there has been similar proliferation of global initiatives to oversee a transparent management of natural resources with a view to tackling development problems associated with the resource curse: government corruption, institutional erosion, civil conflicts and economic crowding-out effects (Acosta 2013).

Despite their rapid growth, and the growing donor support they receive, little attention has been paid to the impact and effectiveness of TAIs. Additionally, over the past decade, donors and policymakers have been promoting transparency as a means of remedying mismanagement of natural resource revenues, to combat corruption, increase accountability and promote government effectiveness, development and peace in resource-rich developing economies.

However, evidence of the benefits of transparency in resource revenue management is scarce. Instead, it has been found that the design of TAIs is frequently based on ad hoc data, untested assumptions, and implicit, rather than explicit and well-informed theories of change (McGee and Gaventa 2011). Furthermore, implementation of TAIs is often fragmented, making it difficult to identify intended and unintended – and potentially contradictory – impacts or to measure their effectiveness and efficiency.

[1] The 'resource curse', also known as the 'paradox of plenty', refers to the paradox that countries with an abundance of natural resources – specifically non-renewable resources such as minerals and fuels – tend to have less economic growth, less democracy and worse development outcomes than countries with fewer natural resources.

In July and August 2007, oil and gas reserves were discovered in commercial quantities off-shore Ghana by a consortium of US and English oil companies and the Ghana National Petroleum Corporation, Ghana's national oil company. Guided by its history of failure in managing revenues from other natural resources, such as gold and timber, and bearing in mind the resource curse, there was near nationwide consensus that the windfall revenues from Ghana's new-found wealth needed to be managed judiciously, to catalyse socio-economic development. It is against this background that the Parliament of Ghana promulgated the Petroleum Revenue Management Act (PRMA) 2011 (Act 815), 'to provide the framework for the collection, allocation and management of petroleum revenue in a responsible, transparent and accountable manner for the benefit of the citizens of Ghana' (Government of Ghana 2011).

Two notable provisions of the PRMA are the creation of the Annual Budget Funding Amount (ABFA) mechanism and the Public Interest and Accountability Committee (PIAC) in Articles 18 and 51, respectively, to deepen transparency and accountability in the management of Ghana's petroleum revenues. The ABFA is the percentage of annual petroleum revenues (typically approximately 70%) that is used to support the annual budget, while PIAC is an independent citizen-based oversight body tasked with the responsibility of ensuring strict compliance with the implementation of the PRMA.

This study investigated the impacts of two notable provisions of the PRMA – the creation of PIAC and the ABFA – in enhancing transparency and accountability in the management of petroleum revenues in Ghana. The investigators selected the ABFA implementation and PIAC effectiveness as the focus for our evaluation, due to their central role within the PRMA in strengthening transparency and accountability within the oil and gas sector in Ghana. The study has two components: a process evaluation and an impact evaluation. This report focuses exclusively on the impact evaluation. For the impact evaluation, we evaluated the effectiveness of PIAC's information dissemination and engagement efforts in a randomised field experiment covering 120 districts throughout Ghana. PIAC ran three interventions in a 2x2 factorial design with one control group:

1. District-level meetings attended by local District Assembly (DA) members and representatives of the district's Unit Committees (UCs) and other local stakeholders;
2. A district-level information and communications technology (ICT) platform for citizen information and engagement; and
3. District-level meetings and a district-level ICT citizen information and engagement platform (CIEP).

We measured information retention, attitude and behavioural changes among the treated population and compared these with the control group via the use of baseline and endline survey data. We measured these effects at three levels: among District Assembly members (DAMs) as representatives of the district authority (Level 1); among Unit Committee members (UCMs) as the most immediate intermediaries between citizens and the authorities above (Level 2); and among the general population (Level 3). Level 1 is where we expected the strongest impact, particularly in the behaviour of DAMs. We are interested in Levels 2 and 3 to gauge the diffusion effects of PIAC's information dissemination strategy among ordinary citizens and their lowest-level political representatives, the UCMs.

We assessed the effectiveness of the ABFA through a process evaluation because the projects the ABFA funded do not lend themselves easily to impact evaluation.

This study is thus crucial in many respects: first of all, the outcome provides timely evidence for TAIs such as PIAC to better engage citizenry and demand greater accountability and responsiveness from government from an informed position. The evaluation hopes to generate evidence and/or knowledge to underpin the work of state and non-state actors (such as PIAC, the Parliament of Ghana and civil society organisations) towards the effective management of petroleum revenues, as well as promote evidence-based policy formulation and practice in the management and use of petroleum proceeds. At a global scale, the evaluation will help to deepen understanding about what kinds of TAIs are the most effective, and in what context, for effective and efficient management of natural resources, while also ensuring socio-economic development.

1.2 Report outline

The rest of the report is organised into the following sections. Section 2 describes the intervention, theory of change and research hypothesis, while section 3 presents the context in which the study has been implemented and section 4 details the project timeline. Section 5 discusses the evaluation design, methods and implementation, and section 6 presents the programme design, methods and implementation. Section 7 analyses the impacts and presents the results of key evaluation questions; section 8 discusses the results and provides insights on the research process; and section 9 draws conclusions and proffers recommendations regarding the policy implications of study findings.

2. Intervention, theory of change and research hypotheses

As indicated above, the study seeks to evaluate two key TAI provisions in the PRMA – PIAC and the ABFA – using a mixed-methods evaluation design, which combines a randomised control trial (impact evaluation) and a process evaluation entailing key informant interviews, review of secondary data and case studies of selected projects. We assess the actual implementation of the ABFA mechanism and the role of PIAC in monitoring the allocation and use of the ABFA through the process evaluation.

The findings from the process evaluation are contained in a separate report, which has also been submitted to 3ie. For the impact evaluation, we evaluated the effectiveness of PIAC's information dissemination and engagement efforts in a randomised field experiment covering 120 districts throughout Ghana. This report focuses on the impact evaluation. However, relevant portions of the findings of the process evaluation are incorporated as and when necessary to help provide the context and/or reinforce the findings from the impact evaluation.

2.1 The intervention

PIAC is an independent public oversight body established under Article 51 of the PRMA to provide an extra layer of public oversight regarding the use and management of petroleum revenues. PIAC has the following three main objectives, as specified in Article 52 of the PRMA:

1. To monitor and evaluate compliance with the Act by government and other relevant institutions in the management and use of the petroleum revenues and investments as provided by the Act;
2. To provide a space and platform for the public to debate whether spending prospects and the management and use of the revenues conform to development priorities as provided for in Section 21(3) of the Act; and
3. To independently assess the management and use of petroleum revenues and assist Parliament and the executive in the oversight and performance of related functions.

PIAC is required to publish a semi-annual and an annual report in at least two daily national newspapers – as well as on its website – by 15 September and 15 March, respectively. Copies of the PIAC reports are expected to be submitted to the president and Parliament. PIAC is also mandated to hold two public meetings each year to report to the general public. Thus, disseminating timely and reliable information on the use of petroleum revenues and engaging the public on the best use of the petroleum revenues is the most important function of PIAC.

The establishment of PIAC appears to draw on the concept of social accountability, which is an umbrella term that encapsulates a variety of transparency and accountability initiatives, which include: citizen monitoring and oversight of public and/or private sector performance; user-centred public information access/dissemination systems; public complaint and grievance redress mechanisms; and citizen participation in actual resource allocation decision-making, such as participatory budgeting (Fox 2015).

The illustrative hypothesis underpinning social accountability interventions might be summarised as follows: as more government information becomes available to the wider public, civil society and the general public will have more ammunition to hold leaders to account, thus reducing corruption and strengthening government legitimacy. Increasingly accountable leaders will invite public participation in governance processes, enabling them to fine-tune their response to citizen needs. Ultimately, as information-sharing becomes more widespread, and transparency about government processes and government–citizen linkages increases, governments and citizens will be better able to make rational decisions that will lead to a virtuous circle of ever-improving development outcomes (Kalathil 2015). Thus, awareness (through transparency and information) is expected to lead to empowerment and articulating of voice (through formal and informal institutions), resulting in improved accountability and ultimately to better development outcomes (Joshi 2011; 2013). It is this chain of causation that we seek to evaluate in this study.

Our study further seeks to explore the causal pathways leading to citizens' behavioural change, which is grounded in standard economic theory/model of rational choice in decision-making. In the standard view, rational choice is defined as the process of determining what options are available and then choosing the most preferred one according to some consistent criterion (Levin and Milgrom 2004). Standard economic assumptions about rational choice theory highlight the role of information in determining behavioural outcomes and thus result in linear models of behaviour (also referred to as information deficit models), whereby information generates knowledge, which shapes attitudes, which lead to a particular behaviour (Darnton 2008b; Kollmuss and Agyeman

2002). Although it has been widely noted that, in practice, information alone is insufficient to result in action (for example, Kollmuss and Agyeman 2002; Collins et al. 2003; Talbot et al. 2007), it is nonetheless a prerequisite for many behaviours, as a source of knowledge, and also performs a persuasive function, as seen in much marketing and communications activity (Darnton 2008b).

Yet, while information can play a significant role in shaping attitudes, the relationship between attitudes and behaviour is often less strong. The disparity between attitudes and actions has been termed the 'value action gap' (Blake 1999). According to Blake, inaction is not down to information deficit or a lack of rationality; instead, the presupposed decisional flow is blocked by other factors intruding into the process.

Our study evaluated the effectiveness of PIAC's information dissemination and engagement efforts in engendering citizens' activism and behavioural change at district level in a randomised field experiment covering 120 districts throughout Ghana. PIAC ran the following three interventions in a 2x2 factorial design with one control group (Table 1):

1. District-level meetings attended by local DAMs and representatives of the district's UCs and other local stakeholders;
2. A district-level ICT CIEP; and
3. District-level meetings and a district-level ICT CIEP.

Table 1: Study design

	No PIAC information dissemination forum	**PIAC information dissemination forum**	**Total**
No ICT platform	'Pure' control 30 districts	PIAC information dissemination forum only 30 districts T1	60 districts with no ICT platform
ICT platform	ICT platform 30 districts T2	PIAC information dissemination forum + ICT platform 30 districts T1+T2	60 districts with ICT platform
Total	60 districts with no PIAC forum	60 districts with PIAC forum	120 districts

2.1.1 Treatment 1: PIAC leaders' information dissemination forum

PIAC organised meetings in collaboration with the DA and/or a local organiser selected by PIAC in 60 districts – 30 in the Treatment 1 (T1) arm, and 30 in the Treatment 1 plus Treatment 2 (T1+T2) arm. Meetings were held in the district capital in community public meeting places. There was only one forum held in a district during the study timeframe.

During the meeting, PIAC provided information on: its own activities and mandate; oil and gas revenue management, including the PRMA in general, with a particular focus on ABFA funding and on ABFA-funded projects in the district; citizens' rights with respect to natural resource governance; and transparency and accountability as the golden rule of good governance in oil and gas revenue management.

The information was disseminated in an easy-to-understand format (infographics)[2] by members of PIAC present at each meeting. At the beginning of each meeting, PIAC informed participants that their feedback would be relayed to the relevant authorities and duty bearers. This was meant to provide an incentive for active participation throughout the forum. Feedback was also collected on forum participants' thoughts on discussions and how to improve the dissemination of information.

Each district engagement was expected to be attended by 30 randomly invited participants, comprising: 10 DAMs (8 elected and 2 non-elected; 5 of them ought to have been covered in the baseline); 3 UCMs, the heads of UCs from randomly selected units in the district; 1 (a or the) member of Parliament; 5 representatives of traditional authorities, local media and civil society organisations; and 13 local stakeholders drawn from PIAC's constituents in the district. The inclusion of UCMs was intended to help the evaluation team gauge whether the trickle-down effect works well when information is targeted primarily at DAMs, who are then expected to pass on knowledge to the UCs from which they have been elected (indirect effect). Alternatively, knowledge diffusion may be more effective in those UCs that have had a member directly attending the meeting.

The 10 DAMs, 3 UCMs and the representatives of traditional authorities, media and other civil society organisations were all supposed to be selected at random by PIAC with the proviso that five of the DAMs and UCMs ought to have been surveyed at the baseline. Although average attendance at PIAC engagements was 32 (which suggests full participation), it should be pointed out that not all the DAMs and UCMs who were expected to attend engagement meetings managed to attend either, because meeting organisers did not invite them or they could not make it even though they had been invited.

Although PIAC organised the meetings, members of the study team were present at all the district meetings to ensure quality control, as well as to collect information on participants, and the number and content of comments and questions for PIAC.

2.1.2 Treatment 2: Citizen information and engagement platform

The second treatment administered by our study entailed the use of an ICT platform to disseminate information on the quantum and use of oil revenue management to local political leaders, traditional authorities and ordinary citizens in a total of 60 districts – 30 in the Treatment 2 (T2) arm, and 30 in T1+T2 arm – and provide them the opportunity to share their views on how oil revenues are managed in Ghana. PIAC engaged VOTO Mobile – a Ghana-based technology start-up and social enterprise – to develop and run an interactive voice response (IVR) and SMS platform for citizen information and engagement. PIAC managed the content of the IVR/SMS information messages to ensure the independence of the intervention. However, KITE also independently provided backstopping support to ensure that the roll-out, context and content of messaging did not deviate from the research design.

The treatment was administrated at district level. Respondents who received this treatment were selected from the T2 and T1+T2 districts and were interviewed during the

[2] Copies of the infographic are available in online appendix A.

baseline study. They had expressed their willingness to be contacted in any follow-up study by providing their telephone numbers to the research team. The telephone numbers of all the respondents were sent to VOTO Mobile and uploaded onto the CIEP.

Using the VOTO platform and technology, PIAC sent out IVR/SMS messages to respondents on subjects ranging from the petroleum law, the ABFA and ABFA-funded projects, to how oil and gas revenues are distributed at local level. A total of eight messages were sent to respondents/participants using IVR and SMS technologies in the T2 and T1+T2 treatment arms over a five-week period between 25 January and 1 March 2017. The CIEP offered the option of listening to the messages in four different languages: English, Twi, Hausa and Ewe. Two pre-recorded messages on oil and gas revenues and expenditures, and citizens' right to demand sound use of petroleum revenues, were sent out every week to respondents in the 60 districts. Each message was followed by an SMS summarising the key points in the pre-recorded voice message. The information relayed replicated that given during T1 by PIAC.

In addition to the messages, a hotline was set up to allow participants to call in and listen to messages at any time that was convenient for them and also register their concerns on the use of oil and gas revenues in Ghana during the period the treatment was administered.

At the end of the period of ICT activity, our team collated and analysed the number of subscribers and messages and phone calls received on/by the ICT platform. Overall, the second treatment was administered to a total of 1,825 respondents/participants in the T2 and T1+T2 treatment arms.

2.1.3 Joint treatment (T1+T2): combination of PIAC forum and CIEP

PIAC visited this group of districts for a meeting as in T1. The group had the possibility of receiving more information and the opportunity to interact with PIAC directly for a longer timeframe by receiving information from the ICT platform as in T2.[3]

The ICT platform and PIAC meetings are designed as partial substitutes as regards information dissemination to the population and the possibility of receiving comments and suggestions and responding to queries concerning petroleum revenue management. In the joint treatment, we expect them to reinforce each other and increase the effects observed at Levels 2 and 3, in particular.

There are two main differences between T1 and T2. First, PIAC meetings were more targeted at duty bearers at Level 1, who were expected to relay information to Levels 2 and 3 through the regular interaction channels between DAMs and UCMs and electorates (the trickle-down effect). The ICT platform on the other hand was not targeted at any level in particular, but disseminated the same basic information as the PIAC meetings and also offered the possibility of asking questions and making comments. Second, the timeframe for the two was different: the PIAC forums were typically one-time, three-hour face-to-face meetings, with the possibility for participants to comment and ask questions during the meeting, or later through the conventional

[3] Respondents in this treatment arm received the two treatments at the same time as those in the T1 arm were receiving T1 and those in the T2 arm were receiving T2.

channels; while the ICT platform was scheduled to be available over a five-week period, during which time PIAC sent regular (for example, twice-weekly) information messages, and also received comments and answered questions.

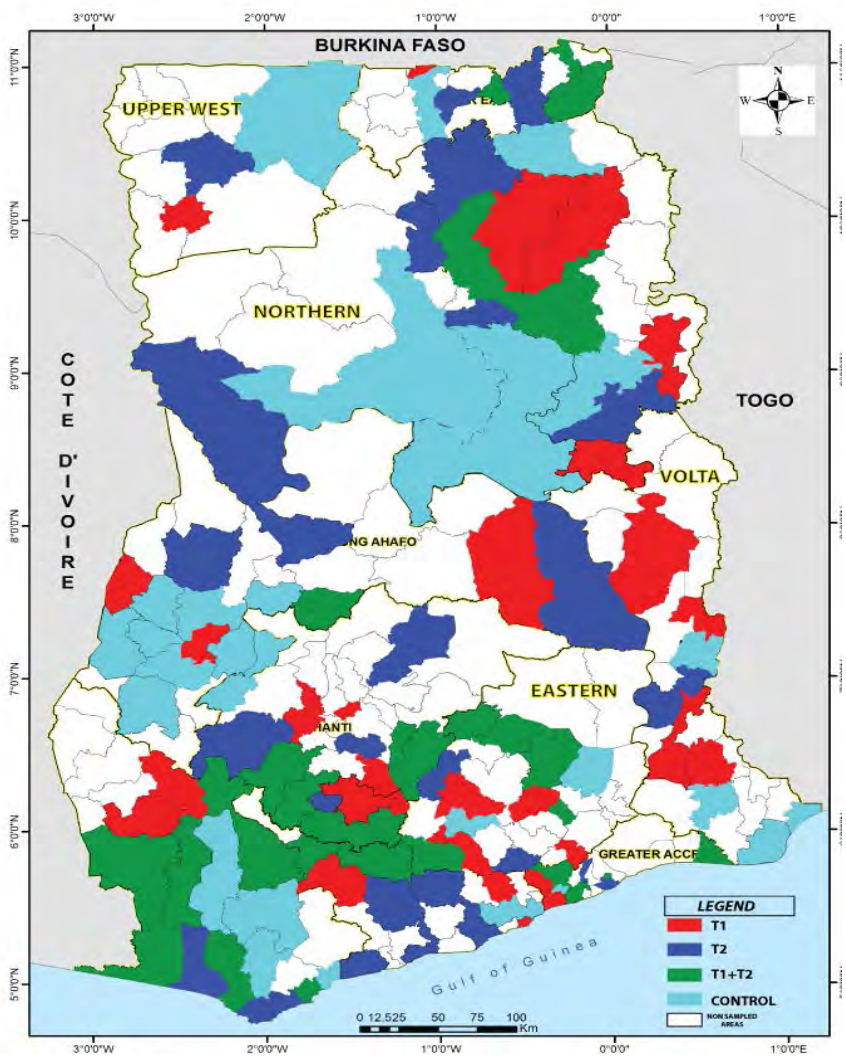
Both the PIAC meetings and ICT platform were funded through direct support of PIAC by a third party, the Ghana Oil and Gas for Inclusive Growth (GOGIG), thus ensuring that we would not evaluate our own treatment.

2.1.4 Control group

Another 30 districts served as a control group, which neither played host to any of the PIAC meetings (T1) nor received information disseminated through the ICT platform (T2) during the period of the experiment. It should be noted, however, that although none of the PIAC interventions took place in the control districts, it was still possible for some respondents in the control districts to access information on petroleum revenues from the PIAC websites or during radio discussions on petroleum revenues.

Figure 1 is a map of Ghana showing the location of the districts assigned to the various treatment arms.

Figure 1: District map of Ghana showing sample districts by treatment arm



Source: KITE (2017a).

2.2 Outcomes and impacts of interest

Our outcomes of interest were as follows:

1. Knowledge and awareness levels of district leaders and the citizens;
2. Sense of entitlement (attitudes) of district leaders and citizens; and
3. Behaviour of district leaders and citizens in:
    a. promoting accountability
    b. demanding accountability.

These outcomes were measured at three levels: Level 1 – DAMs; Level 2 – UCMs; Level 3 – citizens.

At Level 1, the DAMs should: gain knowledge and awareness about oil revenue management; gain knowledge about possible ways to act; and give feedback to PIAC about its activities. This should lead to increased demand for transparency and accountability from the central government, but also to better management of natural resource revenues and transparency at the district level.

At Level 2, we expected UCMs to: gain knowledge and awareness about oil revenue management; and gain knowledge about possible ways to act. This should lead to increased demand for transparency and accountability from the DA and the central government, but also to better management of natural resource revenues and transparency at the local level.

At Level 3, we expected dissemination to the local population of the information gained during the PIAC meetings. Increased knowledge and awareness among the general population should lead to increased demand for transparency and accountability from district and central authorities. This effect will be indirect, through meetings with the local UCMs (some of whom will have been invited to the PIAC meetings), local DAMs or Members of Parliament (MPs), or by word of mouth.

By randomising invitations to the PIAC meetings among UCs, we also sought to gauge how effective the conventional trickle-down effects of knowledge from the DA to the general population are: do we see significant differences in knowledge and behavioural outcomes among the population whose UC has sent a member to the PIAC meetings? Or is the focus on the DA level enough to ensure transparency about oil and gas revenues throughout the population? In addition, the effect could also be direct if citizens sign up to the ICT platform and make active use of its interactive design by addressing their comments and questions to PIAC.

2.3 Hypotheses

Our first set of hypotheses regards the basic information dissemination effect of being in one of the treated groups, either as duty bearers participating directly in the meetings, or as members of the general population in a treated district.

- Hypothesis 1a (H1a): PIAC's information dissemination and feedback provided in the PIAC information forums (T1) will increase knowledge and awareness about petroleum revenue management and monitoring, particularly among duty bearers (Levels 1 and 2);

- Hypothesis 1b (H1b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will increase knowledge and awareness about petroleum revenue management and monitoring at all levels, particularly among ordinary citizens; and
- Hypothesis 1c (H1c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) will reinforce each other and lead to the largest positive impact on knowledge and awareness about petroleum revenue management and monitoring at all levels, particularly among ordinary citizens.

Our second set of hypotheses concerns the expected changes in feelings of entitlement ('attitude') with respect to oil and gas revenues that will arise among the treated population at all levels.

- Hypothesis 2a (H2a): PIAC's information dissemination and feedback provided in the PIAC information forums (T1) will increase the feeling of entitlement with respect to petroleum revenue management among duty bearers (Levels 1 and 2);
- Hypothesis 2b (H2b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will increase the feeling of entitlement with respect to petroleum revenue management at all levels, particularly among ordinary citizens; and
- Hypothesis 2c (H2c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) will reinforce each other and lead to the largest positive impact on the feeling of entitlement with respect to petroleum revenue management at all levels, particularly among ordinary citizens.

Our hypotheses on how transparency can influence individual behaviour are based on the model of voice and exit by Hirschman (1970). Hirschman (1970 p.16) defined voice as 'political action par excellence': it can vary 'from faint grumbling to violent protest'. Exit can also take various forms, from buying a different product (in the case of customer dissatisfaction) to political apathy or emigration (in the case of dissatisfaction with policymakers or political institutions). If a member resorts to voice, she explicitly tries to change the practices and policies of the organisation (or the state) to which she belongs.

However, voice is costly, both in terms of direct and indirect (opportunity) costs. Hirschman (1970 p.43) points out that 'the propensity to resort to the voice option depends also on the general readiness of a population to complain and on the invention of such institutions and mechanisms as can communicate complaints cheaply and effectively'. Consequently, greater information on the costs of voice, and the creation of cheap avenues for its use, make it more likely to be chosen (Reinikka and Svensson 2007).

We developed the following sets of hypotheses for how treatment will affect the behaviour of duty bearers (Levels 1 and 2):

- Hypothesis 3a (H3a): PIAC's engagement with duty bearers in the PIAC information forums (T1) will increase duty bearers' efforts to create more transparency about the management of petroleum revenues;
- Hypothesis 3b (H3b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will have a weak positive effect on duty bearers' efforts to create more transparency about the management of petroleum revenues;

- Hypothesis 3c (H3c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) reinforce each other and will increase duty bearers' efforts to create more transparency about the management of petroleum revenues;
- Hypothesis 4a (H4a): PIAC's engagement with duty bearers in the PIAC information forums (T1) will increase their capability and willingness to make demands of district authorities and of central government in the management of petroleum revenues;
- Hypothesis 4b (H4b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will have a weak positive effect on duty bearers' capability and willingness to make demands of district and central government in the management of petroleum revenues; and
- Hypothesis 4c (H4c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) will reinforce each other and increase duty bearers' capability and willingness to make demands of district and central government in the management of petroleum revenues.

As regards the effects on the general population (Level 3), we postulated that:

- Hypothesis 5a (H5a): PIAC's engagement with duty bearers in the PIAC information forums (T1) will weakly increase the general population's capability and willingness to make demands of their local authorities and central government in the management of petroleum revenues;
- Hypothesis 5b (H5b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will increase the general population's capability and willingness to make demands of their local authorities and central government in the management of petroleum revenues; and
- Hypothesis 5c (H5c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) will weakly reinforce each other and increase the general population's capability and willingness to make demands of their local authorities and central government in the management of petroleum revenues.

Finally, we expected greater transparency and demand for accountability about oil and gas revenue management (through more knowledge and voice) to lead to changes in central government policy:

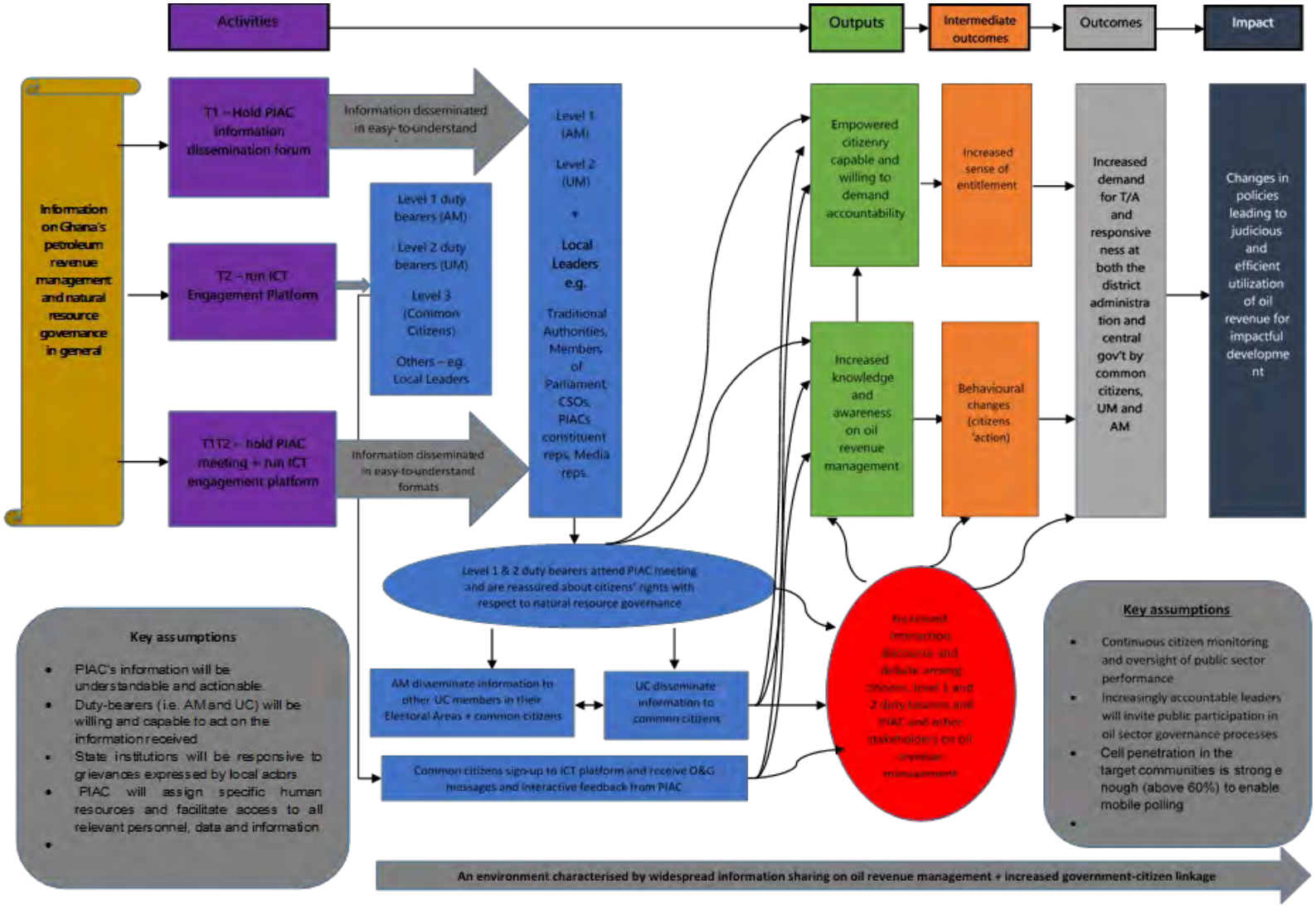
- Hypothesis 6a (H6a): PIAC's engagement with duty bearers in the PIAC information forums (T1) will affect the government's policies on the management of oil and gas revenues and lead to greater alignment with local demands;
- Hypothesis 6b (H6b): PIAC's information dissemination and feedback provided in the citizen engagement platform (T2) will weakly affect the government's policies on the management of oil and gas revenues and lead to greater alignment with local demands; and
- Hypothesis 6c (H6c): PIAC's information dissemination forum and the citizen engagement platform (T1+T2) will weakly reinforce each other and affect the government's policies on the management of oil and gas revenues and lead to greater alignment with local demands.

Tables B1, B2 and B3 in online appendix B describe our outcome variables, which hypothesis and treatment arm they relate to, as well as notes on variable construction.

2.4 Theory of change

Our theory of change seeks to investigate the causal chain between more transparency (by providing reliable information) to awareness through to empowerment, feeling of entitlement and leading ultimately to attitudinal and behavioural change as illustrated in Figure 2. The theory of change is based on the overall assumption that making information about revenue flows more transparent enables citizens, governments and other stakeholders to use the information to hold government to account. We expect that PIAC's information dissemination and engagement activities will lead to short-term outcomes (transparency), intermediate outcomes (for example, participation and accountability) and ultimately to long-term outcomes (social and developmental gains). We do not, however, expect the long-term outcomes (impacts) to be achieved in our experiment given the duration of the intervention.

Figure 2: Intervention theory of change

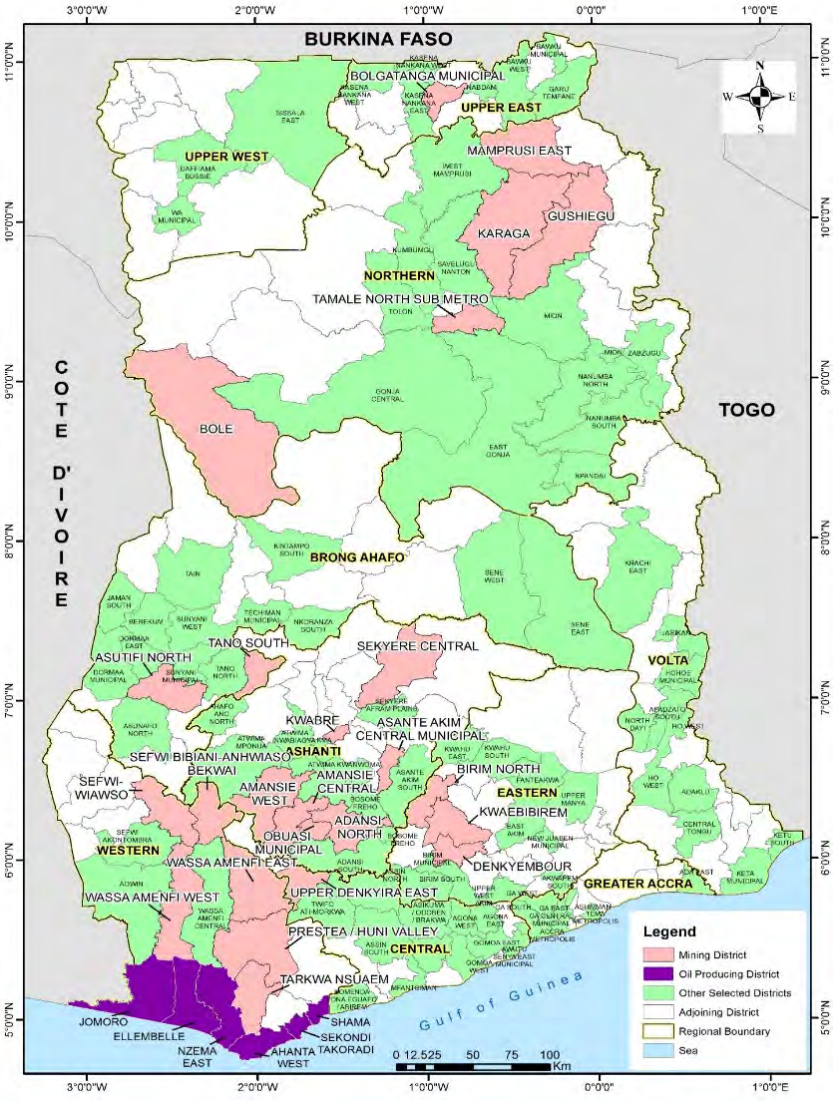


3. Context

3.1 Geographical focus of study

Ghana (formerly known as the Gold Coast) is located near the equator and on the Greenwich meridian between latitude 40°N and 120°N and longitude 300°W and 10°E. The country covers a total land area of 238,540km^2 and it is bounded by the Atlantic Ocean to the south, Côte d'Ivoire to the west, Burkina Faso to the north and Togo to the east. Ghana is divided into 10 administrative regions, which are further divided into 216 Metropolitan, Municipal and District Assemblies (MMDAs; 6 Metropolitan; 49 Municipal; 161 Ordinary District). The study experiment was undertaken in 120 MMDAs (representing ~56%) selected from all the 10 regions in Ghana, as shown in Figure 3.

Figure 3: Map of Ghana showing survey districts



Source: KITE (2017a).

A combination of random and purposive sampling techniques was used to select the study areas. Firstly, all resource-rich (mining and oil-producing) districts, totalling 32 (6 oil districts and 26 mining) were purposively selected. We included oil districts because

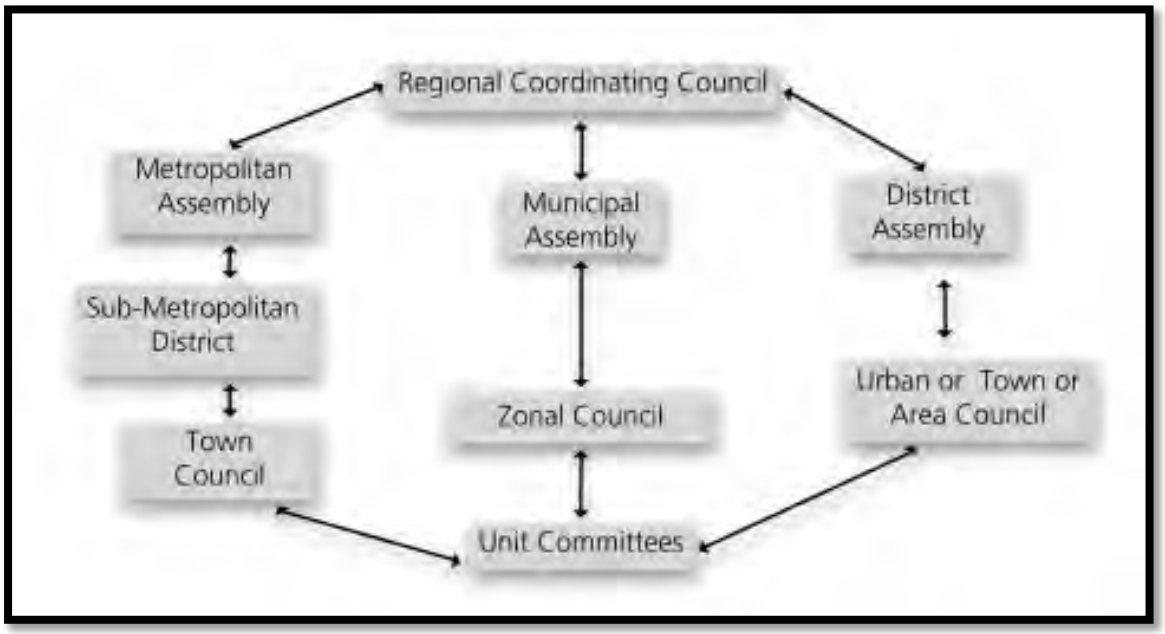
we expected the populations of the oil districts to be more aware of petroleum-related issues, while mining districts were included because we envisaged populations in those districts are likely to be more sensitive to natural resource revenue management in general. The remaining (88) non-resource-rich districts were randomly selected using a probability proportional to size sampling technique.

We focus the study on the MMDAs because the assemblies are the highest decision-making bodies at the metropolitan, municipal and district levels: they are the basic unit of government administration with deliberative, legislative and executive functions.

3.2 Local government structure

Conventionally, Ghana's sub-national governance system is characterised by a three-tier structure, which operates at the regional, district and sub-district levels. At the top of the hierarchy (Tier 1) are the Regional Coordinating Councils, followed by MMDAs on the second tier, and the Urban or Town or Zonal or Area Councils in addition to UCs on the third tier, as depicted in Figure 4. In practice, however, the local governance system has four tiers, given that the UCs represent the lowest and most basic unit in the hierarchy, upon which all the other structures including the Urban or Town or Area Councils are built (Institute of Local Government Services 2010).

Figure 4: Local government structure in Ghana



Source: Institute of Local Government Services (2010).

The DAs are the crucial links between the regional and central government above, and the UCs and general population below. Two-thirds of DAMs are elected and these elected members are also part of the UC in their local electoral area (EA). The DA also includes the MP(s) representing constituencies within the district. Finally, not less than 30 per cent of the DAMs are directly appointed by the president in consultation with chiefs and interest groups in the district. The appointed members include the district chief executive.

At the local level, there are approximately 16,000 UCs that cover parts of towns or cities, zones or whole villages with at least 500 and no more than 1,500 inhabitants. The units are the lowest level of the local government structure. They are responsible for local enforcement and mobilisation of the population and provide mechanisms of representation, participation and accountability at the local level, from the village upwards. The formal UC consists of a maximum of 15 members made up of 10 elected persons ordinarily resident in the unit (including the locally elected member of the DA), and not more than five other persons resident in the unit and nominated by the district chief executive, who acts on behalf of the president. Elections to all local government bodies – including DAs and UCs – are on a non-partisan basis. The elections are state sponsored and conducted by the electoral commission.

3.3 External validity

As indicated in section 3.1, over 73 per cent (88) of the study districts were selected at random using the probability proportional to (population) size sampling method. The remaining 27 per cent of the study districts (in other words, the 6 oil and 26 mining districts) were grouped and included in the study because these districts are expected to have certain peculiar characteristics and thus needed to be included to ensure adequate representation of these resource-rich districts in the total sample size. Figure 3 above shows how geographically dispersed the study districts are throughout Ghana.

Within each district, 30 respondents were selected using a combination of random and purposive sampling; the DAMs were randomly selected from urban and rural EAs. This was to ensure a fair representation of a rural-urban classification within the sample. The two ordinary citizens were also randomly selected in each of the EAs with consideration given to equal gender representations in most cases in the EAs. However, the UC, opinion leaders and traditional leaders were purposively selected. Thus, the sampling procedure used in selecting the districts coupled with the mix of the sampled subjects/respondents help ensure the external validity of the study results at sub-group level.

We believe that our sample districts are geographically and ecologically representative and thus the study results could be generalised to DAMs, UCMs, traditional authorities and the citizenry in the remaining 96 districts of the country. However, duty bearers have deliberately been oversampled relative to the whole population, which means that (unadjusted) results for the entire sample are not representative of the Ghanaian population. Given the oversampling of (elected and unelected) duty bearers, who tend to be male in the majority, we also have an over-representation with respect to the whole population of male respondents in the entire sample, though not at the sub-group level.

3.4 Political context

Ghana attained independence from the United Kingdom on 6 March 1957 and subsequently become a full-fledged republic on 1 July 1960. Since independence, Ghana has had a chequered political history characterised by four attempts at constitutional democracy interspersed with military juntas. After 11 years of military rule, from 1981 to 1991, Ghana returned to constitutional democracy in January 1992 when

the fourth republican constitution came into effect and has since enjoyed a stable democracy to date.

Ghana is a unitary (as opposed to federal) republic with an executive presidency and a multiparty political system. The president doubles as the head of state and commander-in-chief of the armed forces and is elected by universal suffrage for a maximum of two four-year terms. The legislature is unicameral (one chamber or house) and has 275 MPs representing as many constituencies. The MPs are also elected by universal suffrage every four years with no term restrictions.

Although officially there are 25 registered political parties, two parties – the National Democratic Party (NDP) and incumbent New Patriotic Party (NPP) – have dominated the political landscape since Ghana returned to constitutional rule in 1992, the NDP having governed for a total of 16 years (1992–2000 and 2008–2016) and the NPP nine years (2000–2008). The most recent presidential and parliamentary elections were organised in December 2016 and both were won by the then opposition (now ruling) NPP.

Historically, the Ashanti and Eastern Regions are the strongholds of the ruling NPP, while the Volta, Northern, Upper East and Upper West Regions are 'bastions' for the opposition NDP, with either party winning in these regions in all general elections since 1992. The Central, Western, Greater Accra and Brong-Ahafo Regions are swing regions, which usually tilt the balance in favour of the party that ends up winning the general election.

During the 2012 general election – which was the last election before the study – the NDP won both the presidential and parliamentary elections, with their presidential candidate (the incumbent president) winning 50.63 per cent of total valid votes cast and parliamentary candidates winning 148 seats, compared with 47.81 per cent of valid votes and 123 parliamentary seats won by the then opposition NPP. In keeping with the outcome of the 2012 polls, the NDP won both the presidential and parliamentary elections in the study districts with its presidential candidate winning the majority of votes in 72 out of the 128 constituencies in the study districts (representing 56%) and parliamentary candidates triumphing in 69 constituencies, representing 54%, as against the 44% and 46% of constituencies won by the NPP in the presidential and parliamentary polls respectively in the study districts as shown in Table 2.

Table 2: Performance of political parties in 2012 elections in study districts

Political party	Presidential		Parliamentary	
	Number	Percentage	Number	Percentage
NDP	72	56	69	54
NPP	56	44	59	46
Total	128	100	128	100

Source: Authors' construct based on 2012 election results (Electoral Commission 2012).

Table 3 on the other hand shows the performance of the two leading political parties in the 2012 elections by treatment arms.

Table 3: Performance of leading political parties in 2012 elections by treatment arm

Presidential								
Political party	**Ctrl**		**T1**		**T2**		**T1+T2**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
NPP	13	43	16	53	8	27	17	57
NDP	17	57	14	47	22	73	13	43
Parliamentary								
NPP	11	37	16	53	11	37	16	53
NDP	19	63	14	47	19	63	14	47

Source: Authors' construct based on 2012 election results (Electoral Commission 2012).

Table 3 shows that the then-ruling NDP won the presidential election and majority of the Parliament seats in the Control and the T2 districts in the 2012 general election, while NPP came top in both elections in the T1 and T1+T2 districts.

Unlike the presidential and parliamentary elections, DA elections are supposed to be apolitical. Party politicking is outlawed by the District Assemblies Election Act 1994 (Act 473). Section 4 of Act 473 prohibits candidates in a DA or lower government-level election from using the name, motto or symbol of a political party or organisation. Section 4 further bars candidates in a district-level election from soliciting or accepting sponsorship from a political party in connection with a DA election.

Section 7 of Act 473 on other hand makes it illegal for political parties to endorse or sponsor; canvass for votes for, or in any way campaign for or against a candidate seeking for election to a DA or any lower local government unit. Any political party that contravenes the provisions of Section 7(1) of Act 473 commits an offence and is liable on conviction to a fine not exceeding GH ¢ 5 million. It should be added, however, that, although the law does not allow party politicking in the district-level elections, it is perhaps an 'open secret' that political parties have over the years sought to influence the outcome of DA elections and have in some instances been reported to have sponsored candidates to contest various seats at the DA and UC levels.

An overwhelming majority (98%) of the study respondents are active voters who indicated during the study that they voted in the 2012 and 2016 general elections. When asked whether their decision to vote for a particular candidate or party in the general elections was influenced by the way and manner in which natural resource revenues are managed, the majority of respondents (30.4%) answered in the affirmative that their voting choices were very much influenced by how natural resource revenues are managed, while another 17.6 per cent said their decisions were somewhat influenced by the management of natural resource revenues, as shown in Table 4.

Table 4: Impact of the management of natural resource revenues on voting

Did you consider how oil and mining revenues are handled important in your decision who to vote for in the last presidential/parliamentary elections?		
	Frequency	Percentage
No, not at all important	720	27.6
No, not very important	577	22.1
Yes, somewhat important	467	17.9
Yes, very important	805	30.9
Do not know (DNR)	33	1.3
Do not want to answer (DNR)	4	0.2
Total	2,606	100.0

Source: KITE (2017).

Table 4 also shows that 49% of the study respondents were not influenced by how natural resource revenues are being managed, with 27.6% indicating that that did not consider the management of mining/petroleum revenues at all important and 22.1% saying they are not very important. A similar pattern/result emerges when the analysis is conducted across the various treatment districts, as shown in Table 5.

Table 5: Impact of the management of natural resource revenues on voting by treatment arm

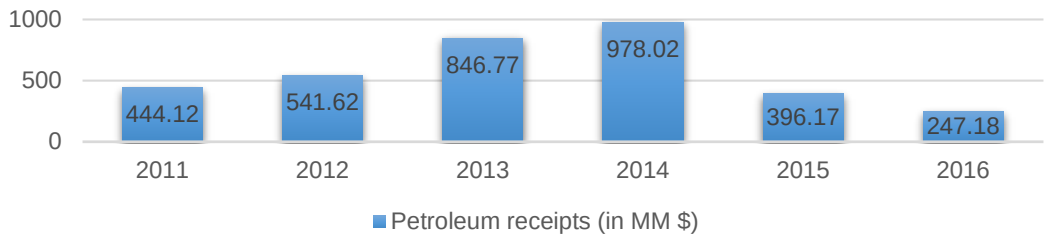
Did you consider how oil and mining revenues are handled important in your decision who to vote for in the last presidential/parliamentary elections?						
Responses	Treatment and control	Control (%)	T1 (%)	T2 (%)	T1+T2 (%)	Total average (%)
No, not at all important		25.5	30.3	26.5	28.1	27.6
No, not very important		20.9	22.3	21.3	24.1	22.1
Yes, somewhat important		20.1	16.0	18.5	17.1	17.9
Yes, very important		32.3	29.9	32.4	29.0	30.9
Do not know (DNR)		1.1	1.5	1.1	1.4	1.3
Do not want to answer (DNR)		0.2		0.2	0.3	0.2
Total		100.0	100.0	100.0	100.0	100.0

Source: KITE (2017b).

3.5 Total petroleum revenues and their use

It has been established through the process evaluation that Ghana received a total of US$3.45 billion in petroleum revenues between 2011 and 2016 (KITE 2017b). Figure 5 shows the annual breakdown of petroleum receipts.

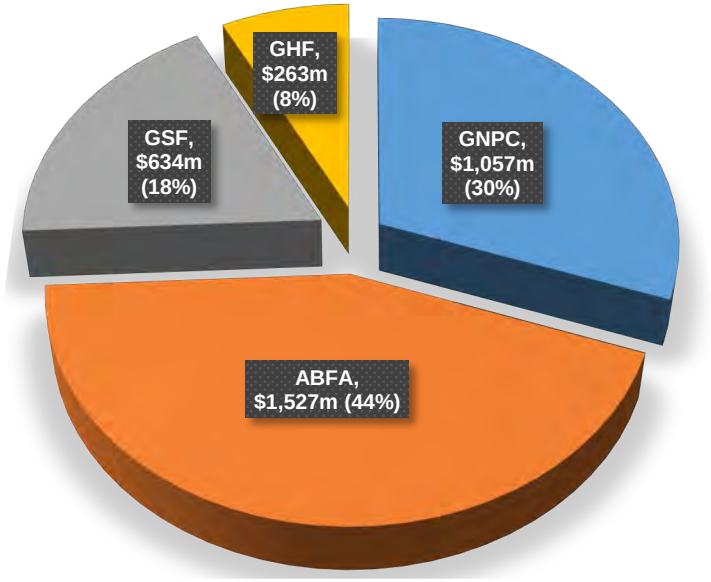
Figure 5: Total annual petroleum receipts in Ghana (2011–2016)



Source: KITE (2017b).

This amount has been distributed in accordance with the relevant provisions of the PRMA, which stipulates that total petroleum revenue for each year should be distributed to the Ghana National Petroleum Company (to cover its equity financing cost and carried and participating interest), the ABFA and Ghana Petroleum Funds (in other words, Ghana Stabilisation Fund and Ghana Heritage Fund). The total disbursements to the four designated recipient accounts from 2011 to 2016 are as shown in Figure 6.

Figure 6: Distribution of petroleum revenues (2011–2016)



Note: GNPC = Ghana National Petroleum Company; GSF = Ghana Stabilisation Fund; GHF = Ghana Heritage Fund.

Figure 6 indicates that US$1,527 million (or 44%) of total oil receipts that have accrued to Ghana between 2011 and 2016 have been allocated to the ABFA as annual budgetary support; US$1,057 million (30%) have been given to the Ghana National Petroleum Corporation; while US$634 million (18%) and US$263 million have been lodged in the Ghana Stabilisation Fund and Ghana Heritage Fund respectively.

The PRMA provides clear guidelines on how the ABFA could be used. First of all, the Act stipulates that the use of the ABFA must be guided by a medium-term expenditure framework aligned with a long-term national development plan approved by Parliament. However, where the plan is not in place, Section 21(5) of the Act mandates the minister of finance and economic planning to prioritise not more than four areas for the spending of the ABFA with an opportunity to revise the priority areas every three years.

In the 2011 Budget, the minister selected the following four priority areas to benefit from ABFA-funded support:

- agricultural modernisation;
- roads and other infrastructure;
- expenditure and amortisation of loans for oil and gas infrastructure; and
- capacity building (including oil and gas).

These same priority areas were maintained in 2014 for a further three years (2014–2016). In 2014, the government established the Ghana Infrastructure Investment Fund (GIIF) through the Ghana Infrastructure Investment Fund Act 2014 (Act 877), with the ABFA as one of the main sources of money for the GIIF. According to Section 5(1b) of Act 877, a minimum of 25 per cent of each year's ABFA is required to be transferred to the GIIF. Consequently, the PRMA was amended in 2015 to, among other things, allow for the transfer of a specified percentage of the ABFA into the GIIF. Another important amendment to the PRMA was Section 57, which primarily provides that PIAC's budget should be drawn directly from the ABFA.

As indicated in Figure 6, 44 per cent (US$1.527 billion) of the total petroleum revenues received between 2011 and 2016 has been channelled into the annual budget through the ABFA account. This translated to a cedi equivalent of GH ₵ 3,306.87 million. Figure 7 shows the distribution of the ABFA to the four priority areas, the GIIF and PIAC over the period 2011–2016.

Figure 7: Distribution of the ABFA (2011–2016)

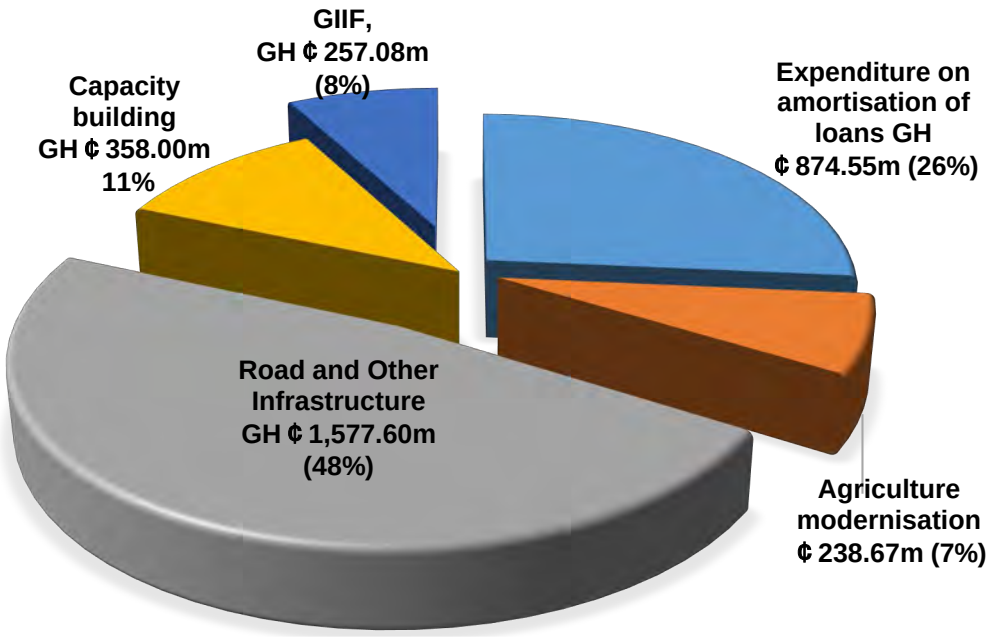


Figure 7 shows that GH ₵ 1.58 billion (48%) of the ABFA has been used to support expenditures in the road and other infrastructure priority area; GH ₵ 874.55 million (26%) to repay loans contracted in respect of oil and gas infrastructure; approximately 11 per cent (GH ₵ 358.0 million) has been spent on various capacity-building initiatives; GH ₵ 238.67 million (7%) has been used to support initiatives intended to modernise agriculture; GH ₵ 257.08 million (8%) has been transferred into the GIIF; while GH ₵ 0.97 million (0.03%) has been allocated to PIAC.

As shown in Figure 7, the roads and other infrastructure priority area has received the largest share (GH ₵ 1.58 billion or 48%) of the total allocation of the ABFA from 2011 to 2016. Of this amount, GH ₵ 790.74m (50.12%) has gone to the Ministry of Roads and Highways and its sector agencies to fund the construction and/or maintenance of roads

and ancillary works, while the remaining GH ₵ 786.87m (49.88%) has been used to support infrastructure and recurrent expenditure in other sectors of the economy. The ABFA allocations to the roads and highways sector has been used to support a total of 182 roads and related projects over the six-year period, with the highest amount spent on a single road project being GH ₵ 34.30 million and minimum being GH ₵ 1,422.

Table 6 gives an annual breakdown of the road projects by numbers and amounts spent.

Table 6: Breakdown of ABFA-funded road and related projects (2011–2016)

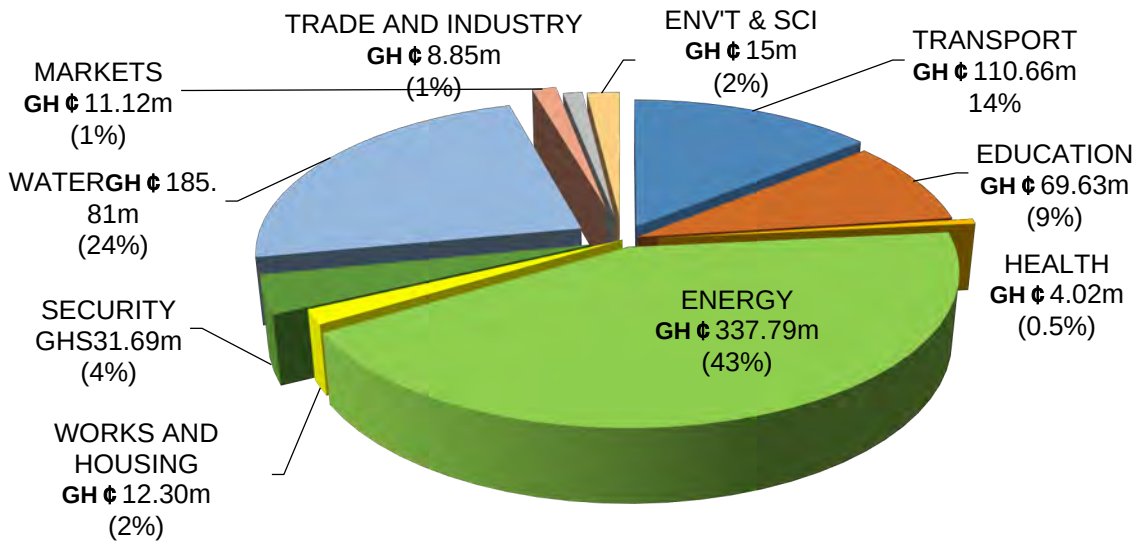
Year	Number of projects[4]	Total amount (GH ₵)	Average cost per road	Minimum amount (GH ₵)	Maximum amount (GH ₵)
2011	41	227,641,767.99	5,552,238.24	65,509.00	34,300,601.28
2012	33 (26)	72,672,288.73	2,202,190.57	267,887.43	12,268,428.46
2013	80 (54)	236,913,607.09	2,961,420.09	1,422.19	32,502,342.76
2014	68 (40)	128,218,531.00	1,885,566.63	13,862.00	12,811,921.00
2015	33 (20)	77,138,908.98	2,337,542.70	127,591.14	21,558,364.12
2016	8 (1)	48,151,290.94	6,018,911.37	2,264,932.85	10,710,586.31
Total	182	790,736,394.73	4,421,037.02		

Source: KITE (2017b).

The remaining GH ₵ 786.87 million (49.88%) of the allocation to the roads and other infrastructure priority areas was used to fund infrastructure projects in 10 broad sectors: energy; water resources; works and housing; education; transport; public security (interior); health; trade and industry; markets; and environment and science.

Figure 8 gives the breakdown of ABFA allocation to these sectors over the reporting period.

Figure 8: Allocation of the ABFA to other infrastructural sectors (2011–2016)

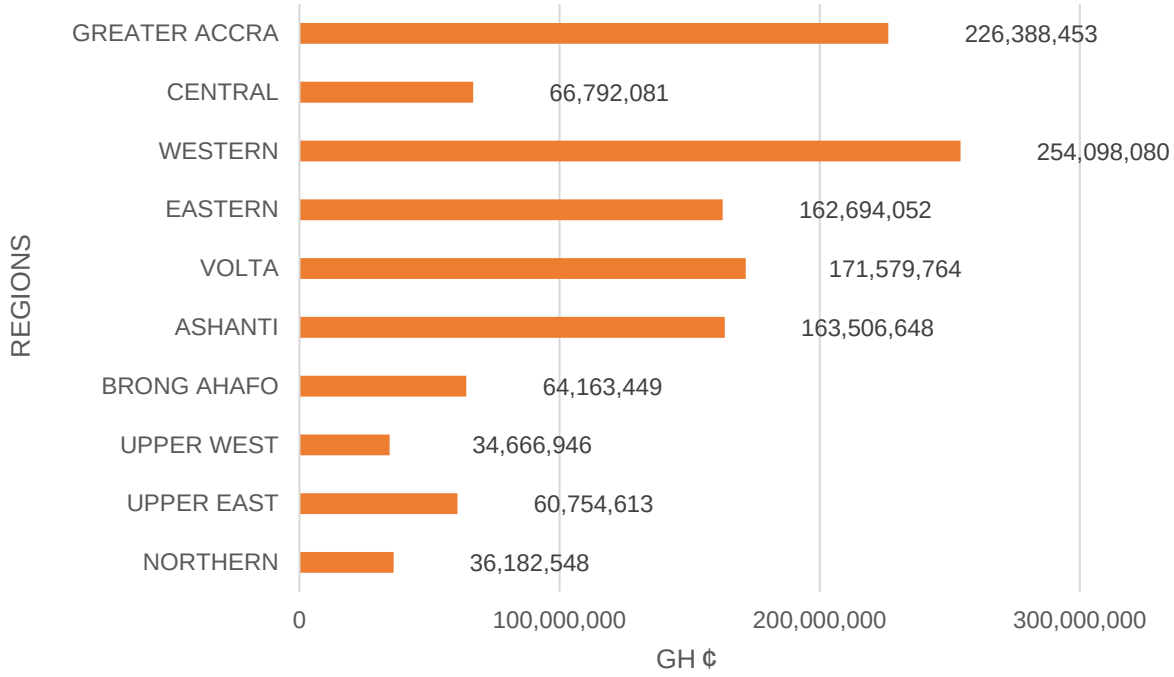


[4] Numbers in parentheses represent new road projects that receive funding in any given year. For example, in 2012, 33 projects were funded, out of which 26 were new ones and 7 old projects.

Figure 8 shows that the energy sector has received up to 43 per cent of the ABFA funding. This is followed by the water resources, works and housing sector, which has received a combined total of 26 per cent (water – 24%; and works and housing – 2%) of the ABFA allocation to the roads and other infrastructure priority areas; transport (14%); education (9%); and public safety (4%). The figure also shows that less than 1 per cent of the ABFA allocation has gone to the health sector.

In cedi terms, the Western and Upper West Regions received the largest share and the least share, respectively, of the ABFA between 2011 and 2016, as shown in Figure 9.

Figure 9: Regional distribution of ABFA-funded projects (2011–2016)



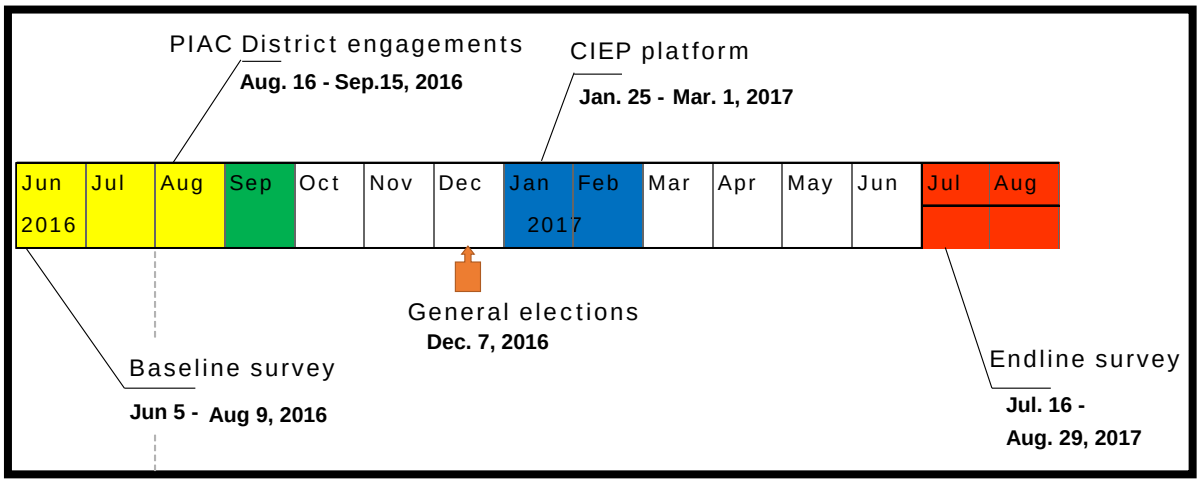
There is at least one ABFA-funded project in 62 per cent of study districts. However, the process evaluation has revealed that none of the districts have had a direct say in any project(s) they have received; nor is any part of the ABFA transferred directly to the DAs to be managed or used to pay contractors for work done. In fact, the majority of the DAs covered in the study did not know of the existence of the ABFA (as highlighted in the baseline study), nor did they know that some projects executed in their districts had been funded partly by the ABFA.

4. Timelines

Although the study was designed to be implemented over a three-year period, it was actually implemented over two years. This is because all of 2015 was spent re-designing the impact evaluation component of the study after the study team realised, during the first quarter of the year, that the ABFA projects whose impacts were to be assessed were unevaluable. The new design for the impact evaluation was finally approved by 3ie in December 2015, paving the way for the impact evaluation to commence in 2016. Detailed planning of and preparation for the interventions took place during the first

quarter of 2016. This entailed designing the questionnaires, training enumerators, testing/piloting the instruments and contacting respondents in the study districts. The baseline survey was conducted over a 60-day period from 5 June to 9 August. PIAC carried out T1 (leaders' forums) from 16 August to 15 September (before the 2016 presidential and parliamentary elections), while the CIEP (T2) was rolled out by PIAC (wth technical support from VOTO Mobile) between 25 January and 1 March 2017. Endline data collection took place from 16 July to 29 August 2017. Figure 10 illustrates the intervention timeline.

Figure 10: Intervention timeline



5. Evaluation: design, methods and implementation

5.1 Research ethics

The research proposal was designed and implemented in collaboration with experienced researchers from Wageningen University, the Norwegian University of Science and Technology and University of East Anglia, who oversaw each step of the process to ensure that the study was conducted ethically. Participation in the survey and intervention was entirely voluntary, and all participant identities were kept anonymous. All participants in both the baseline and the endline surveys were asked to sign a consent form before being interviewed and those who did not consent were allowed to drop out. All survey data files containing the participants' responses have been – and will continue to be – handled in strict confidence.

5.2 Identification strategy

As indicated in section 2.1, the impact evaluation study is designed to employ a 2x2 factorial randomised design with three interventions (two distinct treatments and one combination of treatments: T1, T2 and T1+T2) and one control group. Causal effects have been identified through random assignment. Randomisation took place mainly at the district level. The 120 districts selected to participate in the study were randomly assigned in groups of 30 to each of the four study arms.

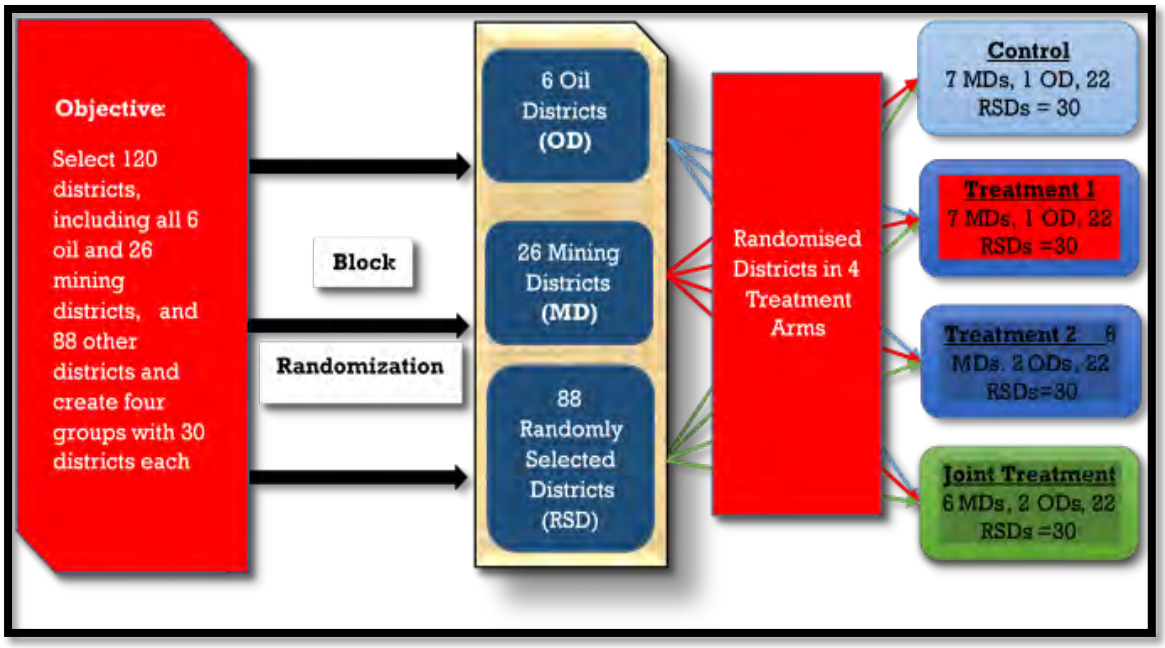
Assignment to treatments was done in the following way in three stages:

1. Districts were assigned a random number from 0 to 1 in Excel;

2. Within blocks of oil, mining and other areas, the first quarter with the highest number was assigned to have both T1 (forums) and T2 (ICT platform), the second-highest quarter was assigned T1 only, the third T2 only, and the final quarter was the control group (neither T1 and nor T2); and
3. Since the numbers of oil districts (6) and mining districts (26) were not divisible by four, two oil districts and two mining districts with the lowest number assigned in stage 2 were assigned another number from 0 to 1 and the one with the highest total number was assigned to T1+T2, the second to T1 only, the third to T2 only and the last to the control group.

Figure 11 illustrates how the districts were assigned to the four treatment arms.

Figure 11: Randomisation and assignment of districts to treatment arms



5.3 Sample size and design

A maximum of 30 respondents were expected to be interviewed in each of the 120 districts, which translates to a total expected sample size of 3,600. The sample size was determined by budgetary constraint imposed by the change in evaluation design, which was not accompanied by additional budget. The selection of respondents at the district level was biased towards duty bearers within the local government system, even though ordinary citizens were also targeted and interviewed. The 30 respondents were to be picked from a total of five EAs randomly selected from the list of all EAs within the districts. In each of the five EAs, six respondents were expected to be interviewed, with the breakdown as follows:

- 1 DAM;
- 1 UCM;
- 1 opinion leader;
- 1 member of the traditional authority; and
- 2 ordinary citizens (1 male and 1 female).

The following procedure was used to select the respondents in each of the EAs:

1. A list of all EAs and the corresponding DAMs manning the EAs was obtained from the district administration;
2. Five EAs were selected at random and DAMs selected as contact persons in the EAs;
3. The selected DAMs were contacted and appointments booked to meet them in their EAs, as well as asking to talk to a UCM, the chief or in his absence any prime member of the traditional authority;
4. In the EAs, DAMs, UCMs introduced by the DAMs, and the chief/prime member of the traditional authority were interviewed;
5. An additional opinion leader introduced by a DAM was also interviewed, and, where any of the UCMs or chiefs could not be reached, another opinion leader was added instead; and
6. Lastly, two ordinary citizens (1 male and 1 female) were randomly selected and interviewed using the following method:
    a. First, two enumerators agreed that one would interview the female citizen and the other the male, alternating from EA to EA;
    b. Then the two enumerators would each go in opposite directions, counting 100 steps from the place where the team met the DAM (note that if the meeting place was close to the border of the EA, the directions would be selected in such way that both resulting spots were within the EA); and
    c. At the resulting spot, the nearest person of the respective gender who was willing to participate would be interviewed.

Note that no selection was made on the basis of language, especially if a common language was spoken in the area. Where necessary, interpreters or team members who spoke the language were made available to explain the questions to the participants. The only exception was if the person did not speak the most common language in the area (either English, Twi/Fante or other language spoken by a team member), in which case a new participant was selected.

5.4 Power of the experiment

To compute the smallest magnitude of the effect or the minimum detectable effect size for some of our outcome variables, we used STATA's 'clustersampsi' command, using 80 per cent power and 0.05 per cent significance level. We used two-sided tests, although an argument could be made for a one-sided test – it was very unlikely that our variables of interest would decrease as a consequence of our treatments. We used an equal-allocation design, as our cluster size (i.e. the district) varied only very little – on average, we had 29.5 participants per cluster, with a standard deviation (SD) of 2.2. For decision makers, we had 5 DAMs, 5 UCMs and, on average, 3 chiefs per cluster (the number of chiefs varied between 0 and 10). Mean, SD and intra-cluster correlation were derived from the baseline for each outcome variable. The results are reported in Table 7.

Table 7: Power calculation

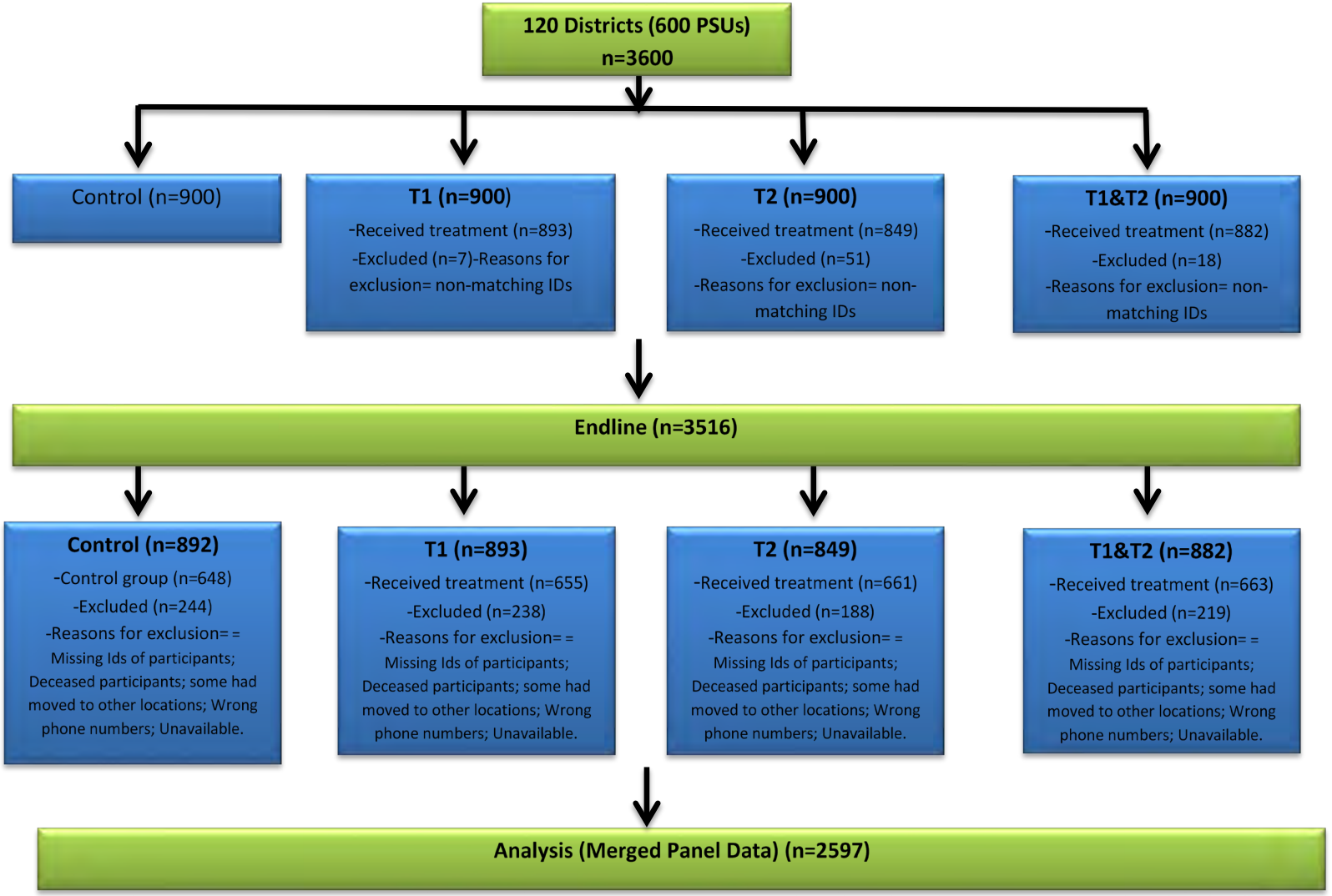
	Mean number of participants per cluster	Mean	SD	ICC	Detectable effect	Corresponding upper mean	Corresponding lower mean
1. Received info on oil&gas or mining revenue use in Ghana or in my area in past year. Scale: binary.	29	0.313	0.464	0.017	0.05	0.37	0.26
2. How would you characterise your knowledge about what happens to revenues from oil and gas production? Scale: 0 to 3	29	0.375	0.581	0.031	0.08	0.45	0.30
3. Has heard about PRMA, ABFA, or PIAC. Scale: binary.	29	0.456	0.498	0.031	0.07	0.52	0.39
4. You have right to demand information about oil, gas or mining revenues from responsible national officials and leaders. Scale: 0 to 4.	29	3.82	0.59	0.03	0.08	3.90	3.74
5. You have right to demand better handling of oil, gas and mining revenues from responsible national officials and leaders. Scale: 0 to 4.	29	3.82	0.60	0.04	0.08	3.90	3.73
6. Discussed usage of revenues from oil, gas and mining with family, friends or colleagues in past year. Scale: Binary.	29	0.20	0.40	0.04	0.06	0.26	0.15
7. Contacted somebody in past year to ask about how revenues from oil, gas or mining are handled in Ghana or in area. Scale: Binary.	29	0.06	0.24	0.05	0.04	0.10	0.03
8. DAM has discussed revenues from oil, gas or mining during internal meetings in past year. Scale: 0 to 3.	5	0.10	0.46	0.00	0.11	0.20	-0.01
9. UCM has discussed revenues from oil, gas of mining during internal meetings in past year. Scale: 0 to 3.	5	0.14	0.51	0.19	0.16	0.29	-0.02
10. Chief: has discussed revenues from oil, gas or mining with other traditional leaders in past year. Scale: 0 to 3.	3	0.27	0.76	0.40	0.31	0.58	-0.03

The results show that the study could detect relatively small effects. A challenge with regard to outcome variables 4 and 5 was that very few respondents chose an alternative other than ‘completely agree’, which meant there was only a limited amount of variation for these two variables. These were omitted from the final impact analysis. Another potentially problematic outcome variable was outcome 2, in which most people admitted to having either no or only a little knowledge about what happens to oil and gas revenues. Just 116 and 22 respondents, respectively, chose ‘some knowledge’ or ‘good knowledge’. All other variables showed a good amount of variation in responses.

5.5 Participation in the study

A total of 3,600 respondents were targeted to take part in the study. Approximately 3,516 (98.3%) were covered during the survey. In the endline survey, we set out to collect panel data by re-interviewing the same respondents interviewed during the baseline survey. This meant that 3,516 respondents would have been interviewed. However, 136 baseline respondents had to be dropped either as a result of unmatched/missing ID numbers or failure to provide their telephone numbers during the baseline survey, leaving an endline sample of 3,416 who were followed. Figure 12 depicts the flowchart of participants in the study.

Figure 12: Study participants' flowchart



5.6 Data collection

Our main data sources are the baseline and endline surveys. Structured questionnaires were developed for both and data collected using electronic data capture tools: Open Data Kit for the baseline survey and SurveyToGo, a similar but more customisable computer-assisted interviewing platform, for the endline survey. Training consisted of a three-day training at baseline and a two-day training at endline, both led by the KITE research team. Pilot surveys were conducted for each wave of data collection. Data collection was undertaken by a combination of KITE staff and research assistants from the Planning Department of Kwame Nkrumah University of Science and Technology. Researchers were paid daily remuneration in Ghanaian cedi, equivalent to US$20. However, no respondent was paid for participating in the study.

5.7 Data quality assurance

To ensure data quality, the following measures were designed and/or observed:

1. Protocols were developed for sampling in the field, as well as for the field work itself;
2. Two separate training sessions were undertaken so that research assistants could acquaint themselves with the questionnaires, ensure that they understood the questions and could explain them in the local dialect, and knew how to administer the questionnaire using the Open Data Kit and SurveyToGo software;
3. Two separate pre-tests were carried out in three districts in the Greater Accra, Eastern and Ashanti Regions, respectively. The specific districts visited were Suhum-Kraboa-Coaltar in the Eastern Region, Ada West in the Greater Accra Region and the Ejisu-Juaben in the Ashanti Region, between 24 April and 26 May 2016 for the baseline survey and June 2017 prior to the endline survey. The purpose of the pre-testing was to get the research assistants to demonstrate the skills acquired during the training sessions, to have a sense of the interview time, and to assess responses from respondents to check the relevance and understanding of the questions administered. It was also important to assess the political sensitivity of the questionnaires, given that the study was being carried out in an election year when citizens are relatively highly politically sensitive;
4. The questionnaires were reviewed and the questions refined after both the training and pre-testing. Debriefing sessions after the pre-testing allowed field issues to be adequately addressed, ensuring high quality in the data collected;
5. Research assistants were drawn from various research-based and development-oriented institutions from the Kwame Nkrumah University of Science and Technology. The research assistants were MSc and MPhil degree holders and had undertaken similar studies during and after their academic training, using similarly robust study designs;
6. Selected DAMs and UCMs, opinion leaders and members of the traditional authorities were contacted beforehand to arrange interview times. This ensured maximum compliance with our randomisation design and a high response rate, while allowing field teams to plan their travel in the field optimally;
7. Monitoring the conduct of interviews, field supervisors reviewed, edited and demanded accuracy in the presentation of the filled questionnaires. They were

also monitoring adherence to field protocols by the team to elicit the best possible cooperation from interviewees; and

8. In terms of data management and analysis, data were collated at a central point from all the tablets and uploaded to a Dropbox account specifically created for the study. A technical team in the base office downloaded the data, conducted data audits to check for regularities or irregularities, notified the field team where necessary and cleaned the data. The Open Data Kit and SurveyToGo software automatically kept back-up files.

6. Programme or policy: design, methods and implementation

6.1 Programme design and methods

As explained in section 2, the experiment includes two PIAC interventions: the leaders' information dissemination forum and the ICT-based CIEP. Both experiments were designed by the study team and its collaborating partners in close consultation with PIAC. The interventions were, however, implemented by PIAC with funding from GOGIG,[5] with the study team in close attendance to ensure compliance with the study design.

6.2 Content of interventions

The contents of the two information-based treatments were developed by PIAC with the support of the study team.

6.2.1 Treatment 1

Information provided by PIAC at the public forums organised as Treatment 1 included information on: PIAC's own activities and mandate; oil and gas revenue management, with particular focus on ABFA funding and the PRMA; citizens' rights and natural resource governance; and transparency and accountability as the golden rule of good governance in oil and gas revenue management. To ensure uniformity and easy appreciation of the issues to be presented and discussed, GOGIG engaged a graphic designer to package the information to be presented during the forums into infographics, which all the teams used.

A total of 60 meetings were organised by three teams concurrently to ensure the timely completion of the forums before the 2016 electioneering campaigns peaked. Each team comprised 1 PIAC member, 1 PIAC Secretariat staff member and 1 member of personnel from any of the 3 collaborating institutions (KITE, Ghana Centre for Democratic Development and Africa Centre for Energy Policy). Each of the forums was expected to be attended by 30 participants drawn from the DAs, UCs, traditional authorities, stakeholder institutions with nominees on PIAC and the public.

[5] Ghana Oil and Gas for Inclusive Growth (GOGIG) is a five-year programme funded by the UK Department for International Development that supports Ghana in maximising the potential of the oil and gas sector to promote inclusive, broad-based economic growth and poverty reduction. GOGIG seeks to address policy and legislative gaps, while strengthening the capacity of government institutions and oversight actors to deliver a well-managed petroleum sector.

The PIAC district-level forums were organised between 16 August and 15 September 2016, one meeting per district with each meeting lasting an average of four hours. The meetings were organised using a town hall format and the information presented by the PIAC members on each of the teams using PowerPoint. At the beginning of each meeting, PIAC informed participants that their feedback would be relayed to the relevant authorities and duty bearers. This was meant to provide an incentive for active participation throughout the forum.

Facilitated discussion ensued after the presentations, during which participants were allowed to ask questions and express their views and preferences regarding the management of Ghana petroleum revenues. In addition, pre- and post-engagement evaluation was conducted using a structured questionnaire to assess participants' prior knowledge and the effectiveness of the forums in terms of knowledge accrued after these forums.

6.2.2 Treatment 2

PIAC developed eight messages with the support of the study team. The messages were framed around five thematic areas:

1. General information on oil and gas production in Ghana, including how much revenue the government has received so far, translated into 'understandable' figures, such as the number of hospitals, schools and roads that have been built;
2. An explanation of oil and gas legislation, including revenue distribution and PIAC;
3. An explanation of the ABFA and what it does, priority areas that have been focused on so far and how oil money has been spent; this theme was presented in three parts;
4. An outline of options for the next three years: where should priorities lie? A short summary of where money has gone (as in the PIAC presentation);
5. An explanation of DAs and MPs and what they do in relation to oil and gas revenues; and how citizens or UCMs or DAMs or MPs can influence oil revenue distribution in the Ghanaian system; or do we direct them to PIAC that will act as an intermediary?; and
6. Repeating the message about how use of oil and gas revenues is important for every Ghanaian; how to get more information and (legally) influence distribution; what PIAC is for and how PIAC relies on the voice of every Ghanaian to present recommendations to Parliament.

The messages were reviewed by GOGIG, VOTO Mobile and a communications expert to ensure their appropriateness. KITE and its partners also reviewed and commented on the messages to ensure that they were in line with the research design. The finalised messages were then read out to randomly selected audiences for their feedback on issues such as catchiness, length, richness, etc. The final messages were translated into three widely spoken Ghanaian languages – Twi, Ewe and Hausa – and recorded in the three languages in addition to English.

GOGI engaged VOTO Mobile, a Ghana-based technology start-up and social enterprise, to work with PIAC to develop the ICT platform used to administer Treatment 2. The platform combined IVR and SMS technologies to disseminate the messages on behalf of PIAC. SMS was added to the IVR to help ensure that the recipients of the messages,

who were expected to call into a hotline to provide feedback if so desired, would be able to pick up facts and figures from the text messages that were sent after each IVR.

The CIEP was rolled out over a period of five weeks from 25 January to 1 March 2017 in 60 T1 and T1+T2 districts. Two pre-recorded messages on oil and gas revenues and expenditures, as well as citizens' right to demand sound use of petroleum revenues, were sent out every week to the phone numbers of participants between 25 January and 19 February 2017. Each IVR message was followed by an SMS summarising the key points in the IVR message. Prior to sending the IVR messages, an advance SMS was sent on 24 January 2017 to all participants to confirm the correctness or otherwise of their phone numbers and to alert them to the commencement of the treatment. To give more respondents the opportunity to complete their surveys, VOTO Mobile placed follow-up calls from 22 February to 1 March. Originally, the messages were to be sent on Wednesdays at midday and Saturdays at 10am. However, the Wednesday slot had to be changed to Sundays following the realisation after the first week that the response (pick-up) rates on the weekend were much higher than those at mid-week. In addition to the messages sent, a hotline was set up during the roll-out period to allow participants to call in and listen to messages at a time that was convenient for them and also register their concerns on the use of oil and gas revenues in Ghana.

6.3 Implementation of interventions

Although the interventions were implemented by PIAC and VOTO Mobile (in the case of T2 on behalf of PIAC), the study team put in place protocols to ensure that the treatments were administered in accordance with the study design.

Firstly, the study team met with PIAC on a couple of occasions prior to the roll-out of the intervention to ensure that PIAC committee members and Secretariat staff were familiar with the study design and conversant with what they were supposed to do in rolling out the interventions. Secondly, the study team assigned representatives of the collaborating institutions (KITE, Ghana Centre for Democratic Development and Africa Centre for Energy Policy) to each of the three teams that administered T1 in the 60 districts. This was intended to serve two purposes: to provide logistical support to the PIAC team and ensure adherence to agreed protocols. In the case of CIEP, the phone numbers of some study team members as well as those of the PIAC Secretariat staff were added to the treatment group, to monitor the broadcast of the eight messages. The systems put in place helped ensure that any deviations from the study design were identified and corrected as soon as possible.

For instance, the representatives of the study team noticed in the initial stages of the district dissemination forums that some DAMs and UCMs who were expected to be in attendance had not been invited by the local organisers of the meetings who had been tasked by PIAC to send out the invitations. As per the evaluation design, the DAMs and some of the UCMs who had been interviewed during the baseline survey were to be part of the PIAC meetings. However, it turned out that the local organisers had invited UCMs and DAMs who had not been interviewed during the baseline survey at the expense of those who had been.

As a result, the study team representative had to personally intervene by extending the invitation to those UCMs and DAMs who were interviewed during the baseline survey to join in subsequent meetings. Although this error was corrected, the subsequent meetings did not involve all the expected UCMs and DAMs as they had already committed to other assignments. Also, the KITE team discovered during the monitoring of the implementation of the CIEP that the messages that were supposed to be sent on the weekend of week 3 had not been sent. VOTO Mobile's attention was quickly drawn to the mix-up and the message was immediately broadcasted.

6.4 Recruitment strategy and participation

6.4.1 Treatment 1

According to the study design, on average 30 participants were to be invited to attend each of the public engagement forums (T1). PIAC was required to randomly select and invite: 10 elected and 2 non-elected DAMs; 1 district MP (randomly selected if there was more than 1 in a district); 3 UCMs, the heads of UCs from randomly selected units in the district; and around 5 representatives from traditional authorities, local media and identifiable civil society groups. At least five of the DAMs and three UCMs invited to the PIAC district meetings ought to have been surveyed during the baseline.

Average attendance at the PIAC public meetings in the T1 treatment districts was 34, with participation ranging from 15 to 40; while an average of 32 participants attended the meetings in the T1+T2 treatment districts, with participation ranging from 17 to 55, as shown in Table 8. Note the gender imbalance, which – as mentioned in section 3.3 above – was expected, due to the oversampling of (mostly male) duty bearers.

Table 8: Participation in PIAC district information forums by treatment arm

	T1 districts				T1+T2 districts			
	District	Number of participants	Male	Female	District	Number of participants	Male	Female
1	Ahanta West	30	29	1	Accra Metropolitan	38	28	10
2	Sefwi Akontombra	37	36	1	Ada East	17	11	6
3	Sefwi-Wiawso	29	24	5	Agona West	32	27	5
4	Twifo Ati-Mokwa	46	39	7	Amansie Central	38	34	4
5	Agona East	31	28	3	Amansie West	35	34	1
6	Awutu Senya East	18	15	3	Aowin/Suaman	39	34	5
7	Ga South	36	29	7	Asante Akim Central	45	32	13
8	Birim Municipal	43	26	7	Asante Akim South	34	24	10
9	Kwaebibrem	25	18	7	Assin North	39	34	5
10	East Akim	28	23	5	Bawku	31	26	5
11	Akuapim South	38	32	6	Bekwai	30	24	6
12	Jasikan	44	33	11	Birim South	35	29	6
13	Krachi East	40	37	3	Fanteakwa	33	31	2
14	Ho West	36	29	7	Ga West	18	12	6
15	Adaklu (New)	36	29	7	Garu-Tempane	30	25	5
16	Kwabre East	40	31	9	Jomoro	33	29	4
17	Atwima Nwabiagya	40	31	9	Kumasi	55	40	15
18	Adansi North	41	36	5	Kwahu East	32	22	10
19	Bosome Freho	41	32	9	Kwahu South	31	22	9
20	Sekyere South	15	13	2	La-Nkwantanang-Madina	29	26	3
21	Zabzugu	36	32	4	Wassa Amenfi East	30	24	6
22	Kpandai	34	34	0	Wassa Amenfi West	30	25	5
23	Karaga	34	30	4	Mion	37	34	3
24	Gushegu	33	31	2	Nabdam	20	17	3
25	Kassena Nankana West	33	27	6	New Juaben	28	22	6
26	Wa Municipal	32	27	5	Nkoranza North	30	28	2
27	Sunyani Municipal	34	27	7	Savelugu	37	30	7
28	Sene West	35	28	7	Sekondi-Takoradi	28	20	8
29	Jaman South	28	27	1	Upper Denkyira East	36	32	4
30	Bosomtwe	34	30	4	Abokobi	38	25	13

Source: PIAC (2016).

Given that PIAC has only one secretariat located in the national capital Accra, it had to rely on local organisers at the district level (typically a focal person at the district/municipal/metropolitan assembly) to invite participants and provide logistical support. As explained in the preceding section, although the study team made it clear to PIAC that at least 50 per cent of the invitees from among the DAM and UCM category ought to have been part of the baseline survey, this did not happen in all the districts. This led to a situation where some districts had fewer than expected DAMs and UCMs surveyed at the baseline being treated, as shown in Table 9 below.

Table 9: Number of baseline respondents who received treatments

	T1 arm					T1+T2 arm				
	District	#DAM baseline	#DAM treated	#UCM baseline	#UCM treated	District	#DAM baseline	#DAM treated	#UCM baseline	#UCM treated
1	Ahanta-West	5	1	5	1	Accra Metropolitan	5	0	5	4
2	Sefwi Akontombra	5	3	5	1	Ada East	7	1	5	0
3	Sefwi Wiawso	5	3	5	1	Agona West	5	0	5	2
4	Twifo Ati-Mokwa	5	3	5	10	Amansie Central	5	19	5	5
5	Agona East	5	2	5	2	Amansie West	5	0	5	2
6	Awutu Senya East	5	1	5	0	Aowin	6	1	5	0
7	Ga South	4	1	5	3	Asante Akim Central	5	2	5	2
8	Birim Municipal	5	9	5	0	Asante Akim South	5	1	5	0
9	Kwaebibrem	5	6	5	1	Assin North	5	2	5	6
10	East Akim	5	9	5	8	Bawku	5	3	5	2
11	Akuapim South	5	3	5	2	Bekwai	5	3	0	0
12	Jasikan	5	13	5	4	Birim South	5	10	5	1
13	Krachi East	5	13	5	2	Fanteakwa	5	14	5	1
14	Ho West	5	9	5	2	Ga West	5	0	5	3
15	Adaklu (New)	5	1	5	1	Garu-Tempane	5	1	5	0
16	Kwabre East	5	15	5	7	Jomoro	5	3	5	1
17	Atwima Nwabiagya	5	12	5	6	Kumasi	5	34	5	0
18	Adansi North	5	16	5	4	Kwahu East	5	6	5	7
19	Bosome Freho	5	8	5	5	Kwahu South	5	9	5	3
20	Sekyere South	5	5	5	0	La-Nkwantanang-Madina	5	0	5	2

	T1 arm					T1+T2 arm				
21	Zabzugu	5	5	5	4	Wassa Amenfi East	5	5	5	5
22	Kpandai	5	5	5	6	Wassa Amenfi West	5	4	5	0
23	Karaga	5	5	5	4	Mion	5	4	5	8
24	Gushegu	5	4	5	8	Nabdam	5	3	5	1
25	Kassena Nankana West	5	5	5	3	New Juaben	5	12	5	4
26	Wa Municipal	5	5	5	1	Nkoranza North	5	2	5	1
27	Sunyani Municipal	5	5	5	0	Savelugu	5	4	5	5
28	Sene West	5	5	5	2	Sekondi-Takoradi	5	1	5	4
29	Jaman South	5	5	5	5	Upper Denkyira East	5	3	5	1
30	Bosomtwe	3	3	3	3	Abokobi	0	0	5	0
	Total	147	180	148	96	Total	148	147	145	70

Source: PIAC (2016).

6.4.2 Treatment 2 and joint treatment (T1+T2)

According to the original research design, a self-selection/selection sampling technique was to be used to select participants who would be receiving T2 (CIEP) and the joint intervention T1+T2. Thus, the creation of the CIEP was to be publicised using posters, information leaflets, radio announcements and so on, asking interested citizens to sign up by sending an SMS to a dedicated number. The recruitment strategy, however, had to change after the baseline survey following the realisation that the majority of the baseline respondents had indicated their willingness to be part of subsequent stages of the projects and as a result provided their phone numbers to be contacted. Using this strategy, the recruitment of participants into the T2 treatment arm was quite straightforward, as the numbers of all baseline respondents in the districts were forwarded to VOTO Mobile and uploaded onto the CIEP.

Recruitment of participants to receive T1+T2 was, however, quite tricky during implementation. Receiving the joint intervention treatment of T1+T2 meant that the respondents would have attended the PIAC district meetings and also participated in the CIEP. However, as explained above, getting respondents who fitted into this distinct category proved difficult because a good number of DAMs and UCMs who attended the PIAC meetings (T1) were not part of the baseline survey, while their baseline counterparts were either not invited by the organisers of the PIAC meetings or could not attend when eventually invited.

To overcome this challenge, the study team decided to automatically maintain the contact database of the participants (UCMs and DAMs) who were covered in the baseline and were also present at PIAC's meeting. For the participants (UCMs and DAMs) who were not interviewed as part of the baseline but were present at the PIAC meetings, the list for each district (in other words, T1+T2 districts) was compiled and a random list of participants selected and subsequently added to the selected list to make up for the threshold number of 30 per district. Telephone numbers of expected participants in the T1+T2 districts were also forwarded to VOTO Mobile and loaded onto their platform.

In total, 1,800 participants were expected to receive interventions T1 and T1+T2. Table 10 shows the number of respondents reached by VOTO Mobile in the various districts within T2 and T1+T2 treatment arms.

Table 10: Participants' response rate to all eight messages

	T2 arm		T1+T2 arm	
	District	Response rate (%)	District	Response rate (%)
1	West Mamprusi	62	Abokobi	58
2	Upper West Akyem	50	Accra Metropolitan	75
3	Tema	46	Ada West	76
4	Tamale Metropolitan	73	Agona West	74
5	Tain District	50	Amansie Central	42
6	Sene East	23	Amansie West	52
7	Sekyere Central	50	Aowin	53
8	Obuasi Municipal	38	Asanti Akim Central	52
9	Nzema East	50	Asanti Akim South	50
10	North Dayi	39	Assin North	72
11	Nanumba South	69	Bawku	64
12	Mfantseman	71	Bekwai	72
13	Kumbungu	69	Birim South	55
14	Komenda-Edina	62	Fanteakwa	70
15	Kintampo	42	Ga Wast	64
16	Gomoa West	12	Garu-Tempane	50
17	Ga East	31	Jomoro	81
18	Ellembele	38	Kumasi	56
19	Daffiama Bussie	50	Kwahu East	52
20	Bolgatanga Municipal	52	Kwahu South	63
21	Bole	50	La-Nkwantanang-Madina	42
22	Birim North	61	Wasssa Amanfi East	52
23	Bawku West	60	Amanfi West	52
24	Atwima Mponua	50	Mion	43
25	Atwima Kwanwoma	50	Nabdam	50
26	Assin South	50	New Juaben	56
27	Asikuma-Odoben	74	Nkoranza North	56
28	Ajumako-Enyan	65	Savelugu	95
29	Afadjato South	54	Sekondi-Takoradi	76
30	Adansi South	85	Upper Denkyira East	35
	Total average	52.49	Total average	59.60

Source: KITE/VOTO Mobile (2017).

Table 10 shows that an average of approximately 52 per cent of the intended recipients in the T2 treatment arm participated in the engagement throughout the entire five-week period, compared with approximately 60 per cent in the T1+T2 treatment arm. Table 11, on the other hand, shows the extent to which the participants who participated in the CIEP treatment actually listened to the pre-recorded messages that were delivered by the platform operator. The messages sent by VOTO were divided into three main blocks: the first block covered the language selection; the second covered the main pre-recorded message; and the last block covered the questions posed at the end of each of the messages.

Table 11: Participation in message blocks – treatment arms

		Blocks		
Treatment arms		Language selection	Main message	Question
T2	Total average	73%	10%	17%
T1+T2	Total average	71%	10%	19%

Source: KITE/VOTO Mobile (2017).

Table 11 shows that, although 52% and 59% of the intended recipients in the T2 and T1+T2 treatment arms respectively participated in the CIEP, the majority of them (73% in the case of T2 and 71% in the case of T1+T2) dropped the calls at the language selection block, with only 27% and 29% completing the calls in the T2 and T1+T2 treatment arms, respectively. It should be stressed, however, that SMS messages (containing summaries of the key messages in the IVR messages) were sent to all T2 and T1+T2 respondents. This means that even those who dropped the calls still received the SMS treatment.

7. Impact analysis and results of key evaluation questions

7.1 Empirical model

We estimate our treatment effects by comparing the mean outcomes between the different experimental groups at the three levels: DAMs, UCMs and ordinary citizens. In all, three models (as specified below) are estimated to test the treatment effects. Model 1 is a simple regression with treatment dummies. In Model 2, we control for baseline value of the outcome; and in Model 3, we control for the baseline value of the outcome and other demographic variables, geographical variables and use of different media.

In the three models, the coefficients of interest are β_1, β_2 and β_3, where: β_1 represents the marginal effect of PIAC leader meetings in districts without citizens' platform (relative to control); β_2 represents the effect of the citizens' platform in districts without PIAC leader meetings; and β_3 gives us the combined effect of both treatments.

We rely on multiple related measures, such as different measures of attitudes. In this case, problems related to multiple hypothesis testing arise. For example, it may be that all measures trend positive, but none is individually statistically significant. In such a case, it is possible that effects are jointly significant across the family of measures. Conversely, it may be that, by chance, one or other measure is significant in a family while most are not, or even trend in the wrong direction. In such cases, it is possible that there are no significant effects across the family of measures. To generate a meaningful summary of multiple effects within each family, we follow the approach of Kling et al. (2007) to create standardised indices of outcomes on related items. Even with the indices, we are testing for multiple levels and conduct multiple tests (T1, T2 and T1+T2) in each model. In total, nine hypotheses are tested in each model, so we will apply false discovery rate (FDR) corrections (Anderson 2008).

We also estimate the models for each individual outcome, adjusting for FDR across all outcomes under a given level. Finally, robust standard errors clustered over districts are used in all the models.

Model 1

Model 1 is a simple regression with treatment dummies:

$$y_{ikE} = \alpha + \beta_1 T1_k + \beta_2 T2_k + \beta_3 (T1_k T2_k) + \varepsilon_{ik} \qquad (1)$$

where y_{ikE} is the outcome for respondent i (with i = 1, …, 30) in district k (with k = 1, …, 120) at endline (t=E); T1 is a dummy variable indicating assignment of the district to

Treatment 1 (the PIAC meetings); T2 is a dummy variable indicating assignment of the district to Treatment 2 (the citizens' platform); T1+T2 is a dummy variable indicating assignment of the district to the combined treatment T1+T2; and ε_{ik} is the usual disturbance term clustered at the district level.

Model 2

In Model 2, we follow McKenzie (2012) and control for the baseline measurement of the outcome variable, y_{ikB} to increase statistical power:

$$y_{ikE} = \alpha + \beta_1 T1_k + \beta_2 T2_k + \beta_3 (T1_k T2_k) + \delta y_{ikB} + \varepsilon_{ik} \qquad (2)$$

Model 3

In Model 3, we control for the baseline values and additional control variables. Controlling for further variables should decrease variance in the outcome and make the estimated treatment effects more precise:

$$y_{ikE} = \alpha + \beta_1 T1_k + \beta_2 T2_k + \beta_3 (T1_k T2_k) + \delta y_{ikB} + X_{ik}\tau + \varepsilon_{ik} \qquad (3)$$

Here, X_{ik} are gender, urban/rural division of communities, education, oil and mining activity, radio, television and mobile phone ownership, discussing political matters; and for Level 3 also traditional leader and opinion leader dummies.

7.2 Data summary

Tables 12, 13 and 14 show summary statistics for endline values of outcomes for each sub-group of respondents (Level 1, Level 2 and Level 3) and Table 15 shows the summary statistics for demographic variables and other covariates.

Table 12: Summary statistics – District Assembly members (Level 1)

Variable	N	Mean	SD	Min.	Max.
Overall outcome	380	0.92	2.92	-14.02	15.07
Knowledge	418	1.20	4.06	-3.50	17.25
S7Q1	433	0.83	0.74	0	3
S7Q2	434	0.73	0.73	0	3
S9Q2	433	0.32	0.57	0	3
S9Q5	419	0.31	0.58	0	2
S9Q9	434	0.64	0.74	0	2
Attitudes	414	-0.34	5.18	-53.34	3.58
S8Q1a	431	3.91	0.41	0	4
S8Q1b	432	3.94	0.26	1	4
S8Q1c	432	3.93	0.34	0	4
S8Q1e	431	3.92	0.35	0	4
S8Q2a	432	3.47	0.97	0	4
S8Q2b	433	3.70	0.76	0	4
S7Q4a	432	0.88	1.53	0	4
S7Q4b	430	0.57	1.25	0	4
S7Q4c	430	0.45	1.12	0	4
Demanding transparency	419	1.14	3.28	-7.32	10.62
S6Q7	434	0.50	0.50	0	1
S6Q8	433	0.20	0.40	0	1
S8Q4	432	0.16	0.37	0	1
S8Q7	426	0.95	0.21	0	1
S14Q1	434	0.86	0.35	0	1
S11Q6	428	0.29	0.68	0	3
Promoting transparency	426	0.60	3.79	-0.99	20.73
S11Q8	431	0.18	0.59	0	3
S11Q9	427	0.05	0.22	0	1
S11Q12	431	0.24	0.68	0	3
S11Q14	432	0.36	0.84	0	3

Table 13: Summary statistics – Unit Committee members (Level 2)

Variable	N	Mean	SD	Min.	Max.
Overall outcome	411	0.56	3.49	-13.37	17.65
Knowledge	487	0.80	4.25	-2.19	21.20
S7Q1	509	0.42	0.61	0	3
S7Q2	509	0.38	0.56	0	3
S9Q2	509	0.16	0.45	0	3
S9Q5	494	0.08	0.31	0	2
S9Q9	504	0.21	0.49	0	2
Attitudes	460	-0.97	8.26	-62.68	4.75
S8Q1a	508	3.93	0.28	1	4
S8Q1b	509	3.94	0.24	3	4
S8Q1c	508	3.84	0.56	0	4
S8Q1d	509	3.85	0.48	0	4
S8Q1e	507	3.85	0.56	0	4
S8Q1f	508	3.89	0.39	0	4
S8Q2a	494	3.25	1.24	0	4
S8Q2b	507	3.70	0.71	0	4
S7Q4a	505	1.05	1.65	0	4
S7Q4b	503	0.65	1.35	0	4
S7Q4c	499	0.58	1.28	0	4
S7Q4d	488	1.28	1.67	0	4
Demanding transparency	479	1.23	3.87	-5.35	15.73
S6Q7	510	0.32	0.47	0	1
S6Q8	511	0.12	0.32	0	1
S8Q4	510	0.11	0.31	0	1
S8Q7	486	0.88	0.33	0	1
S14Q1	511	0.79	0.41	0	1
S10Q6	508	0.43	0.90	0	3
S10Q14	507	0.27	0.70	0	3
Promoting transparency	502	0.33	2.59	-0.74	14.61
S10Q8	507	0.25	0.72	0	3
S10Q9	504	0.04	0.20	0	1
S10Q12	509	0.28	0.75	0	3

Table 14: Summary statistics – Ordinary citizens (Level 3)

Variable	N	Mean	SD	Min.	Max.
Overall outcome	1202	0.55	2.33	-9.27	11.12
Knowledge	1578	0.34	3.75	-2.02	24.12
S7Q1	1644	0.37	0.59	0	3
S7Q2	1642	0.35	0.59	0	3
S9Q2	1632	0.13	0.39	0	3
S9Q5	1600	0.08	0.29	0	2
S9Q9	1625	0.14	0.40	0	2
Attitudes	1417	0.76	5.91	-38.30	6.01
S8Q1a	1630	3.90	0.44	0	4
S8Q1b	1629	3.93	0.31	0	4
S8Q1c	1623	3.81	0.61	0	4
S8Q1d	1620	3.84	0.52	0	4
S8Q1e	1618	3.80	0.67	0	4
S8Q1f	1617	3.83	0.55	0	4
S8Q2a	1562	3.09	1.29	0	4
S8Q2b	1602	3.44	0.98	0	4
S7Q4a	1632	1.18	1.65	0	4
S7Q4b	1619	0.89	1.48	0	4
S7Q4c	1603	0.80	1.38	0	4
S7Q4d	1546	1.40	1.67	0	4
Demanding transparency	1400	0.77	3.54	-6.47	12.94
S4Q4a	1557	2.23	1.03	0	3
S6Q7	1647	0.24	0.43	0	1
S6Q8	1646	0.07	0.25	0	1
S8Q4	1637	0.07	0.26	0	1
S8Q7	1481	0.86	0.35	0	1
S14Q1	1652	0.67	0.47	0	1

Table 15: Summary table covariates

Variable	N	Mean	SD	Min.	Max.
Gender (1: Female)	2597	0.18	0.39	0	1
Urban	2597	0.45	0.50	0	1
Education	2591	4.56	2.59	0	8
Oil or mining in the area	2582	0.13	0.34	0	1
Radio	2597	0.89	0.31	0	1
Television	2596	0.83	0.38	0	1
Mobile phone	2594	0.40	0.49	0	1
Discussing political matters	2596	2.46	1.59	0	5
DA	2597	0.17	0.37	0	1
UC	2597	0.20	0.40	0	1
Traditional leader	2597	0.11	0.31	0	1
Opinion leader	2597	0.23	0.42	0	1

7.3 Balance

To test the comparability of our treatment arms, we calculate the group means of the main background and outcome variables using the baseline survey data. We then perform F-tests to detect differences in means across study groups overall, and t-tests to

detect differences in means across each pair of study groups. The null hypothesis is that there is no difference in means; convention dictates that p-values lower than 10 per cent indicate that we can reject this hypothesis and conclude that there is a significant difference across study groups. A large number of cases in which we have to reject the null would question the internal validity of our study. Table 16 shows the summary of the variable test results.

The results show that, across the board, we reject overall equality of means in only one out of 21 cases, namely for the outcome question on DAM behaviour (‘Have you discussed revenues from oil, gas or mining during internal meetings in the past year?’). Frequencies vary significantly across groups, and the pairwise t-tests indicate that DAMs in group T1 have discussed resource revenues significantly less frequently than those in the control group and in group T2.

Table 16: Balance test results at baseline across all outcome variables

	Means				F-test P-value	Pairwise t-tests P-value					
	T1	T2	(T1+T2)	Control	All	Control-T1	Control-T2	Control-(T1+2)	T1-T2	T1-(T1+T2)	T2-(T1+T2)
Background variables											
Gender (female=1)	0.214	0.229	0.231	0.204	0.106	0.384	0.031	0.052	0.233	0.248	0.873
Literacy (own language)	1.260	1.201	1.170	1.217	0.528	0.351	0.143	0.468	0.636	0.791	0.432
Education	6.001	5.751	6.052	6.086	0.441	0.725	0.137	0.871	0.310	0.825	0.159
Presence of oil or mining districts	0.266	0.273	0.237	0.276	0.986	0.736	0.978	0.934	0.756	0.798	0.956
Radio ownership	0.935	0.921	0.924	0.933	0.702	0.598	0.457	0.906	0.851	0.448	0.283
Mobile phone ownership	0.97	0.969	0.967	0.975	0.846	0.571	0.473	0.413	0.937	0.783	0.82
Frequency of discussion of political matters and public affairs with friends, family or colleagues.	2.346	2.395	2.293	2.497	0.278	0.112	0.345	0.067	0.612	0.583	0.360
Knowledge											
Received info on oil and gas or mining revenue use in Ghana or in my area in past year.	0.32	0.310	0.293	0.33	0.566	0.725	0.447	0.167	0.731	0.348	0.503
How would you characterise your knowledge about what happens to revenues from oil and gas production?	0.364	0.373	0.355	0.409	0.46	0.221	0.324	0.143	0.808	0.826	0.640
Has heard about PRMA, ABFA or PIAC.	0.465	0.436	0.451	0.471	0.607	0.856	0.204	0.528	0.346	0.683	0.623
Accountability - attitudes and behaviour											
Satisfaction with oil&gas revenue management.	0.769	0.903	0.758	0.814	0.631	0.629	0.490	0.718	0.215	0.921	0.285
Satisfaction with mining revenue management.	0.704	0.863	0.74	0.788	0.594	0.470	0.552	0.707	0.183	0.763	0.342
Traditional leaders and local politicians and officials have right to share of resource revenues as compensation for services.	4.432	4.609	4.292	4.597	0.377	0.469	0.959	0.141	0.452	0.507	0.141
You have right to benefit from the oil and gas revenues Ghana receives.	3.912	3.929	3.879	3.914	0.351	0.948	0.522	0.283	0.4	0.266	0.076
You have right to demand information about oil, gas or mining revenues from responsible national officials and leaders.	3.809	3.852	3.787	3.826	0.251	0.696	0.491	0.356	0.24	0.607	0.054
You have right to demand better handling of oil, gas and mining revenues from responsible national officials and leaders.	3.807	3.838	3.793	3.831	0.589	0.606	0.846	0.387	0.419	0.757	0.200
Discussed usage of revenues from oil, gas and mining with family, friends or colleagues in past year.	0.228	0.200	0.188	0.203	0.546	0.336	0.928	0.506	0.389	0.145	0.664
Contacted somebody in past year to ask about how revenues from oil, gas or mining are handled in Ghana or in area.	0.065	0.078	0.058	0.055	0.711	0.594	0.286	0.880	0.543	0.661	0.307
DA member: has discussed revenues from oil, gas or mining during internal meetings in past year.	0.038	0.135	0.079	0.141	0.082	0.030	0.926	0.235	0.063	0.297	0.32
UC member: has discussed revenues from oil, gas or mining during internal meetings in past year.	0.137	0.169	0.159	0.083	0.674	0.451	0.253	0.386	0.69	0.817	0.911
Chief: has discussed revenues from oil, gas of mining with other traditional leaders in past year.	0.277	0.232	0.299	0.291	0.939	0.921	0.633	0.962	0.694	0.886	0.617

Notes: Literacy ranges from none (0) to read only (1) to full (2). Education ranges from none (0) to complete tertiary (10). Oil or mining district is combined dummy variable. Radio and mobile phone ownership is at household level. Knowledge levels go from none (0) to good (3). Satisfaction levels range from completely dissatisfied (0) to completely satisfied (4). Frequency goes from never (0) to all the time (5). Agreement ranges from completely disagree (0) to completely agree (4). p-values are not adjusted for multiple hypothesis testing.

However, we do not see similar differences in the corresponding question for UCMs. Moreover, given the very small number of DAMs who have discussed the issue at all – only 31 out of 605 DAMs surveyed (5.1%) – it seems difficult to argue that there is a true problem of selection bias.

One of our background variables, namely the gender of respondents, also shows differences in means across study arms that fall just short of being significant. The pairwise t-tests show that the control group has significantly fewer female respondents than either group T2 or group T1+T2. Overall, as mentioned above, we have only 774 female respondents out of a total of 3,528 respondents in our survey (22%). We see some small differences in pairwise study-arm means for the background question on political interest ('How often do you discuss political matters and public affairs with friends, family or colleagues?'); and for the outcome questions on agreement levels with the right to benefit from oil and gas revenues, and with the right to demand information on resource revenues.

However, the closely related outcome question on the right to demand better handling of resource revenues shows no significant differences in means, so there appears to be no threat to internal validity when it comes to attitudes towards accountability.

In sum, although there are some significant differences between means across and between study groups, we reject the null of no difference in very few cases, and only two of these have p-values below 0.05 (and none below 0.01). These differences are consistent with random selection and we therefore do not detect any selection bias.

7.4 Results: treatment effect (intent-to-treat)

7.4.1 Overall outcomes

Tables 17, 18 and 19 show estimated treatment effects on the overall outcomes for each sub-group. As explained in section 7.1, standardised indices of outcomes were created on related items to generate meaningful summaries of multiple effects using the Kling et al. (2007) approach. The 'overall outcome' is one of such indices and is defined as the sum of normalised answers to questions on the individual outcomes (Knowledge, Attitude, Demanding transparency for Level 1; and for Level 2 also Promoting transparency), as specified in Tables B1, B2 and B3 in online appendix B.

Using the model without control variables (Model 1 in Table 17), we find no significant effects of the treatments on the overall outcomes. Model 2 (Table 18), controlling for baseline values, shows significant positive effect of T1 ($p = 0.008$) and T2 ($p = 0.042$) on overall outcome for the DAMs. The effect of T1 is found significant even after adjusting for FDR (adjusted $p = 0.072$).

Those results further change when controlling for covariates in Table 19: the effects of T1 and T2 are still found significant for DAMs ($p = 0.001$ and $p = 0.003$ respectively). They are both also significant after controlling for FDR (adjusted $p = 0.009$ and $p = 0.0135$).

Furthermore, in Model 3 we also observe significant positive effects of T1 ($p = 0.09$) and T2 ($p = 0.035$) on the UCM group (Level 2). Furthermore, we see a significant positive effect of T2 ($p = 0.041$) and a significant negative effect of the interaction ($p = 0.080$) on

Level 3, the ordinary citizens. However, none of the effects on Level 2 or 3 are found significant after adjusting for FDR.

Table 17: Overall effects – Model 1, basic model

Variables	(1) Overall outcome – District Assembly members	(2) Overall outcome – Unit Committee members	(3) Overall outcome – ordinary citizens
T1	0.702	0.0346	-0.258
	(0.436)	(0.398)	(0.197)
T2	0.681	0.432	0.00519
	(0.543)	(0.526)	(0.221)
T1*T2	-0.0697	-0.0888	0.123
	(0.680)	(0.746)	(0.290)
Constant	0.280	0.341	0.638***
	(0.304)	(0.283)	(0.151)
Observations	380	411	1,202
R-squared	0.025	0.003	0.002

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 18: Overall effects – Model 2, controlling for baseline values

Variables	(1) Overall outcome – District Assembly members	(2) Overall outcome – Unit Committee members	(3) Overall outcome – ordinary citizens
T1	1.055***	0.467	-0.164
	(0.389)	(0.483)	(0.211)
T2	0.928**	0.791	0.0939
	(0.451)	(0.580)	(0.223)
T1*T2	-0.195	-0.383	0.0563
	(0.615)	(0.833)	(0.315)
Baseline value	0.362***	0.410***	0.395***
	(0.112)	(0.108)	(0.0395)
Constant	0.187	0.434	0.654***
	(0.217)	(0.330)	(0.142)
Observations	344	326	988
R-squared	0.124	0.087	0.108

Robust standard errors clustered at district level in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 19: Overall effects – Model 3, controlling for baseline value and other controls

Variables	(1) Overall outcome – District Assembly members	(2) Overall outcome – Unit Committee members	(3) Overall outcome – ordinary citizens
T1	1.114***	0.801*	0.126
	(0.335)	(0.469)	(0.158)
T2	1.137***	1.259**	0.357**
	(0.375)	(0.590)	(0.173)
T1*T2	-0.653	-0.834	-0.431*
	(0.487)	(0.780)	(0.244)
Baseline value	0.282**	0.308**	0.215***
	(0.108)	(0.122)	(0.0364)
Gender (1: Female)	-1.117**	-0.920	-0.550***
	(0.521)	(0.786)	(0.175)
Urban	-0.671**	0.383	-0.236
	(0.261)	(0.402)	(0.147)
Education	0.159*	0.240**	0.143***
	(0.0954)	(0.107)	(0.0319)
Oil or mining in the area	1.181***	1.172	-0.0212
	(0.435)	(0.709)	(0.281)
Radio	0.626	1.357**	0.272
	(0.702)	(0.591)	(0.210)
Television	-0.0585	-0.565	0.0741
	(0.612)	(0.639)	(0.165)
Mobile phone	0.813**	0.649*	0.855***
	(0.329)	(0.384)	(0.140)
Discussing political matters	0.163	0.0583	0.319***
	(0.0984)	(0.120)	(0.0455)
Traditional leader			0.636***
			(0.178)
Opinion leader			0.406**
			(0.162)
Region dummies	Yes	Yes	Yes
Constant	-2.814***	-3.935***	-1.970***
	(0.986)	(0.996)	(0.370)
Observations	343	325	981
R-squared	0.267	0.237	0.298

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

7.4.2 Individual outcomes

This section provides estimated treatment effects for different individual outcomes on the three levels. Primarily, the effects that are observed significant will be discussed.

Level 1: District Assembly members

Tables 20, 21 and 22 show estimated treatment effects on the different outcomes for DAMs resulting from Model 1, Model 2 and Model 3, respectively.

We observe no significant treatment effects on any of the outcomes in Model 1 for the DAM level.

Estimated treatment effects resulting from Model 2 for the DAMs show significant effects only for the knowledge outcome. The T1 and T2 arms both lead to significant increase in Knowledge ($p = 0.027$ and $p = 0.049$, respectively). However, neither of the two is significant after controlling for the FDR.

Using Model 3, which should be the most precise of our three models, we find significant treatment effects for Knowledge and Demanding transparency outcomes for the DAMs. Both T1 and T2 lead to a significant increase in Knowledge ($p = 0.087$ and $p = 0.068$). Likewise, for the Demanding transparency outcome, we observe significant positive effects for both T1 and T2 ($p = 0.032$ and $p = 0.004$). The effect of T2 is found significant even after controlling for FDR within the level analysis (adjusted $p = 0.048$). The rest of the outcomes are not found significant after this adjustment.

No significant treatment effects (at $\alpha = 0.05$) are observed on Attitudes and Promoting transparency outcomes for Level 1.

Table 20: Level 1 effects – Model 1, basic model

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	0.478	-0.339	0.784	0.216
	(0.572)	(0.831)	(0.498)	(0.613)
T2	0.997	-0.608	0.686	0.395
	(0.708)	(0.737)	(0.505)	(0.746)
T1*T2	0.740	0.596	-0.277	-0.400
	(0.943)	(1.112)	(0.670)	(0.901)
Constant	0.331	-0.0248	0.502	0.397
	(0.434)	(0.491)	(0.330)	(0.489)
Observations	418	414	419	426
R-squared	0.040	0.002	0.017	0.001

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 21: Level 1 effects – Model 2, controlling for baseline values

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	1.185**	-0.560	0.722	0.343
	(0.528)	(0.840)	(0.437)	(0.528)
T2	1.200**	-0.569	0.697	0.583
	(0.604)	(0.700)	(0.469)	(0.644)
T1*T2	0.657	0.829	-0.238	-0.726
	(0.825)	(1.093)	(0.620)	(0.793)
Baseline value	0.554***	0.00567	0.270***	0.522***
	(0.0770)	(0.0293)	(0.0629)	(0.112)
Constant	0.386	0.0621	0.564*	0.543
	(0.372)	(0.471)	(0.298)	(0.386)
Observations	404	400	409	418
R-squared	0.192	0.002	0.074	0.117

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 22: Level 1 effects – Model 3, controlling for baseline value and other controls

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	0.836*	-0.207	0.980**	0.405
	(0.484)	(0.660)	(0.452)	(0.428)
T2	1.073*	0.0474	1.236***	0.686
	(0.582)	(0.600)	(0.415)	(0.560)
T1*T2	0.278	0.617	-0.927	-1.078*
	(0.776)	(0.855)	(0.576)	(0.635)
Baseline value	0.469***	0.00101	0.215***	0.428***
	(0.0788)	(0.0416)	(0.0672)	(0.0964)
Gender (1: Female)	-2.490***	0.542	-0.663	-0.363
	(0.683)	(1.059)	(0.428)	(0.589)
Urban	0.00952	-0.548	-0.522*	-0.937**
	(0.311)	(0.543)	(0.310)	(0.382)
Education	0.263**	0.258*	0.107	-0.204
	(0.102)	(0.149)	(0.103)	(0.128)
Oil or mining in the area	0.185	0.159	0.507	1.857**
	(0.551)	(0.574)	(0.529)	(0.744)
Radio	-0.180	0.924	1.262**	0.0545
	(0.806)	(2.434)	(0.485)	(0.476)
Television	0.0777	-0.862	-1.430**	0.118
	(0.723)	(1.411)	(0.550)	(0.699)
Mobile phone	0.973**	-0.199	0.616	1.068**
	(0.388)	(0.579)	(0.400)	(0.430)
Discussing political matters	0.255**	0.278	0.328***	-0.0359

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
	(0.114)	(0.171)	(0.109)	(0.117)
Region dummies	***	***	***	***
Constant	-2.951**	-1.901	-1.699*	-0.379
	(1.309)	(1.921)	(0.894)	(1.235)
Observations	403	399	408	417
R-squared	0.301	0.137	0.166	0.261

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Level 2: Unit Committee members

Tables 23, 24 and 25 show estimated treatment effects on the different outcomes for UCMs resulting from Model 1, Model 2 and Model 3, respectively.

When estimating the treatment effects using the basic model with no controls (Model 1), we find that both T1 and T2 lead to significantly increased Knowledge ($p = 0.023$ and $p = 0.038$). These effects are found even more significant in Model 2 ($p = 0.003$ and $p = 0.005$) and Model 3 ($p = 0.004$ and $p = 0.0003$). For Model 2 and Model 3, these effects are found significant (at $\alpha = 0.05$) even after adjusting for FDR; and for T2 in Model 3 (even at $\alpha = 0.01$). They are not found significant after this adjustment in Model 1. In Model 2 and Model 3, the interactions effect on Knowledge is found significant and negative ($p = 0.091$ and $p = 0.052$); however, this effect is not significant after adjusting for FDR.

No significant treatment effects (at $\alpha = 0.05$) are observed on Attitudes, Demanding transparency and Promoting transparency outcomes for Level 2 in any of the models. However, respondents' perception of their rights regarding resource revenues (in other words, the Attitudes outcome) was very high, with low variation, in the baseline, leaving little room for improvement. More disappointing is the lack of significant impact on Demanding transparency and Promoting transparency: our interventions were obviously not effective in changing UCMs' behaviour.

Table 23: Level 2 effects – Model 1, basic model

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	1.310**	-1.535	0.356	-0.0812
	(0.570)	(1.188)	(0.552)	(0.300)
T2	1.135**	-0.514	0.468	0.192
	(0.540)	(1.136)	(0.589)	(0.414)
T1*T2	-0.901	0.569	-0.456	0.148
	(0.935)	(1.772)	(0.836)	(0.533)
Constant	-0.208	-0.0912	0.932***	0.231
	(0.307)	(0.743)	(0.352)	(0.241)
Observations	487	460	479	502
R-squared	0.019	0.006	0.002	0.003

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 24: Level 2 effects – Model 2, control for baseline value

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	1.610***	-1.140	0.416	-0.0373
	(0.532)	(1.106)	(0.565)	(0.303)
T2	1.353***	-0.375	0.628	0.103
	(0.471)	(1.173)	(0.604)	(0.361)
T1*T2	-1.485*	1.322	-0.632	0.303
	(0.872)	(1.638)	(0.861)	(0.492)
Baseline value	0.329***	0.102**	0.223***	0.214***
	(0.0723)	(0.0497)	(0.0831)	(0.0769)
Constant	-0.371	-0.0557	0.883**	0.265
	(0.231)	(0.767)	(0.392)	(0.251)
Observations	475	413	431	478
R-squared	0.089	0.014	0.032	0.027

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 25: Level 2 effects – Model 3, control for baseline value and other controls

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency	(4) Promoting transparency
T1	1.529***	-0.855	0.873	0.108
	(0.521)	(0.998)	(0.555)	(0.263)
T2	1.587***	0.141	1.082*	0.258
	(0.428)	(1.021)	(0.614)	(0.312)
T1*T2	-1.476*	1.740	-1.303	0.0228
	(0.753)	(1.430)	(0.815)	(0.440)
Baseline value	0.233***	0.0721	0.154*	0.0899
	(0.0641)	(0.0527)	(0.0836)	(0.0737)
Gender (1: Female)	-1.115**	-3.096*	0.178	-0.183
	(0.452)	(1.744)	(0.810)	(0.360)
Urban	0.176	0.395	0.127	0.0627
	(0.378)	(0.866)	(0.440)	(0.274)
Education	0.390***	0.104	0.240**	0.0315
	(0.108)	(0.224)	(0.0961)	(0.0559)
Oil or mining in the area	0.596	-1.082	1.007	1.843***
	(0.536)	(1.236)	(0.816)	(0.515)
Radio	1.122**	1.044	1.257**	0.227
	(0.491)	(1.214)	(0.594)	(0.298)
Television	-0.765	1.243	-0.611	-0.0491
	(0.501)	(1.165)	(0.637)	(0.350)
Mobile phone	1.127***	-0.518	0.200	0.484*
	(0.426)	(0.816)	(0.417)	(0.263)
Discussing political matters	0.226**	0.0886	0.193	0.0246
	(0.108)	(0.219)	(0.133)	(0.0704)
Region dummies	Yes	Yes	Yes	Yes
Constant	-4.334***	-2.511	-4.158***	-1.132**
	(0.751)	(2.010)	(1.061)	(0.476)
Observations	470	410	427	474
R-squared	0.238	0.175	0.164	0.159

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Level 3 – Ordinary citizens

Tables 26, 27 and 28 show estimated treatment effects on the different outcomes for ordinary citizens, traditional leaders and opinion leaders resulting from Model 1, Model 2 and Model 3, respectively.

For Model 1 and Model 2 no treatment effects are found significant at $\alpha = 0.05$.

Using Model 3, which should be the most precise of our three models, we find significant treatment effects for Knowledge and Demanding transparency outcomes. For Knowledge, there is a significant positive effect for T2 ($p = 0.025$) and significant

negative effect for the T1*T2 treatment arm (p = 0.025). Neither of the two effects is found significant after controlling for FDR. Likewise, for the demanding transparency outcome we observe significant positive effects for T2 (p = 0.006) and significant negative effects for the T1*T2 interaction (p = 0.032). The effect of T2 is even found significant after controlling for FDR within the Level 3 outcomes (adjusted p = 0.054).

No significant treatment effects are observed on Attitudes outcome for Level 3. Again, we found very strong attitudes and little variation in the baseline survey, so there was little scope for improvement on this outcome.

Table 26: Level 3 effects – Model 1, basic model

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency
T1	-0.139	-0.287	-0.532*
	(0.325)	(0.693)	(0.298)
T2	0.414	0.0415	-0.0412
	(0.328)	(0.650)	(0.328)
T1*T2	0.0373	-0.237	0.302
	(0.453)	(0.912)	(0.457)
Constant	0.189	0.936*	0.980***
	(0.242)	(0.507)	(0.212)
Observations	1,578	1,417	1,400
R-squared	0.004	0.001	0.004

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 27: Level 3 effects – Model 2, control for baseline value

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency
T1	-0.0247	-0.311	-0.527*
	(0.308)	(0.686)	(0.313)
T2	0.540*	0.0143	0.0540
	(0.302)	(0.649)	(0.350)
T1*T2	-0.253	0.0888	0.303
	(0.428)	(0.903)	(0.496)
Baseline value	0.359***	0.134***	0.239***
	(0.0449)	(0.0374)	(0.0403)
Constant	0.183	0.918*	1.007***
	(0.227)	(0.499)	(0.221)
Observations	1,541	1,277	1,281
R-squared	0.097	0.023	0.036

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 28: Level 3 effects – Model 3, control for baseline value and other controls

Variables	(1) Knowledge	(2) Attitudes	(3) Demanding transparency
T1	0.0682	-0.545	0.262
	(0.238)	(0.523)	(0.221)
T2	0.577**	-0.0930	0.692***
	(0.257)	(0.431)	(0.243)
T1*T2	-0.812**	0.369	-0.692**
	(0.361)	(0.652)	(0.309)
Baseline value	0.180***	0.0674*	0.163***
	(0.0408)	(0.0369)	(0.0406)
Gender (1: Female)	-0.703***	-0.859**	-0.305
	(0.158)	(0.418)	(0.242)
Urban	0.0820	-0.427	-0.394*
	(0.209)	(0.363)	(0.215)
Education	0.259***	0.131**	0.150***
	(0.0404)	(0.0576)	(0.0394)
Oil or mining in the area	0.0245	-0.350	0.114
	(0.344)	(0.567)	(0.326)
Radio	-0.00809	1.315**	-0.0647
	(0.188)	(0.568)	(0.276)
Television	0.112	-0.0636	0.120
	(0.204)	(0.403)	(0.204)
Mobile phone	1.425***	0.465	0.910***
	(0.235)	(0.340)	(0.215)
Discussing political matters	0.397***	0.260**	0.523***
	(0.0565)	(0.104)	(0.0662)
Traditional leader	0.373	2.058***	0.248
	(0.273)	(0.401)	(0.260)
Opinion leader	0.224	0.736**	0.325
	(0.238)	(0.365)	(0.233)
Region dummies	***	***	***
Constant	-1.588***	-1.074	-3.308***
	(0.413)	(0.731)	(0.480)
Observations	1,524	1,268	1,272
R-squared	0.260	0.165	0.198

Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

7.5 Interpretation of results

This section describes the results as presented in the results section of our initial hypotheses.

Overall, we observe significant effect of both T1 and T2 on the composite outcome for the DAMs. This effect is of medium size[6] (about 0.4 SD) for both treatments, while the joint treatment does not seem to play a role. There is also some limited indication of T1 and T2 having positive effect on overall outcomes for UCMs; and T2 also on overall outcome for the ordinary citizens, but this effect is not conclusive.

Detailed analysis shows that these effects are most likely to be driven by effects on knowledge and on willingness to demand transparency. A feeling of entitlement and efforts to create more transparency do not seem to be significantly influenced by the treatments or their interaction. The former is plausibly explained by the fact that there was already a very high feeling of entitlement at baseline, leaving little scope for variation. The latter could be due to the length of time or even the inefficiency of trickle-down effects to reach ordinary citizens, particularly following treatment T1, which deliberately focused on elected politicians and other duty bearers.

Detailed discussion of the results for specific hypotheses can be found below.

7.6 Effects on knowledge and awareness (Hypothesis 1)

7.6.1 Treatment 1 – PIAC leaders' information dissemination forum (H1a)

The PIAC leaders' information dissemination forum has a positive effect on DAMs, and UCMs' knowledge and awareness of natural resource revenues.

This effect is quite conclusive for Level 2 (UCMs), as it is found significant even after adjusting for FDR, but is much less conclusive for Level 1 (DAMs). It is small (0.21 SD) for the DAMs and small-to-medium (0.36 SD) for the UCMs. Furthermore, for the ordinary citizens, who did not participate in the meetings, there is no effect of T1 on knowledge of natural resource revenues, which, as stated above, is likely to be due to the lengthy or perhaps imperfect trickle-down of information from DAMs and UCMs to ordinary citizens.

These results mean that this experiment provides at least limited evidence to support H1a on Level 1 and reasonable evidence on Level 2.

These results would mean that the PIAC meetings are the most efficient/effective means of increasing knowledge about natural resource revenues management for the UCMs group, perhaps due to lower initial knowledge of UCs.

7.6.2 Treatment 2 – citizen information and engagement platform (H1b)

The CIEP seems to have some positive effect on all levels, which is encouraging as this intervention explicitly targeted all levels.

[6] Effect sizes from Model 3 are used in the discussion part.

Similar to T1, this effect can be taken as conclusive for Level 2 (significant even after controlling for FDR with α = 0.01), but much less conclusive for Level 1 and even less for Level 3. The observed effect on Level 2 is medium-to-small (0.37 SD), while the effects are small for Level 1 and Level 3 (0.26 SD and 0.15 SD). Overall, we find solid evidence supporting H1b for Level 2. However, for Level 1 and Level 3, even though there is some indication of a positive effect, we cannot convincingly conclude whether H1b holds for these two levels.

7.6.3 Interaction of Treatment 1 and Treatment 2 (H1c)

There is no support for Hypothesis H1c in our data. That is, there is no support for the existence of positive reinforcement of knowledge creation between T1 and T2. For Level 1, this effect is positive but insignificant. For Level 2 and Level 3, this effect is actually negative and sometimes significant, but not very robust. We can only speculate about the reason for this weak negative effect; perhaps receiving the voice messages in addition to attending the PIAC meetings was perceived as too much information by UCMs (Level 2), although this would not explain the negative effect at Level 3.

7.7 Effects on feeling of entitlement (Hypothesis 2)

There does not seem to be any effect of the treatments on the feeling of entitlement towards natural resource revenues (Attitudes outcome) on either the DAMs, UCMs or ordinary citizens. This means we fail to confirm our hypotheses H2a, H2b and H2c for all the levels; but recall that we were starting at very high levels of entitlement at baseline.

7.8 Effects on creation of more transparency (Hypothesis 3)

We observe no effect of the treatments on self-stated efforts of the DAs and UCs to create more transparency around natural resource revenues (outcome Promoting transparency). Therefore, we fail to provide any evidence supporting H3a, H3b or H3c on either Level 1 or Level 2.

7.9 Effects on demanding more transparency (Hypotheses 4 and 5)

7.9.1 Treatment 1 – PIAC leaders' information dissemination forum (H4a, H5a)

The PIAC leaders' information dissemination forum seems to have some positive effect on the willingness to demand transparency by DAMs. The effect size is rather small (0.3 SD). However, as the treatment effect is not significant after adjusting for FDR, the evidence to support this is only very limited and inconclusive.

No effect of the PIAC forum on willingness to demand transparency is observed for UCMs, or on ordinary citizens who did not participate in the meeting. Therefore, we fail to provide enough evidence to support H4a and H5a.

7.9.2 Treatment 2 – citizen information and engagement platform (H4b, H5b)

The CIEP seems to have a positive effect on willingness to demand transparency by DAMs and ordinary citizens. Both effects are significant even after adjusting for FDR within the level. The effect on the UCMs is also positive, but only weakly significant and cannot be taken as conclusive. The effect is medium-to-small (0.37 SD) for the DAMs and only small (0.2 SD) for ordinary citizens.

The findings support H4b or H5b for Level 1 and Level 3, but are inconclusive for Level 2.

7.9.3 Interaction of Treatment 1 and Treatment 2 (H4c, H5c)

There is no support for H4c or H5c in our data. That is there is no indication of positive reinforcement of the effects of T1 and T2 on willingness to demand transparency. This is the case for all three levels. If anything, the interaction effects are actually generally negative and insignificant (for ordinary citizens in Model 3 it is actually significant but not after adjusting for FDR). Again, it is difficult to speculate on the reasons for this result, though information overload is one possibility for Level 1 and Level 2.

7.10 Additional heterogeneity analysis

In the original research design, we focused on the breakdown of the sample into Levels 1–3 and the analysis of the impact on these sub-groups. We have argued that external validity for these sub-groups is high. Ex-post, we are also interested in examining the effects between genders and age groups, with the caveat that these sub-groups were not considered in the original design, and external validity of these results is therefore expected to be low. In the following, we show only results for the overall outcomes for reasons of space, and briefly mention results for individual outcomes where relevant. Given the difference in sub-groups, in Model 3 we now include dummy variables for DAMs and UCMs.

7.10.1 Effects by gender

Tables 29 and 30 show the impact on the overall outcome for female and male respondents, respectively. T1 had negative though not robust average effects for females (Table 29, Model 1);[7] T2 has no significant impact; while we see a positive reinforcing effect of T1+T2 in Models 1 and 2.[8] Note that the sample size for female respondents is quite small, fluctuating between 237 and 325 depending on the model used. Our results for male respondents in Table 30 are based on a much larger sample, which may in part explain the stronger effects found: both T1 and T2 have significant positive effects, while we once again see a puzzling negative effect for the combination of T1 and T2.[9]

[7] From the individual outcomes (not shown), this impact derives from a negative effect on women's self-declared Knowledge, while there is no significant effect on either Attitudes or Demanding transparency.
[8] The individual outcome results show that these positive effects come from an increase in both Demanding transparency and a (weak) strengthening of Attitudes.
[9] These results for the overall outcome are due mainly to the impact on Demanding transparency and, to a lesser degree, on Knowledge. Attitudes were unaffected in the male-only sample.

Table 29: Effects on overall outcome for female respondents

	Model (1)	Model (2)	Model (3)
T1	-1.373**	-0.820	-0.212
	(0.612)	(0.655)	(0.641)
T2	-0.290	-0.103	0.342
	(0.592)	(0.716)	(0.772)
T1*T2	2.229**	2.213**	1.272
	(0.905)	(1.040)	(0.981)
Baseline value		0.400***	0.360***
		(0.0862)	(0.0873)
Urban			0.340
			(0.543)
Education			0.169
			(0.122)
Oil or mining in the area			0.654
			(0.920)
Radio			0.815
			(0.665)
Television			-0.626
			(0.566)
Mobile phone			0.750
			(0.595)
Discussing political matters			0.439**
			(0.170)
District Assembly member			-0.995
			(0.960)
Unit Committee member			0.573
			(1.068)
Constant	-1.802**	-2.162***	-4.606***
	(0.810)	(0.813)	(1.090)
Observations	325	237	237
R-squared	0.093	0.154	0.209

Regional dummies included in all models. Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 30: Effects on overall outcome for male respondents

	Model (1)	Model (2)	Model (3)
T1	0.475	0.654**	0.915***
	(0.287)	(0.267)	(0.262)
T2	0.861**	1.011***	1.236***
	(0.343)	(0.325)	(0.296)
T1*T2	-0.882**	-0.876**	-1.291***
	(0.421)	(0.423)	(0.395)
Baseline value		0.325***	0.239***
		(0.0389)	(0.0379)
Urban			-0.572**
			(0.235)
Education			0.274***
			(0.0599)
Oil or mining in the area			0.651
			(0.401)
Radio			0.810*
			(0.432)
Television			-0.187
			(0.300)
Mobile phone			1.254***
			(0.260)
Discussing political matters			0.456***
			(0.0818)
District Assembly member			-1.521***
			(0.273)
Unit Committee member			-0.442
			(0.323)
Constant	-0.0857	-0.510	-3.677***
	(0.473)	(0.436)	(0.658)
Observations	1,678	1,458	1,448
R-squared	0.032	0.106	0.194

Regional dummies included in all models. Robust standard errors clustered at district level in parenthesis; *** p < 0.01, ** p < 0.05, * p < 0.1.

7.10.2 Effects by age group

Another possibility is that different age groups were affected differentially by the interventions. For example, younger respondents might be more open to messages received via the ICT platform; they could also be less likely to have attended the meetings under T1, as duty bearers are on average older. To test this, we separated the full sample into two groups: respondents aged 18–35 years, and those aged 36 years and above.[10] Table 31 shows results for the overall outcome on the younger group, and Table 32 on the older group. We see, indeed, that the ICT platform of T2 had a positive effect on the younger respondents, while T1 and the combination of T1+T2 had no

[10] Respondents aged below 18 and over 110 were dropped, losing 52 observations.

impact.[11] Table 32 shows positive and significant effects for both T1 and T2, and a weak negative effect of the combined T1+T2 for the group of older respondents.[12]

Table 31: Effects on overall outcome for respondents aged 18–35 years

	Model (1)	Model (2)	Model (3)
T1	0.0141	0.200	0.626
	(0.496)	(0.542)	(0.564)
T2	1.043*	1.244**	1.429**
	(0.566)	(0.589)	(0.632)
T1*T2	0.239	0.0185	-0.360
	(0.869)	(0.917)	(0.916)
Baseline value		0.373***	0.277***
		(0.0854)	(0.0853)
Urban			-0.864**
			(0.407)
Female			-1.032**
			(0.481)
Education			0.397***
			(0.113)
Oil or mining in area			0.735
			(0.861)
Radio			0.923
			(0.644)
Television			-0.181
			(0.709)
Mobile phone			1.028**
			(0.463)
Discussing political matters			0.407***
			(0.131)
District Assembly member			-1.504***
			(0.551)
Unit Committee member			-0.437
			(0.567)
Constant	1.018	0.446	-3.739***
	(0.782)	(0.766)	(1.326)
Observations	561	490	487
R-squared	0.041	0.115	0.208

Regional dummies included in all models. Robust standard errors clustered at district level in parenthesis; *** p < 0.01, ** p < 0.05, * p < 0.1.

[11] The effect of T2 derives from a strong positive impact across all models on Demanding transparency. Interestingly, T1+T2 has a positive effect (p = 0.05) on Attitudes in Model 1 and Model 2.

[12] The impact of T1 is based on the Knowledge outcome, while that for T2 and T1+T2 on Knowledge and Demanding transparency. There was no detectable impact of any intervention on attitudes.

Table 32: Effects on overall outcome for respondents aged 36 years and above

	Model (1)	Model (2)	Model (3)
T1	0.253	0.528*	0.806***
	(0.298)	(0.292)	(0.283)
T2	0.362	0.620*	0.955***
	(0.328)	(0.321)	(0.309)
T1*T2	-0.519	-0.565	-1.105**
	(0.422)	(0.447)	(0.433)
Baseline value		0.334***	0.229***
		(0.0373)	(0.0351)
Urban			-0.255
			(0.272)
Female			-0.964***
			(0.351)
Education			0.213***
			(0.0541)
Oil or mining in area			0.558
			(0.356)
Radio			0.748*
			(0.424)
Television			-0.246
			(0.336)
Mobile phone			1.224***
			(0.297)
Discussing political matters			0.469***
			(0.0877)
District Assembly member			-1.436***
			(0.348)
Unit Committee member			-0.354
			(0.340)
Constant	-0.724**	-1.126***	-3.679***
	(0.363)	(0.338)	(0.606)
Observations	1,442	1,205	1,198
R-squared	0.048	0.133	0.218

Regional dummies included in all models. Robust standard errors clustered at district level in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

7.11 Cost-effectiveness analysis

The total cost of the PIAC leaders' information dissemination forum in the 60 districts was approximately US$140,000 compared with the approximately US$22,000 spent designing and implementing the CIEP. This makes the CIEP by far the most cost-effective of the two interventions in that not only did it have the greater impact (across all three levels as discussed above), but it also cost a little over six times less to administer in the treatment districts.

8. Discussions

8.1 Internal validity

In the baseline study report, we identified three main threats to the internal validity of the study. These were history effects, social interaction threats and selection effects.

8.1.1 History effects

History effects refer to events that happen in the environment that change the conditions of a study, affecting its outcome. We considered the possibility that there are historical events that influence our results. For example, past experience with mining could increase citizens' awareness of resource revenue management, affecting their attitudes towards and expectations about the management of oil and gas revenues. Alternatively, we envisaged that oil and gas revenue management may have become an issue during the campaign for the 2016 presidential election.

We addressed these and other threats from exogenous historical events through our research design, which is based on block randomisation and a factorial design, including a pure control group. Potentially, confounding historical events could affect all treatment arms or groups in a similar manner, which means that if one or more of our treated groups show an effect that is statistically significantly different from our control group, we can plausibly argue that this effect is caused by our intervention(s).

8.1.2 Social interaction effects

We also considered the possibility of social interactions affecting our results. To avert or minimise any such social threat, our design explicitly took into account the desired trickle-down and trickle-up effects in the Ghanaian context by aiming interventions at three levels, all of which were surveyed in our project: DAMs (Level 1); UCMs (Level 2); and ordinary citizens (Level 3). Information is meant to be passed down from the central government to the DAs, and from there disseminated to the lowest-level administrative units and ordinary citizens. Conversely, issues and requests can reach the national Parliament and central government by taking the opposite, bottom-up route.

It is conceivable, however, that social interactions dilute the effect of our interventions across study arms. Although our basic unit of observation is the district, and districts are often large and sometimes remote, we cannot entirely rule out this possibility. For example, a person receiving information on oil and gas revenue management in one district may relate the information to family or friends living in another district. If the latter were part of our control group, we would expect social interactions to introduce a slight downward bias in our post-intervention results. Given the scale of the study, with 3,600 respondents in 120 districts, we do not believe this effect will be very strong.

8.1.3 Selection biases/effects

The greatest possible threat to internal validity is that our randomisation has not been effective and that we face selection bias due to incomparable groups. For example, one study group may already have greater access to information sources or have, on average, greater knowledge about oil and gas revenue distribution; or one group may be ex-ante more politically interested and demand greater accountability of the use of revenues. We tested comparability across all, and between pairs of, groups with the help

of our baseline survey data and, as indicated in section 7.3, found our sample to be balanced (no selection bias) across treatment arms.

8.1.4 Attrition

At the endline, we considered another threat to internal validity – experimental attrition – which could have compromised the internal validity of the study were the number of dropouts across the comparison groups (in other words, the treatment groups and control group) found to be different. We conducted a preliminary assessment of attrition rates using descriptive statistics and the results are shown in Table 33.

Table 33: Attrition rates by treatment arm and status

Status	Treatment arm				Total
	T1	T2	T1+T2	Control	
District Assembly	22.6	24.8	21.6	19.3	22.1
Unit Committee	21.2	10.5	14.3	15.9	15.6
Opinion leader	18.8	16.9	20.3	26.5	20.6
Traditional leaders	23.3	20.2	30.6	30.1	26
Ordinary citizen	37.1	30.4	43.2	36.4	36.8
Total	26.7	22.1	28.2	27.4	26.1

Source: KITE (2017b).

Table 33 indicates a total dropout rate of approximately 26 per cent, with the attrition rate highest among respondents in the T1+T2 treatment arm (28%) and lowest in the T2 treatment arm (22%). Table 33 also reveals that the attrition rate was highest among respondents in the ordinary citizens category (approximately 37%) and lowest among Unit Committee respondents. The inter-treatment attrition rates from Table 33 appear to suggest that attrition happened at random, since there is no systematic difference between groups in withdrawals from the study (thus no attrition bias). To examine this further, we conducted a t-test to see if the differences in baseline characteristics of the attrited respondents between the study arms and the control group were significant (Table 34).

Table 34: Attrition test results

	Means		T-test	Means				T-test with control group		
	Non-attrited	Attrited		T1 Attrited	T2 Attrited	T1T2 Attrited	Control Attrited	T1 Attr + Contrl Attr	T2 Attr + Contrl Attr	T3 Attr + Contrl Attr
Gender (1 = Female)	0.19	0.31	0.000	0.30	0.30	0.33	0.31	0.892	0.829	0.664
Literacy (own language)	1.22	1.20	0.466	1.25	1.17	1.16	1.20	0.556	0.724	0.644
Education	4.56	4.59	0.713	4.89	4.48	4.46	4.54	0.146	0.797	0.735
Oil or mining in the area	0.46	0.52	0.060	0.37	0.48	0.57	0.65	0.001	0.047	0.372
Owns radio (1 = yes)	0.93	0.93	0.498	0.94	0.93	0.94	0.93	0.507	0.901	0.747
Owns tv	0.85	0.85	0.605	0.88	0.82	0.84	0.85	0.379	0.376	0.776
Owns Mobile Phone (1 = yes)	0.98	0.95	0.000	0.97	0.95	0.94	0.94	0.220	0.706	0.942
Frequency of discussing political matters (max 5)	2.48	2.11	0.000	2.14	2.22	2.01	2.09	0.719	0.389	0.614
DA	0.17	0.12	0.001	0.13	0.16	0.09	0.12	0.726	0.244	0.385
UC	0.19	0.11	0.000	0.14	0.12	0.10	0.09	0.090	0.304	0.700
Traditional Leader	0.11	0.11	0.964	0.12	0.10	0.09	0.14	0.179	0.239	0.113
Opinion Leader	0.23	0.17	0.000	0.14	0.17	0.18	0.17	0.453	0.996	0.695
Common citizen	0.29	0.49	0.000	0.49	0.45	0.53	0.48	0.913	0.511	0.302

Notes: The t-test in column 3 shows the test when comparing means for Non-attrited and attrited respondents; t-tests in columns 8–10 show the tests when comparing the mean for T1, T2 or T1+T2 and the mean for the control group (only attrited respondents included). Literacy ranges from none (0) to read only (1) to read and write (2). Education ranges from none (0) to complete tertiary (10). Oil or mining district is combined dummy variable. Radio, TV and mobile phone ownership is at household level. Frequency of discussing political matters with friends and family goes from never (0) to all the time (5).

The results show that at aggregate level, there are significant attrition biases for gender (attrition among females was higher), oil and mining areas (attrition within these areas was higher), mobile phone ownership (less attrition among owners) and political engagement (attrition was higher among those who discuss political matters with family and friends less frequently; column 3 in Table 34). However, the differences in attrition between the treatment arms and the control group were mostly insignificant (columns 8–10). The only clear exception was the dummy for oil and mining districts: there is evidence that the attrition in the T1 and T2 arms was lower than in the control group.

In the light of the foregoing, we are confident that the results we obtained in the study are consequences of the two interventions, but not other factors.

8.2 External validity

As explained in section 3.3, we used random sampling to ensure the generalisability of our study results. We argued that the sampling procedure used in selecting the districts, coupled with the mix of the sampled subjects/respondents, gave us the confidence that the study and its results could be generalised. We then concluded that our sample districts are geographically, ecologically and nationally representative; and, thus, the study results could be generalised to DAMs, UCMs, traditional authorities and the citizens in the remaining 96 districts of the country.

The positive effects of the two interventions on some key outcome variables (knowledge and demand for accountability) provide enough empirical basis for PIAC to continue with the district information dissemination activities and/or CIEP. However, scaling up these activities would require substantial capacity strengthening of PIAC (both financial and human resources). The 60 PIAC leaders' forums were implemented at a cost of approximately US$140,000, which was equivalent to approximately 52 per cent of the

total budgetary allocation received by PIAC from the government for its operations in 2016; while the total cost for setting up and running the CIEP for the five-week period was approximately US$22,000.

Given that in the process evaluation the investigators found lack of funding to be a major factor hampering PIAC's operations, it is clear that PIAC would not have the financial muscle to scale up the intervention without external support from institutions such as GOGIG, which funded the experiment. Lack of adequate human resources could also pose a significant barrier to scaling up or replicating the intervention given that PIAC has a lean staff at its Secretariat, coupled with the fact that its members work part time.

9. Conclusions and recommendations

9.1 Conclusions

In the previous two sections, we discussed and presented the results of the experiments on the three categories of respondents who participated in the experiments. Table 35 summarises the findings of the study.

Table 35: Impacts of PIAC leaders' forum and CIEP on study outcomes

Variables	Knowledge/awareness	Attitude	Promoting transparency	Demanding transparency	Overall outcome
Level 1: District Assembly members					
T1	(+)	X	x	(+)	(+)
T2	(+)	X	x	(+)	(+)
T1+T2	(+)	X	x	x	x
Level 2: Unit Committee members					
T1	(+)	X	x	x	(+)
T2	(+)	X	x	(+)	(+)
T1+T2	(-)	X	x	x	x
Level 3: Ordinary citizens					
T1	X	x	N/A	x	x
T2	(+)	x	N/A	(+)	(+)
T1+T2	X		N/A	x	x

Note: Each cell shows the impact of PIAC meeting alone, CIEP alone and/or combination of PIAC meeting and CIEP on the outcome listed in the top row. The symbol (+) denotes a significant positive effect, (-) a significant negative effect and (x) no significant effect.

Table 35 shows that both the PIAC leaders' information dissemination forum and the CIEP (T1 and T2) have a significant effect (medium-sized effect of ~0.4 SD) on the composite outcome for DAMs (Level 1), while the joint treatment (T1+T2) does not seem to play a role. The table also shows that there is some limited indication of T1 and T2 having a positive effect on overall outcomes for UCMs and T2 also on overall outcome for ordinary citizens; however, this effect is not conclusive.

Detailed analysis shows that these effects are most likely to be driven by effects on knowledge and on willingness to demand transparency; and that feeling of entitlement and efforts to create more transparency do not seem to be significantly influenced by the treatments or their interaction. The former is plausibly explained by the fact there was a very high feeling of entitlement already at baseline, leaving little scope for variation. The

latter could be due to the length of time or even the inefficiency of trickle-down effects to reach ordinary citizens, particularly following treatment T1, which deliberately focused on elected politicians and other duty bearers.

At the individual outcome levels, the PIAC leaders' information dissemination forum was found to have a positive effect on knowledge and awareness of natural resource revenues for both DAMs and UCMs, although the effect on UCMs was found to be more conclusive than that on DAMs. However, we did not observe any effect of T1 on citizens who did not participate directly in the meetings, a phenomenon we surmised could be a result of the lengthy or perhaps imperfect trickle-down of information from the DAs or UCMs to the citizenry.

The CIEP, on the other hand, seems to have a positive effect on all the levels, which we find quite encouraging because the T2 intervention explicitly targeted all the sub-groups in the experiment. Just as in the case of T1, the effect on the UCMs was found to be more conclusive than that on Level 1 (DAMs) and Level 3 (ordinary citizens). There is, however, no evidence of positive reinforcement of knowledge and awareness creation by the joint treatment (T1+T2), even though it had some positive (albeit insignificant) effect on knowledge and awareness of DAMs.

Similarly, we observe positive effects of the CIEP (T2) on the willingness of all sub-categories to demand accountability. The effect on DAMs and ordinary citizens is significant, while the effect on UCMs is weakly significant and thus inconclusive. The PIAC leaders' information dissemination forum (T1) seems to have some positive effect on the willingness to demand transparency by DAMs, even though the effect is rather small and thus inconclusive. There is, however, no indication of positive reinforcement of the effects of the joint treatment (T1+T2) on willingness to demand transparency at all three levels.

However, we do not observe any effect of the treatments on the feeling of entitlement towards natural resource revenues (Attitudes outcome) on either the DAMs, UCMs or ordinary citizens; nor do we observe any effect of the treatments on the efforts of the DAs and UCs to create more transparency around natural resource revenues (outcome: Promoting transparency).

In summary, we conclude as follows:

1. We find at least limited evidence to support H1a on Level 1 and reasonable evidence on Level 2;
2. Overall, we find solid evidence supporting H1b for Level 2. However, for Level 1 and Level 3, even though there is some indication of a positive effect, we cannot convincingly conclude whether the H1b holds for these two levels;
3. We observe no support for H4c or H5c in our data at all levels;
4. We are unable to confirm H2a, H2b and H2c for all levels, but this could be explained by the fact that we started at very high levels of entitlement at baseline; and
5. We are also unable to provide any evidence supporting H3a, H3b or H3c on either Level 1 or Level 2.

9.2 Recommendations

The study has shown that PIAC information dissemination and engagement interventions (leaders' forum and the CIEP) at the district level will most likely result in increases in the knowledge and awareness levels of the general population regarding petroleum revenue management in Ghana, which will in turn lead to increased/improved demand for accountability. Since awareness-raising and ensuring that oil revenues are used in the most judicious manner are at the heart of PIAC's mandate, the study team is optimistic that the results of the study would inspire PIAC to do more of the same.

The relatively low knowledge and awareness levels observed during the baseline study are a reflection of the strategies that PIAC used to disseminate information on oil revenues to citizens over the period 2011–2016. Prior to the roll-out of the two interventions, PIAC's information and engagement efforts had almost exclusively been held at regional level, with the intervention period being the first time PIAC had interfaced with the general population at the district level. It was therefore unsurprising for an overwhelming majority of study participants not to be aware of what has been going on with the management of Ghana's oil and gas resources.

Interviews with some members of PIAC and selected staff of the PIAC Secretariat as part of the process evaluation indicate that PIAC is aware of the shortcomings of its engagement strategies and that it is eager to take its work closer to the general population and the constituencies that the members represent. This has, however, not materialised, mainly because of lack of resources.

In light of the foregoing, we wish to make the following recommendations for the consideration of key stakeholders.

PIAC

1. The low level of knowledge/awareness among the general population (including elected officials at the district level) about the management of oil and gas revenues and of institutions and mechanisms put in place to ensure prudent management of these revenues observed at the baseline indicates that PIAC needs to intensify its campaign and engagement activities at the district and possibly grassroots levels. The momentum gained by PIAC through the study should therefore be sustained and built upon.
2. PIAC should consider using an ICT-based engagement platform in scaling up and/or decentralising its interactions with the general population, given that the CIEP emerged as more cost-effective than the in-person meetings conducted at the district level. The VOTO (now known as Viamo) mobile platform could be used as a starting point. However, there is a need for further investigation into the CIEP as piloted, with a view to establishing/ascertaining why the majority of study respondents did not listen to significant portions of the pre-recorded messages disseminated using the IVR technology.
3. Although the PIAC leaders' information dissemination forum style of engagement is relatively more expensive, face-to-face meetings at the district level cannot be avoided because of the lack of access to and capacity to use ICT among certain segments of the population (especially non-mobile phone users in rural areas).

4. The unavoidable nature of the leaders' forum at the district level (in the face of resource constraints) calls for a change in the strategic approach used by PIAC in rolling out public meetings. We recommend that PIAC should identify capable civil society organisations at the district level – or alternatively use members of the nominating institutions with offices at the district level – to lead the engagements, while PIAC focuses its efforts on producing the information to be disseminated.

Policymakers and other stakeholders

5. Undoubtedly, scaling up PIAC's information dissemination and citizens' engagement initiatives would require many more resources than are currently available to PIAC. We recommend that Parliament and other stakeholders should put pressure on the Ministry of Finance to increase allocations from the ABFA to PIAC, which in 2017 came to 0.17 per cent of the total ABFA. Similarly, the human resources strength of the PIAC Secretariat needs to be increased to support the intensification of PIAC's operations, which would be engendered by the decentralisation of PIAC activities to the district level.
6. Civil society organisations, such as the Civil Society Platform on Oil and Gas, should ensure that the regulations being developed for the PRMA include a clear definition/interpretation of Section 52(b) of the Act, which enjoins PIAC to 'provide a space and platform for the public to debate on the spending prospects, management and use of the petroleum revenues'. To be effective, the regulations should mandate that the public engagement and consultations should be undertaken at the district level.
7. The DAs should put in place systems and mechanisms to ensure that information received by the DAMs is disseminated to the UCs and ordinary citizens to empower them for possible activism.

Scope for further research

8. The rather inexplicable lack of evidence of positive reinforcement of knowledge and awareness creation by the joint treatment (T1+T2) is definitely worth further investigation to gain better understanding of why the individual treatments had positive impacts, but gave a different outcome when the two treatments were administered together.
9. The experiment could also be implemented over a much longer period than the approximately 12-month period used for the current study.
10. The high call drop rate by the respondents in CIEP could also be investigated.

Online appendixes

Online appendix A: PIAC leaders' information dissemination infographic

http://www.3ieimpact.org/sites/default/files/2019-02/tw8.1002-PIAC-leaders-information-dissemination-infographic-online-appendix-A.pdf

Online appendix B: Outcomes definitions

http://www.3ieimpact.org/sites/default/files/2019-02/tw8.1002-Outcomes-definitions-online-appendix-B.pdf

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In the wake of off-shore oil and gas discovery, the government created the Public Interest and Accountability Committee to enable citizen engagement and public debate on petroleum revenue utilisation. The authors evaluated the impact of various interventions implemented by the committee to promote engagement and information dissemination. Meetings attended by district and local political representatives had a positive effect on their knowledge and awareness levels. No such effects were observed among citizens who did not attend these meetings. Disseminating information through an ICT platform had a positive effect on both knowledge and awareness among district officials, local representatives and citizens. A combination of the two interventions did not have any effect on information retention or on the willingness to demand transparency by district officials, local political representatives and citizens.

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