Transparent for whom? Dissemination of information on Ghana's petroleum and mining revenue management

Greater transparency has been proposed as an antidote to mismanagement of natural resource revenues in resource-rich, developing countries. The dominant transparency narrative in policymaking attributes a key role to the public: once citizens gain information, they are predicted to use it to demand better resource governance. Whether the public receives the available information in the first place, however, has not been scrutinized in a large-N analysis. This article examines Ghanaians' information sources and information-seeking behaviour using a unique survey with over 3500 respondents. Although Ghana has actively pursued transparency in its natural resource revenue management, most Ghanaians have poor access to understandable information as information is disseminated through channels that the intended receivers normally do not use. Non-elite citizens and those with limited English skills were least likely to have heard about natural resource revenue management, compared with elected duty bearers, traditional authorities, other opinion leaders, and those with an interest in the issue through working in mining or living near an extraction site. The results suggest that the conceptualisation of transparency may be too simplistic, and that the expectations linked to transparency in enhancing natural resource governance may not materialise through the mechanisms hypothesised in the literature.

1.   Introduction

In many developing countries, revenues from high-value natural resources such as petroleum, diamonds, and certain types of timber are an integral part of the national economy (Lujala & Rustad, 2012). Despite abundant natural resources, however, these countries are often characterised by the 'resource curse': slow economic growth, weak political institutions and even violent conflict (van der Ploeg, 2011). Since the 1990s, the international community has attempted to improve natural resource governance by promoting transparency, on the assumption that the resource curse stems, at least in part, from resource revenue mismanagement (Haufler, 2010). Consequently, transparency has become a common prerequisite for obtaining investment, debt relief and loans, as well as aid from donors, multinational financing institutions and extractive industry companies (David-Barrett & Okamura, 2016; Kasekende, Abuka, & Sarr, 2016; Shaxson, 2009; Sturesson & Zobel, 2015).

In the extractive sector management literature, transparency is seen as a key to better resource governance: once citizens gain information about the management of valuable natural resources and their revenues, they will use it to form or amend their views; to debate natural resource governance-related issues; and, when desirable, as a basis for voicing concerns and requesting improved accountability in resource governance (Epremian, Lujala, & Bruch, 2016; Gillies & Heuty, 2011; Lujala & Epremian, 2017). Better governance, in turn, should increase the revenues available for public spending on education, healthcare, infrastructure and other sectors that promote economic and social development.

A better-informed public is thus central in contemporary conceptualisations of how to improve natural resource governance in poor but resource-rich countries. The empirical research on transparency in natural resource governance, however, has either focused on the information disclosure itself (that is, whether new information has been made public or not), or on whether the existence of a transparency initiative in a country correlates with the level

of corruption and development. This research has thus far failed to properly scrutinise the supposed intermediary steps that link a transparency initiative – through better informed citizens and their demands for more accountability in resource governance – to the more long-term outcomes such as improved living standards (Mejía Acosta, 2013; Rustad, Le Billon, & Lujala, 2017; Sovacool & Andrews, 2015). At the basic level, we may ask: does public information on natural resource management and revenues actually reach citizens? How do citizens access this information; and who are those most likely to access the available information?

This article analyses these first steps in the transparency process and makes a unique contribution to the natural resource governance and transparency literature by providing results from a survey of over 3500 citizens conducted in 2016 in Ghana – a resource-rich, developing country actively engaged in increasing transparency in its natural resource revenue management. Ghana's 2011 Petroleum Revenue Management Act (PRMA), for example, has drawn much attention from other African countries seeking a strategy for managing their natural resources due to its strong embedded transparency measures that are often seen as model legislation when it comes to resource revenue management. Therefore, examining the extent of information diffusion, sources and uptake in Ghana may not only help in understanding whether and how transparency in natural resource governance works, but can also inform transparency initiatives in other resource-rich nations. We examine how Ghanaians access information about national and local issues in general, and how and to what extent they receive information about national and local natural resource revenue management in particular. Further, the empirical analysis assesses which factors are linked to a greater likelihood of citizens receiving information about national and local resource revenue governance.

The overall results suggest that Ghanaians have very strong feelings of entitlement when it comes to their natural resources: over 90 per cent of survey respondents completely

agree with the statement that they have a right to benefit from natural resource revenues, and a similarly large share believe the government of Ghana has an obligation to publish information about revenues. Nevertheless, Ghanaians are faced with poor dissemination of understandable information. In other words, transparency exists, but only nominally, because most people are not actually receiving the available information on natural resource revenue management. Our findings show that the likely reason for this is that the main information channels used for information dissemination about natural resource governance – i.e., internet, newspapers and meetings in the regional capitals – do not reflect the most effective ways to reach people in Ghana, i.e., radio, TV and local community meetings.

Our results also show that increased information about natural resource revenues is most likely to reach those who are already in a better position in their community, and whose levels of wealth and English literacy are higher. Further, those with a more immediate interest in the extractive sector, through work in the sector or living nearby an extraction site, are also more informed about resource management. Finally, there is some evidence that people living in more remote areas may have less access to information on natural resource revenue management.

Taken together, our results suggest that it can be extremely difficult to reach citizens with this type of information. The theory of transparency in the extractive industry literature may thus be too simplistic, and the expectations linked to increased information disclosure may not materialise through the mechanisms hypothesised in the literature.

The article proceeds as follows. Section 2 presents an overview of the transparency policies in Ghana's petroleum and mining revenue governance. Section 3 outlines the transparency process, and Section 4 provides a conceptual framework for factors that may affect the likelihood of an individual being informed about natural resource revenue

management. Section 5 presents the data and methods and Section 6 the results. Section 7 concludes with a discussion and policy implications.

2.   Transparency in Ghana's petroleum and mining revenue governance

Ghana earns substantial revenues from the extractive sector: around 60 per cent of its export revenues come from gold mining and petroleum exploitation (IMF, 2017). The government of Ghana has engaged in several transparency processes within high-value natural resource management, of which the participation in the Extractive Industry Transparency Initiative (EITI) and the establishment of the independent Public Interest and Accountability Committee (PIAC, for petroleum revenues) under the PRMA are the most prominent.

Ghana joined the EITI – a worldwide initiative to increase transparency within the extractive industry – in 2003 and was validated as fully compliant in October 2010.[1] Through its annual EITI Reconciliation Reports (RRs), the Ghana EITI (GHEITI) publishes information on revenue flows originating from extractive industry companies; production volumes; leaseholders; and disbursements of revenues to sub-national units such as districts and traditional authorities.[2] Although the RR provides information on revenue flows going to the central government and, more recently, also sub-national transfers, it does not provide information on revenue expenditure.

By March 2020, the GHEITI had produced 20 RRs; 13 of them covering mining revenues (2004-2018), and seven oil revenues (2010-2018). The RRs are the core GHEITI output and have been described as 'solid, reliable, comprehensive and quite innovative in their contents' (Scanteam, 2016, p. 3). The RRs are usually formally launched in the national capital, Accra, at which key findings and recommendations are presented. The launch is extensively covered by both print and electronic media, and followed by radio interviews and discussions on the findings and recommendations. Limited copies of the RRs are also printed

and distributed at the launch. As part of its RR dissemination strategy, the GHEITI has since

2015 organised between two and four community forums in mining districts after the launch.

These are attended by opinion leaders, District Assembly (DA) members and local

government, CSO, community-based group, student and local media representatives. The

GHEITI community forums seek to equip communities in resource rich areas with critical

information on the contracts, production and revenue contributions as well as externalities of

the mining industry.

All the RRs are downloadable from the GHEITI website. In addition to the RRs, the

GHEITI also publishes annual progress reports and documents and newsletters on mining and

petroleum extraction related issues, which are available on its webpages.

Following the discovery of offshore petroleum reserves in 2007 and the start of

production in 2010, the Government of Ghana passed the Petroleum Revenue Management

Act (PRMA; henceforth termed the Act) in 2011. The Act provides the framework for

collecting and allocating petroleum revenues, with the aim of ensuring responsible,

transparent and accountable revenue management that benefits all citizens, including future

generations (PRMA, 2011). Among other things, the Act requires the Minister of Finance to

make public the records of petroleum receipts, the production volume, and oil and gas prices

in the official Ghana Gazette, two national newspapers and the Ministry's own webpage on a

quarterly basis, as well as to submit the information to the Parliament directly (Section 8).

Further, the Act stipulated the establishment of PIAC, which is responsible for

ensuring compliance with the Act (Sections 51-57).[3] PIAC is mandated to publish semi-

annual and annual reports[4] and make them accessible through two daily newspapers and its

own webpage, and to present these to the President and Parliament, as well as to create space

for the public to engage with the management and utilisation of petroleum revenues. PIAC's

engagement with citizens is aimed at increasing knowledge and awareness of petroleum

revenue management and monitoring and improving citizen's capability and willingness to hold the government accountable in managing and spending petroleum revenues. By the time of the survey, PIAC had held in total six meetings in regional capitals to engage the public.[5] Since then, PIAC has conducted such meetings in district capitals as well.

Thus, the information about *national* resource revenue management (NRRM) is publicly available through the Internet and newspapers, and to some extent through the electronic media during and after report launch when findings and recommendations made in the reports are discussed on radio and television. Information about petroleum revenues is also directly available to the members of parliament (MP), who are expected to convey the information to the District Assembly (DA) in their local constituency, of which they are also members. In turn, the DA members, including the MPs, are expected to transmit information to the Unit Committees (UC), which constitute the lowest-level administrative units in the Ghanaian political system; to traditional authorities; and to non-elite citizens[6] in their electoral area.

Local authorities manage revenues that originate from local mining resource extraction through various mechanisms, such as mineral royalties, concession ground rents and community development trust funds established by some mining companies (Dupuy, 2017; Kasimba & Lujala, 2018; Lawer, Lukas, & Jørgensen, 2017). Local authorities can also suggest projects to be funded by petroleum revenues through the District Medium Term Development Plans. There are, however, few formal requirements and channels to make information about the *local* resource revenue management (LRRM) public. For example, the Minerals Development Fund Act passed in 2016 does not address issues related to transparency and accountability in the management of mineral royalties transferred to paramount chiefs, traditional councils, district assemblies and local (mineral royalty) management committees (Lujala & Narh, 2019).

Despite the strong emphasis by the Government of Ghana on making national revenue-related information public, little research has so far been conducted on the actual diffusion of information on natural resource revenues. One study that focused on a rural village on Ghana's oil coast found that the inhabitants there had little access to petroleum revenue-related information, and that no one had heard about the GHEITI (Ofori & Lujala, 2015). The study also indicated that the villagers had limited access to information sources in general.

3. Information disclosure, transparency and accountability

Theories of transparency often model it as operating through causal chains where increased information disclosure catalyses a series of stages ending in improved governance, and in which each stage acts as a precondition for the following stage (Fenster, 2015; Heald, 2006a). Formulated as the transparency action cycle by Fung (2007) and Kosack and Fung (2014), the transparency process consists of the state institutions providing salient and accessible information to citizens about their practices and policies; citizens acting on the information, seeking to influence the state; the state institutions finding the citizen action and feedback salient; and, finally, the state institutions responding constructively through changing practices and policies. The loop is finalized by the state providing updated information to the public about the changes it has made to practices and policies for further evaluation.

This transparency process may break down in any one of its phases. Most importantly for the current paper, it may fail already in the first step if the information provided does not reach the intended audience, the information is not useful or the intended users simply do not care about the information. For behavioural changes to take place, citizens also must care about the policy in question, and they should be dissatisfied with the status quo. Further,

citizens need to have feasible ways of acting on the information, and they need to be aware of these ways.

It is important to note that there is no one universal series of mechanisms for transparency to work, as each context requires different types of information to be disclosed, and different disclosure avenues and enabling conditions for the transparency initiative in question to be successful (Fenster, 2015; Fox, 2015; Fung et al., 2007; Heald, 2006b; Kosack & Fung, 2014). For example, limiting extractive industries' environmental or social impact requires different types of information to be disclosed than if the public were expected to demand reforms in national natural resource revenue governance. Further, while a few committed individuals may suffice to push for local changes, attempts to change national-level resource governance policies and practices likely require collective action by citizens to hold the state accountable directly (through elections or other means) or indirectly (through official oversight bodies like PIAC).[7]

For information disclosure on oil, gas and mining revenues to result in changes in how revenues are handled at the national and local level in Ghana (and elsewhere), the disclosed information needs first to reach the intended audience, the citizens. To this end, this paper focuses on the first step in the transparency process: has the information provided by PIAC and the GHEITI reached the intended audience? Furthermore, to shed light on information-seeking behaviour, it examines who has been most likely to receive information about natural resource governance in Ghana. A framework for the latter point is developed in the next section.

4.   Characteristics of informed citizens

The quantitative literature on information-seeking behaviour in developing countries has examined determinants linked to the likelihood of being informed about national and local

issues in general, and about specific topics such as health, agriculture and disaster-related issues (Bernal & Vásquez, 2016; Sommerfeldt, 2015). Although the factors included in the analyses vary depending on the aim of the study and data limitations, most studies include variables that describe the respondent and their household, and some also include variables describing the place where the respondent lives.

In this article, we conceptualise the potential factors that may affect the likelihood of being informed along three dimensions: individual, household and geography. This is useful in order to identify and understand the potential barriers to information diffusion, as these may operate at different levels and thus may require different approaches to be overcome.

Table 1 outlines the different characteristics of each dimension that are likely to be relevant within the resource-revenue information context. *Individual characteristics* can be divided into personal and social- and role-related (Wilson, 1997). The personal characteristics include gender (women tend to be less informed on various issues than men; Bernal and Vásquez (2016); Katungi, Svetlana, & Smale (2008)); ethnicity (minority groups tend to be less informed; Bernal and Vásquez (2016)); age (information demand tends to decrease with age; Bernal and Vásquez (2016); Wang, Viswanath, Lam, Wang, & Chan (2013)); and education (less educated people tend to be less informed; Bernal and Vásquez (2016); Dutta (2009); Wang et al., (2013)). In Ghana, at the time of the survey, most information on resource revenue management was available through written sources and in English: English literacy skills are thus potentially an important determinant for information access. Finally, we expect that people who travel more often are more likely to be exposed to information that is not available in their own area.

When it comes to social and role-related variables, it is likely that respondents with their main occupation in mining have both a motive to seek and an opportunity to get more information about revenue management. Further, previous research has shown that household

heads tend to have higher information levels (Bernal & Vásquez, 2016). As revenues

(especially from mining) in Ghana are partially managed by local leaders – who also have a

more direct link to national level administration through regular meetings with elected

representatives in the DA and the national parliament – we would expect local leaders to be

more informed when it comes to natural resource revenue management. We also expect that

those individuals who are more politically engaged would have higher information levels.

Household characteristics that are potentially relevant in our context include

household size, since more household members can mean more sources of information

(Bernal & Vásquez, 2016). Poor households may have less time to seek information in

general, may prioritise other types of information than those related to natural resource

revenue management, or have worse access to information sources (Bernal & Vásquez, 2016;

Ofori & Lujala, 2015; Wang et al., 2013). Finally, we expect that respondents from a

household in which someone engages in mining are more likely to have accessed information

about resource revenue management.

The final set of variables relates to the *geographical environment* of the respondent's

place of residence. The existing literature has established a strong divide between urban and

rural dwellers: people living in urban areas tend to be better informed and use more varied

information sources than those living in rural areas (Bernal & Vásquez, 2016; Dutta, 2009;

Garcia-Cosavalente, Wood, & Obregon, 2010). Further, it is possible that people living in

relatively remote rural areas are less informed as the news sources may be limited (Bernal &

Vásquez, 2016; Dutta, 2009; Garcia-Cosavalente et al., 2010). Finally, we expect people to

be more informed in areas where an extractive company is operating.

5.   Data and methods

The data used in the analysis come from a survey conducted in Ghana between June-August

2016. The purpose of the survey was to study people's level of knowledge of and perceptions and attitudes towards a number of issues related to petroleum and mining revenue management and to understand how people inform themselves about such matters. The survey was part of a field experiment conducted in Ghana from June 2016-September 2017 that sought to evaluate the impact of PIAC's transparency and accountability efforts, targeting both leaders and non-elite citizens. The field experiment focused on the impact of PIAC, but the survey used in this article gathered information on mining and petroleum revenue governance.

The survey sample consists of 3526 adult (18 years and over) respondents, who were interviewed face-to-face by local enumerators. A combination of blocking and clustering was used in the sampling. The survey was conducted in 120 of the 216 districts in Ghana at the time (currently Ghana has 260 districts). All oil (6) and mining districts (25) were included,[8] while the remaining 89 districts were selected randomly among leftover districts. In each district, five electoral areas were randomly selected using the Electoral Commission's list of electoral areas as the sample frame.

One DA member per electoral area was randomly selected from a list obtained from the District Administration. The selected DA was contacted, and an appointment made to meet in their electoral area. Each DA was asked to suggest one UC member; one chief or other senior member of the traditional authorities such as a queen mother; and one other opinion leader (for example, a journalist or teacher) in their electoral area.[9] Lastly, two non-elite citizens (1 male and 1 female) were randomly selected in each electoral area.[10] The sampling structure therefore targeted 30 respondents per selected district, with an average of 26 respondents per district included in the survey. The most difficult to reach were the traditional leaders. Due to limited involvement of women in local and national politics in

Ghana, women are underrepresented among the decision makers, but they make up 50 per cent of the non-elite citizen sample.

5.1. Information sources

The first set of questions about information sources asked the respondents to rank the two most important media sources for national and local news, respectively.[11] The answer alternatives included radio, television, Internet (websites), social media (such as Facebook or Twitter), messages received by cell phone, newspaper, billboard or poster, information centre and information van.[12] The respondents could also indicate if they did not use any of these sources or if they used other sources than what was listed. Further, the respondents were asked to rank the two most important personal sources for national and local news. The answer alternatives included DA member, UC member, chief, another local leader, family member, friend, work colleague, other villager or neighbour and meetings organized by local leaders, community groups or other organizations. Again, the respondents could state if they did not use these as information sources and indicate other sources.

All respondents were asked whether in the past year they had received or heard any information from any source about how revenues from oil, gas or mining had been handled in Ghana (*national resource revenue management, NRRM*). Those who answered positively to this question (in total 1074, or 31%) were then asked which two media and two personal sources were their most important information sources. The answer alternatives were the same as above. The survey also asked whether the respondent had in the past year received or heard any information about how revenues from oil, gas or mining had been handled in their own area (*local resource revenue management, LRRM*). The 235 respondents (7% of the total) who had received such information were then asked to rank the two most important media and personal sources.[13]

Another set of questions regarding information sources mapped respondents' trust in the different information sources: all respondents were asked to indicate the two media and two personal sources they trusted the most and the least. Finally, respondents were asked how they would prefer to get information on petroleum and mining revenues, and what they perceived to be their best channels to contribute to natural resource revenue management.

The data on information sources is summarised and analysed by using descriptive statistics and graphs in Section 6.1 below.

5.2. Determinants of informed citizens

The multivariate analysis of characteristics of citizens who received information on natural resource revenue management uses two dependent variables: NRRM and LRRM. These are coded as dummies, where a positive response takes the value of 1. Summary statistics and variable definitions for our data are provided in Appendix 1.

The independent variables used in the multivariate analysis are grouped into individual, household and geographical categories (see Table 1). The individual variables include the respondent's age in years, gender, ethnicity (a dummy for those who belong to the Akan majority group), level of education (9-point scale from no schooling to completed tertiary level) and English language skills (3-point scale from being unable to read and write in English, to being able to only read, to being able to both read and write). Further, we include a dummy for household heads, for those with main occupation in mining and for those who had recently travelled to Accra. To measure respondents' general political engagement, we use a 6-point scale on how often the respondent discusses political matters and public affairs (from 'never' to 'all the time'). Finally, we include a dummy for non-elite citizens (as opposed to those with a leadership role).

The variables that describe the household include the number of adults in the household, whether a household member is involved in mining (dummy), a self-assessment of a household's living conditions (5-point Likert scale) and whether the household owns a radio (dummy) or TV (dummy). The effect of the physical environment is assessed by including a dummy if an extractive company is located in the area (self-reported), geodesic distance to regional capital (in kilometres, calculated based on the geographic coordinates of the interview location) and a dummy for urban areas.

We construct sampling weights to take into account the oversampling of DA and UC members compared to the overall population (using estimates of the number of elected representatives and 2010 census data); the undersampling of women (using 2010 census data); and the difference in ownership of radios, TVs and mobile phones – as proxies for household income – of our sample with regard to the overall population (using data from the corresponding questions in the Afrobarometer round 6, 2014).

We also consider the sampling design – the two-stage clustering and stratification in the first stage – in our analysis. In the first stage, we sampled districts and thus we use districts as our primary sample unit. The districts were drawn from three strata: oil districts, mining districts and all the other districts with stratum sizes of 6, 25 and 185, respectively. We included all oil and mining districts in the survey, the remaining primary sample units were sampled randomly within the 'no oil/no mining' stratum. We calculate the variance estimates using the three strata and the total stratum sizes with the finite population correction.[14] Our survey design included second level clustering on the electoral area. As each district includes a different number of electoral areas, we adjust the variance estimates by including the total number of electoral areas with the finite population correction.

As the dependent variables are binary, we use probit regressions to analyse the determinants of informed citizens. Standard errors are estimated using Taylor linearized

variance estimation. STATA 15.1 was used in all regression analyses. For anonymized

replication data and replication instructions, see (Lujala, Brunnschweiler, & Edjekumhene,

2020).

6.   Findings

6.1. Information sources

Figures 1-3 present the main results for how Ghanaians access national and local news in

general and for resource revenue related issues through media (Figure 1) and personal

contacts (Figure 2) and to what degree they trust these information sources (Figure 3). The

results are shown separately for the non-elite citizens and the different types of local leaders.

The Supplementary Appendix (SA) provides further details.

Six key points emerge from the results presented in the figures. First, it seems that the

main information channels used by PIAC and the GHEITI at the time (that is, Internet,

newspapers and meetings in region capitals) do not reflect what would be the most effective

ways to reach people: the Internet is a major source for less than 10 per cent of the

respondents; newspapers for less than 5 per cent; and equally few list public meetings as a

main information source (Figures 1 and 2; SA Tables 1 and 2).[15] Instead, radio in general,

and TV for national issues, are the key media to reach people, and also the most trusted

(Figure 3). In fact, almost 90 per cent of respondents list radio among the two most important

sources, and over 70 per cent mention television when it comes to national news (Figure 1,

Panel A).[16] These results closely reflect the latest Afrobarometer results for Ghana that show

a similarly strong importance of, and trust in, radio and TV as news sources, and a small role

of newspapers (Isbell & Appiah-Nyamekye, 2018).

Second, there are few information sources for LRRM beyond radio and television,

especially for non-elite citizens (Panel D, Figures 1 and 2). In fact, over 50 per cent of non-

elite citizens were not able to identify one single personal source for LRRM, with the local leaders being the main personal source for the rest. Even for the local leaders themselves, TV and radio are the main media sources for LRRM – fellow local leaders being the main personal information sources. Similarly, TV and radio are the main media sources for NRRM related information (Panel C, Figure 1) for local leaders – a striking proportion of the respondents listing no or only one personal source for NRRM – other local leaders and family or friends being the main personal sources for information (Panel C, Figure 2).

Third, ICT technologies and social media, often promoted as convenient and cheap ways of reaching people, may be problematic, as people do not list them among the most important sources,[17] and tend to distrust these sources more than others. The 2017 Afrobarometer shows that Internet and social media's importance increase with education level (Isbell & Appiah-Nyamekye, 2018), which is also reflected in our data: DA members, who are most likely to use Internet and social media (SA Table 1) as information source, are four times more likely than non-elite citizens and traditional leaders, and three times more likely than UC members and other opinion leaders, to have tertiary education.

Fourth, DA members are an important information source for other leaders (Figure 2), although less so for non-elite citizens. At the same time, however, people generally tend to trust local leaders as information sources (Panels B and D, Figure 3), a result that is in line with the 2017 Afrobarometer survey showing that most Ghanaians trust government officials (Isbell & Appiah-Nyamekye, 2018).

Fifth, young (under 30) people more often use the Internet and social media, and less often report a local leader as a main information source for both general and revenue-specific information; family and friends are considerably more important sources (SA Tables 3 and 6).

Finally, when it comes to gender, women are less likely than men to report a DA member or chief as an information source, and are more likely to rely on family and other villagers for information (SA Table 4). They are also substantially more likely to report no or only one personal information source for LRRM. Women are less likely to distrust cell phone and social media, and more likely to list family as a trusted information source (SA Table 6).

6.2. Informed citizens

For our outcome variables used in the multivariate analysis, the percentage of respondents who received information from any source about how revenues from oil, gas or mining had been handled in Ghana in the past 12 months (NRRM) varied from 19 per cent (non-elite citizens) to 44 per cent (DA members and traditional leaders), and from 3 per cent (UC members) to 13 per cent (other leaders) for LRRM (SA Table 7). There are also considerable geographical differences when it comes to the two dependent variables. In general, people are best informed about NRRM in Upper East (41%), Ashanti (40%) and Brong-Ahafo regions and least in Upper West (26%), Volta (24%) and Central (22%) regions. Interestingly however, in Ashanti (4%) and Brong-Ahafo (1%) people are among the least informed when it comes to LRRM, while people living in the Western (12%) and Eastern (13%) regions have the highest LRRM rates (SA Table 12 and SA Figure 1).

Tables 2 and 3 report the main results for regressions on who most likely receives information on NRRM and LRRM, respectively. The tables show odds ratios for probit regressions, where values larger than unity indicate an increase in the respondents' likelihood of having heard about resource revenue management, and values less than unity indicate a decreased likelihood. The odds ratio is interpreted in terms of one unit change in the independent variable. For example, the interpretation of the odds ratio of 1.19 for English literacy skills (Model 1 in Table 2) is: for a person being able to read (but not write) in

English, the odds of having heard about NRRM are 1.19 times as large as the odds for a person who can neither read nor write in English.

Due to the large number of factors that potentially can affect the likelihood of having heard about natural resource revenue management, the variables were first added separately for each category of characteristics described in Section 4 and shown in Table 1 – individual, household and geographical – and the clearly insignificant variables eliminated (see SA Tables 8 and 9 for the regression results). In Tables 2 and 3, Models 1, 2 and 3 include the variables that were (nearly) significant in the preliminary estimations, and Model 4 includes all variables simultaneously. Model 4 in both tables thus presents our main findings.[18]

Looking at the first category of characteristics that potentially influence access to natural resource revenue information (Table 1), i.e. the individual aspects, we find that English literacy skills are positively linked to access to NRRM information.[19] In addition, mobility (that is, travel to Accra during the previous 12 months) is positively related to NRRM. For LRRM, we find that older people tend to have less often received information. The preliminary results in SA Table 8 show that although gender is negatively related to both NRRM and LRRM (i. e., females tend to have heard less often about natural resource revenue management), when only the variables for individual characteristics are included, its impact disappears when the role-related aspects are included in the estimation model as well. Ethnicity is in no estimation related to information access.

Of the social and role-related individual characteristics, being a non-elite citizen significantly reduces the likelihood of having received NRRM or LRRM related information in the past 12 months. There is some evidence that those whose main occupation is in mining are more likely to have accessed LRRM and NRRM related information, but in the main models these variables are not significant at conventional levels. Interest in political issues positively predicts the likelihood of having heard about NRRM, but is unrelated to LRRM. In

neither case are the household heads more likely to be more informed than the other household members.

Of the household characteristics, better living conditions and access to media, especially radio, positively predict higher likelihood of having heard about NRRM. Respondents in households in which a member is involved in mining are more likely to have heard of LRRM. Household size is not related to access to N/LRRM related information.

Of the geographical characteristics, presence of a mining company in the area substantially increases the likelihood of having heard about NRRM and LRRM. There is some evidence that the population living in relatively remote areas are less likely to be informed about NRRM and LRRM, these being significant at p-levels of 0.16 and 0.11, respectively. Similarly, there is some evidence that people living in urban areas perhaps have better access to NRRM compared to those living in rural areas.

As a conclusion, the results suggest two main points: first, the information about N/LRRM is most likely to reach those who are already in a better position in their community. Those with better English literacy skills, living conditions and access to media are more likely to access resource revenue related information, while non-elite citizens and people living in the more remote areas have less often heard about resource revenue management. Second, people who themselves engage in mining, have a family member who engages in mining, or live in an area with a mining company are more likely to have received national and local natural resource revenue information. This implies that the information disseminated by the government can potentially be useful to people living in areas affected by mining, underscoring the importance of disseminating such information widely and effectively.

7.   Discussion and conclusions

This study is the first to explore the (determinants of) information levels on natural resource management using a large-N survey in a developing country that has been actively pursuing transparency in this context for several years. The survey was conducted in June-August 2016, covered the whole of Ghana and included 3526 respondents. It delivered a snapshot of the situation in one country, so we cannot trace the evolution of information over time or make any causal inferences. Moreover, our sampling strategy was biased towards duty bearers, with non-elite citizens making up just over one-third (34%) of our sample. We do adjust our strategy by weighting to make results more representative, but we cannot capture every potential type of bias in the sample. Nevertheless, we can draw several conclusions and policy implications from the analysis.

The findings showed that the main information channels used for information dissemination about natural resource governance at the time of the survey – that is, internet, newspapers and meetings in the regional capitals – did not reflect the most effective self-reported ways to reach people, namely radio, TV and local community meetings. In general, people had few other information sources for natural resource governance beyond what they heard or saw on the radio or TV. Further, using regression analysis, we found that respondents with a better position in their community, with better English literacy skills, living conditions and access to media had more often heard about how natural resource revenues had been managed in the previous 12-month period, while non-elite citizens tended to have heard less often about these issues. Similarly, those with a more immediate interest in the issue – respondents who either worked in mining themselves, had a household member involved in mining, or lived near a mining site – had also received more information on resource management.

Although the government of Ghana is conscious of the importance of transparency in natural resource revenue governance and actively seeks to implement transparency, one of the key audiences – the public – has so far received only limited information about natural resource revenues. There thus seems to be a gap between the currently practiced information disclosure and transparency that could activate and sustain the transparency action cycle, a result previously found in other contexts as well (Fox, 2015; Kosack & Fung, 2014). Ghanaians do care about natural resource governance; they feel entitled to benefit from them; and they are highly dissatisfied with the status quo. Many of the preconditions for the transparency process to be successful are thus in place in Ghana, but we identify three main remaining challenges to make transparency more successful – two practical and one theoretical: (1) Understanding and designing the information channel(s), (2) designing the information content, and (3) understanding the limits of the theory.

The first challenge is to reach and inform people about natural resource revenue management – in Ghana and elsewhere – as most people do not actively seek out this kind of information unless they have a personal interest (e.g. work in mining). This is in contrast to, for example, information seeking for health and education-related issues that are of more widespread immediate, personal interest. Transparency thus needs to go beyond the mere availability of information and involve more active dissemination, perhaps linked with a reminder of why every citizen should take a closer interest.

There are many likely reasons for the low levels of knowledge on natural resource revenue management in Ghana, such as people having more pressing needs to attend to (Fox, 2015; Kosack & Fung, 2014; Lieberman, Posner, & Tsai, 2014; Ofori & Lujala, 2015), but this article highlights the limited access to information sources as one of the key issues. In Ghana, PIAC and the GHEITI, the two main organizations focusing on transparency in the sector, make information available mainly in English, often in written and very technical

terms; it is thus not easy for many citizens to make sense of the disclosed information. Further, PIAC and the GHEITI tend to use information channels that the intended receivers do not normally use, as shown in our survey.

Thus, as a first step in making transparency 'work', considerable effort is needed to make the overall issue of natural resource governance salient for a majority of citizens. A general campaign on the radio and TV – the two most-used and most-trusted sources of information – could aim at raising awareness of and stimulating interest in the issues at hand. This could also be done more indirectly, when people seek other information, for example through posters at meetings with local leaders or at local information centres.

The second step is to get relevant, more detailed and actionable information to the citizens (Fung, 2013), for which community-based channels and personal communication may be appropriate, as these have the advantage of providing interaction and immediate feedback. When asked about their views on the most effective ways for citizens to contribute to natural resource management, the respondents listed contacting district assembly members (DAs) as the most effective way for citizens to contribute to the better handling of revenues from oil, gas and mining. The link with elected DAs is not unrealistic: according to the 2017 Afrobarometer, a majority of Ghanaians (52%) think that it is their responsibility to make sure that the elected DAs do their job, a view that has gained support over the last ten years (Armah-Attoh & Norviewu, 2018).

One approach could thus be to target DAs as gatekeepers for information dissemination, for example through MPs, who are part of their constituency's District Assembly (Fiankor & Akussah, 2012). It would be important to sensitize DAs, and other local leaders, to share more information with the local people, including young people and women, who our study found are more difficult to reach through DAs. Another approach to reach the citizens more directly would be through information centres and community

information meetings, two of the most preferred ways to be informed about natural resource revenues chosen by our respondents. Community meetings in particular are an effective way of reaching people in Ghana as 50 per cent of Ghanaians had attended at least one community meeting during the previous 12 months, and another 35 per cent would have attended if they had had the chance.[20] PIAC's decision, since our survey in summer 2016, to move their public meetings from regional to district capitals is thus a move in the right direction, as is the GHEITI's decision to disseminate the annual GHEITI report results also through community forums.

Once the most effective information channel(s) has been identified, the second challenge from the policy point of view is to streamline the actual content of the information to incentivise individuals to make use of it, particularly when they are dissatisfied with natural resource management.[21] As in many other cases of transparency initiatives (Berliner, Bagozzi, & Palmer-Rubin, 2018), citizens in Ghana have been exposed to information that someone else has decided to be important and relevant for them. Instead, citizens should be consulted about what type of information they would like to obtain and how it should be presented. In our survey, the respondents listed information on expenditure at the national and local level, and revenue allocations to the local level, as key issues they would like to have more information about, but on which there is limited information available at the moment.

Moreover, to determine what information to provide and to direct the transparency efforts and citizen action, it is necessary to define in detail what exactly the overall objective and sub-objectives of the transparency initiative are, moving beyond having transparency as the end-goal. It is important that citizens perceive these (sub-)objectives to be relevant and within reach through actions that have been clearly spelled out, as even dissatisfied people who are interested in the information need to believe that taking action is worthwhile.

The final challenge we see is that the underlying transparency model in the extractive industry literature sees transparency as inherently 'good'. This, however, rests on the assumption that better-informed citizens would use the newly acquired information for the good of all citizens. Citizens in countries like Ghana, as shown in this article, are likely to have unequal access to information, with those already in the best position also having the best access to new information. This may simply indicate that information is reaching those who can make the best use of it, but it may also suggest that increased transparency disproportionally benefits those in more powerful positions, replicating and reinforcing any existing social or economic power imbalances (Epremian & Brun, 2018; Shaxson, 2009).

From this derives a more fundamental theoretical issue: whether the 'public' is the correct target audience for transparency initiatives (Fenster, 2015; Fox, 2015; Fung et al., 2007; Lujala & Epremian, 2017). As the results from this study indicate, the underlying assumptions of the transparency model – information provision leading to a better-informed public that will exercise its public duty to hold the leaders accountable – may be untenable, as most people do not receive the information at all. Perhaps a more cost-effective way would be to target key stakeholders, such as relevant civil society organizations, that have the required expertise to make use of the available information, and the channels, tools and resources to talk to citizens and reach decision-makers. In fact, PIAC and the GHEITI themselves, through their reports and recommendations, have already directly affected how revenues from petroleum production and mining are managed in Ghana.

In conclusion, our study shows mixed success of Ghana's transparency efforts in natural resource revenue management. However, it is worth remembering that what any one transparency initiative can achieve may be rather modest, due to limits given by its design and the wider institutional and socio-economic context in which it operates.

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[11] The exact questions and answer alternatives pertaining to information sources are included in Supplementary Appendix (SA Tables 1-6). These tables also provide the fully disaggregated data for Figures 1-3.

[12] An information centre is usually a one-room facility in a rural community providing information to the inhabitants. In most cases, the information centre is affiliated to FM radio stations broadcasting their major news bulletins. Information vans are generally owned by the Information Services Division (ISD) of the Ministry of Information. The vans move from one community to another to provide information (usually of public interest) to the citizens.

[13] The rates for information on NRRM and LRRM in mining and oil districts were slightly higher at 33 per cent and 10 per cent, respectively.

[14] Finite population correction accounts for the reduction in variance that occurs when sampling without replacement from a finite population.

[15] Newspapers is included in the category 'other' in Figure 1. See Supplementary Appendix for more detailed breakdown.

[16] The fact that radio is the preferred information source in developing countries has also been documented in other research (Msoffe & Ngulube, 2017).

[17] A similar tendency has been observed in other studies (Elly & Silayo, 2013; Msoffe & Ngulube, 2017).

[18] As a robustness check, we added each excluded variable into Models 4 one-by-one. None of these variables was significant, and in no model did they affect the other variables in a substantial manner. These results are reported in SA Tables 10 and 11.

[19] English literacy skills trumps the effect of the education level in the NRRM estimations. If education alone is included of the two variables, it is highly significant. Education is not related to LRRM. Correlation between education level and English literacy skills is 0.74.

[20] Afrobarometer 2017, discussed in Duayeden & Armah-Attoh (2017).

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[21] Looking at whether and what citizens do with any information on natural resource management that they receive is beyond the scope of this article. See Brunnschweiler et al. (2019) for more on this point.

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Table 1. Determinants of access to natural resource revenue information

Individual	Household	Geographic location
Personal aspects • Age, gender and ethnic background • Education • Literacy • Mobility Social and role related aspects • Occupation • Position in household • Position in the community • Political engagement	• Household size • Living conditions • Access to media • Engagement in mining	• Urban vs. rural • Remoteness • Presence of an extractive company

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Table 2. Characteristics of informed citizens, national resource revenue management

	(1) Individual	(2) Household	(3) Geographic	(4) Combined
English skills	1.193***			1.141***
	(4.58)			(3.18)
	0.000			0.002
Travel to Accra	1.295***			1.242***
	(3.46)			(2.72)
	0.001			0.007
Occupation mining	1.936**			1.558
	(2.04)			(1.44)
	0.043			0.152
Nonelite citizen	0.676***			0.675***
	(-6.22)			(-6.17)
	0.000			0.000
Interest in politics	1.059***			1.037*
	(2.80)			(1.68)
	0.006			0.096
HH living conditions		1.107***		1.059*
		(3.71)		(1.97)
		0.000		0.052
HH TV		1.260**		1.041
		(2.60)		(0.40)
		0.011		0.692
HH radio		1.639***		1.420**
		(3.79)		(2.43)
		0.000		0.017
Distance to regional capital			0.998**	0.999
			(-2.36)	(-1.41)
			0.020	0.163
Urban area			1.180***	1.093
			(2.84)	(1.41)
			0.005	0.161
Presence of mining company			1.405***	1.334***
			(4.68)	(3.63)
			0.000	0.000
Number of districts	120	120	120	120
Observations	3,462	3,478	3,425	3,384

Table shows results for probit regressions, coefficients are shown in odds ratios. Robust t-values are in parentheses and p-values are in square brackets. Estimations use two-stage clustering (districts and electoral area). Models 1, 2 and 3 are based on preliminary estimations, which are included in Supplementary Appendix.
*** p<0.01, ** p<0.05, * p<0.1

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Table 3. Characteristics of informed citizens, local resource revenue management

	(1)	(2)	(3)	(4)
	Individual	Household	Geographic	Combined
Age	0.994*			0.994*
	(-1.90)			(-1.84)
	0.060			0.068
English skills	1.098*			1.053
	(1.83)			(1.00)
	0.070			0.320
Occupation mining	2.641**			1.634
	(2.42)			(1.12)
	0.017			0.266
Nonelite citizen	0.777***			0.787**
	(-2.84)			(-2.56)
	0.005			0.012
HH involved in mining		1.696***		1.431**
		(3.92)		(2.24)
		0.000		0.027
HH living conditions		1.062*		1.033
		(1.67)		(0.91)
		0.097		0.364
HH radio		1.532*		1.392
		(1.96)		(1.47)
		0.052		0.143
Distance to regional capital			0.998**	0.998
			(-2.00)	(-1.63)
			0.048	0.107
Presence of mining company			1.563***	1.414***
			(4.50)	(3.40)
			0.000	0.001
Number of districts	120	120	120	120
Observations	3,432	3,462	3,422	3,353

Table shows results for probit regressions, coefficients are shown in odds ratios. Robust t-values are in parentheses and p-values are in square brackets. Estimations use two-stage clustering (districts and electoral area). Models 1, 2 and 3 are based on preliminary estimations, which are included in Supplementary Appendix.
*** p<0.01, ** p<0.05, * p<0.1

PANEL A. News about Ghana (N=3517)

PANEL C. National revenue management (N=1073)

PANEL B. News about own area (N=3508)

PANEL D. Local revenue management (N=235)

Legend: NO FIRST SOURCE, NO SECOND SOURCE, OTHER, INFORMATION CENTER, CELL PHONE, INTERNET, TELEVISION, RADIO

Categories: COMMON CITIZENS, UC MEMBER, DA MEMBER, TRAD. LEADER, OTHER LEADER
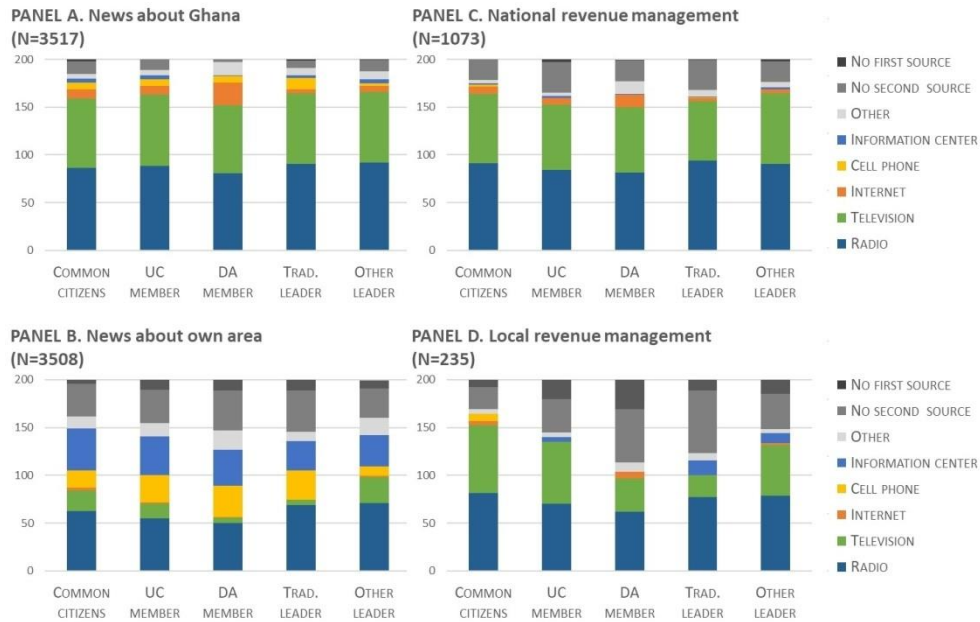
Figure 1. Main media information sources for what happens in Ghana (Panel A) and in the respondent's own area (Panel B) in general and for information about how natural resource revenues are handled in Ghana (NRRM, Panel C) and in the respondent's own area (LRRM, Panel D) in per cent.

Notes: As all respondents could list two main information sources, the per cent shares add up to 200%. UC: Unit Committee; DA: District Assembly. Original data with further breakdown can be found in Supplementary Appendix, SA Tables 1 and 2.

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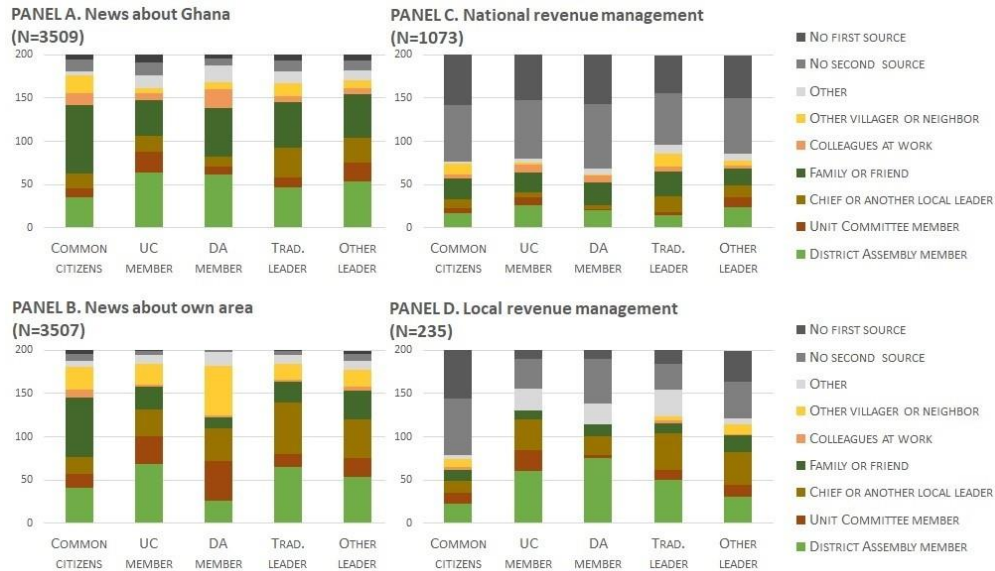
Figure 2. Main personal information sources for what happens in Ghana (Panel A) and in the respondent's own area (Panel B) in general and for information about how natural resource revenues are handled in Ghana (NRRM, Panel C) and in the respondent's own area (LRRM, Panel D) in per cent.

Notes: As all respondents could list two main information sources, the per cent shares add up to 200%. UC: Unit Committee; DA: District Assembly. Original data with further breakdown can be found in Supplementary Appendix, SA Tables 1 and 2.

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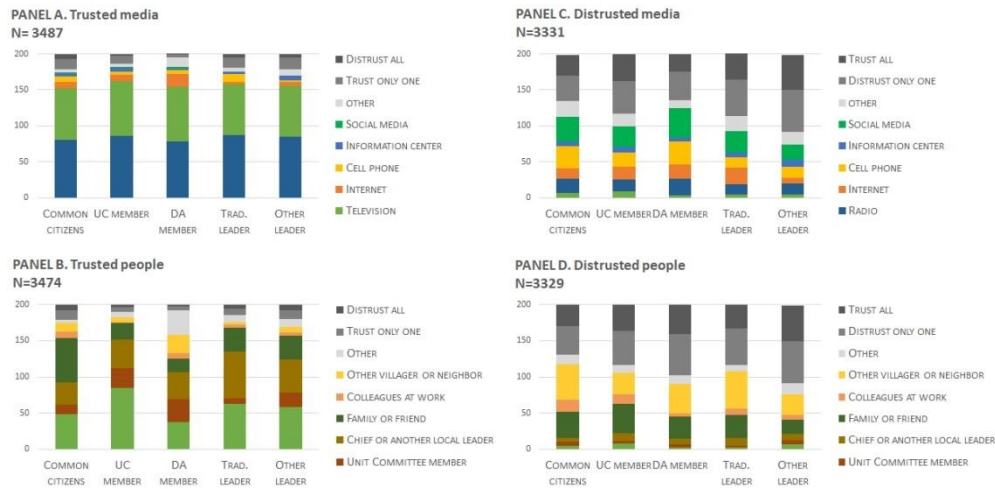
Figure 3. Most and least trusted media (Panels A and C) and personal (Panels B and D) information sources in per cent.

Notes: As all respondents could list two main information sources, the per cent shares add up to 200%. UC: Unit Committee; DA: District Assembly. Original data with further breakdown can be found in Supplementary Appendix, SA Table 5.

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Appendix 1. Summary statistics and variable definitions

			Obs	Mean	Min	Max	Definition
Individual characteristics	Dependent variables	National revenue management (NRRM)	3492	0.31	0	1	Dummy: 1 if respondent had in the past year received or heard any information from any source about how revenues from oil, gas or mining had been handled in Ghana
		Local revenue management (LRRM)	3487	0.07	0	1	Dummy: 1 if respondent had in the past year received or heard any information from any source about how revenues from oil, gas or mining had been handled in own area
	Personal	Age	3466	46	18	110	Age in years
		Gender	3518	0.22	0	1	Dummy: 1 if respondent is female
		Ethnic majority	3526	0.58	0	1	Dummy: 1 if respondent is Akan
		Education	3513	4.57	0	8	Scale from 0 to 8. 0: None (13%); 1: Incomplete primary school (4%); 2: Completed primary school (2%); 3: Incomplete junior high school (5%); 4: Complete junior (32%); 5: Incomplete secondary/technical school (2%); 6: Completed secondary/technical school (18%); 7: Incomplete tertiary (2%); 8: Completed tertiary (22%)
		Travel to Accra	3515	0.72	0	1	Dummy: 1 if respondent has travelled to Accra during the past six months
		English skills	3513	1.48	0	2	Scale from 0 to 2. 0: Cannot read or write English; 1: Can read English; 2: Can read and write English
		Household head	3526	0.71	0	1	Dummy: 1 if respondent is household head
		Occupation mining	3526	0.01	0	1	Dummy: 1 if respondent's main occupation is mining
	Social	Common citizen	3526	0.34	0	1	Dummy: 1 if respondent does not have any leader position
		DA	3526	0.16	0	1	Dummy: 1 if respondent is District Assembly member
		UC	3526	0.17	0	1	Dummy: 1 if respondent is Unit Committee member
		Chief	3526	0.11	0	1	Dummy: 1 if respondent is traditional leader
		Opinion leader	3526	0.22	0	1	Dummy: 1 if respondent is opinion leader (teacher, religious leader, youth leader etc.)
		Interest in politics	3495	2.39	0	5	How often the respondent discusses political matters and public affairs with friends, family or colleagues? 6-point scale: Never, Rarely, Sometimes, Often, Very often, All the time
Household characteristics		HH size	3469	4.91	0	30	Number of adults living permanently in the household
		HH involved in mining	3507	0.06	0	1	Dummy: 1 if someone in the household currently engages in mining
		HH living conditions	3505	1.99	0	4	Respondent's self-assessment of households' present living conditions. 5-point Likert scale from very bad to very good
		HH TV	3517	0.85	0	1	Dummy: 1 if household owns TV
		HH radio	3516	0.93	0	1	Dummy: 1 if household owns radio
Geographic characteristics		Presence of mining company	3469	0.18	0	1	Dummy: 1 if respondent indicates that a mining or oil company operate in or nearby area
		Distance to regional capital	3499	56	1	166	Dummy: Distance in kilometers to the closest regional capital. Measured as direct line (geodesic) from the interview spot (latitude and longitude coordinates).
		Urban area	3526	0.46	0	1	Dummy: 1 if the district is considered as urban area

SUPPLEMENTARY APPENDIX

Transparent for whom? Dissemination of information on Ghana's petroleum and mining revenue management

SA Table 1. Main media and personal sources for general information

A) Main media information sources in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents

	News about Ghana						News about own area					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
No first source	2	0	0	2	1	1	4	11	11	11	8	8
No second source	13	11	3	8	12	10	34	34	42	43	30	36
Radio	86	88	81	91	92	87	63	55	50	69	71	62
Television	72	75	71	73	74	73	21	16	5	6	27	17
Internet (websites)	10	9	24	4	6	10	3	1	1	0	2	2
Social media	2	2	5	1	1	2	1	1	1	1	1	1
Cell phone	7	7	7	12	3	7	18	29	32	31	9	22
Newspaper	2	4	9	6	6	5	1	1	2	0	2	1
Billboard or poster	0	0	0	0	1	0	3	3	7	4	9	5
Information center	4	4	1	3	4	3	44	40	38	30	33	39
Information van	1	0	0	0	1	1	5	6	6	4	6	5
other	0	0	0	0	0	0	2	3	4	1	1	2
Total (%)	200	200	200	200	200	200	200	200	200	200	200	200
Number of respondents	1210	603	557	385	762	3517	1206	603	557	383	759	3508

Notes: The respondents were asked the following questions: i) Which of these media are the most important one for you when you inform yourself about what happens in Ghana? Please rank two; and ii) Which of these media are the most important one for you when you inform yourself about what happens in your area? Please rank two. As all respondents could list two main sources, the percent shares add up to 200%. Com. cit. = common citizen; UC mem. = Unit Committee member; DA mem. = District Assembly member; Trad. Leader = Traditional leader

B) Main personal information sources in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents

	News about Ghana						News about own area					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
No first source	6	8	4	7	6	6	4	1	0	1	4	3
No second source	14	16	9	13	12	13	8	4	2	5	7	6
A District Assembly member	35	65	62	47	54	50	41	69	26	65	54	49
A Unit Committee member	11	24	9	11	22	15	16	32	46	15	22	25
A Chief	11	13	4	16	17	12	14	23	16	32	26	20
Another local leader	6	5	8	19	12	9	7	8	22	28	19	14
A family member	33	10	6	28	15	20	31	6	3	13	11	16
A friend	46	32	49	24	35	39	38	20	10	12	22	24
Colleagues at work	14	8	22	7	7	12	9	2	2	2	5	5
Other villager or neighbor	21	5	7	15	8	13	25	24	57	18	19	28
Meetings org. by local leaders	1	2	7	4	7	4	4	3	10	5	6	5
Meetings org. by a community group	1	6	4	4	3	1	2	6	4	2	3	2
Meetings org. by another organization	0	4	6	1	1	3	0	0	1	0	1	2
other	2	2	3	4	1	2	1	1	2	3	1	1
Total (%)	200	200	200	200	200	199	200	200	200	200	200	199
Number of respondents	1209	603	557	385	755	3509	1206	603	557	384	757	3507

Notes: The respondents were asked the following questions: i) Which of these people or meetings are the most important one for you when you inform yourself about what happens in Ghana? Please rank two; and ii) Which of these people or meetings are the most important one for you when you inform yourself about what happens in your area? Please rank two. As all respondents could list two main sources, the percent shares add up to 200%. Com. cit. = common citizen; UC mem. = Unit Committee member; DA mem. = District Assembly member; Trad. Leader = Traditional leader.

SA Table 2. Main media and personal source for information about oil, gas, and mining revenues

A) Main media information sources in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents

	National revenue information						Local revenue information					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
No first source	0	2	1	1	2	1	8	20	31	12	15	15
No second source	22	32	22	31	21	25	23	35	55	65	37	38
Radio	91	84	82	94	90	88	82	70	62	77	79	77
Television	73	68	68	62	74	70	71	65	34	23	53	53
Internet (websites)	7	7	13	3	4	7	5	0	7	0	2	3
Social media	0	1	1	1	0	1	0	0	0	0	0	0
Cell phone	2	0	0	1	0	1	8	0	0	0	0	2
Newspaper	2	3	10	6	4	5	2	5	7	0	3	3
Billboard or poster	0	0	0	0	0	0	0	0	0	0	0	0
Information center	2	2	0	1	2	1	0	5	0	15	11	6
Information van	0	0	0	0	0	0	2	0	3	4	0	1
other	0	0	2	0	1	1	2	0	0	4	1	1
Total (%)	200	200	200	200	200	200	200	200	200	200	200	200
Number of respondents	234	167	245	170	257	1073	65	20	29	26	95	235

Notes: The respondents were asked the following questions: i) Which of media are the most important one for you when it comes to getting to know how revenues from oil, gas, and mining are handled in Ghana? Please rank two; and ii) Which of media are the most important one for you when it comes to getting to know how revenues from oil, gas, and mining are handled in your area? Please rank two. As all respondents could list two main sources, the percent shares add up to 200%. Com. cit. = common citizen; UC mem. = Unit Committee member; DA mem. = District Assembly member; Trad. Leader = Traditional leader

B) Main personal information sources in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents

	National revenue information						Local revenue information					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
No first source	59	52	57	44	49	53	55	10	10	15	35	33
No second source	65	68	75	60	64	66	66	35	52	31	43	48
A District Assembly member	18	26	20	14	24	20	23	60	76	50	31	39
A Unit Committee member	6	10	2	4	11	6	12	25	3	12	13	13
A Chief	6	2	1	5	7	4	11	5	10	31	22	17
Another local leader	4	3	3	12	7	6	3	30	10	12	16	13
A family member	6	5	2	7	2	4	0	0	0	4	5	3
A friend	19	19	25	22	17	20	12	10	14	8	14	13
Colleagues at work	4	10	7	5	3	6	3	0	0	4	1	2
Other villager or neighbor	13	2	1	15	6	7	9	0	0	4	11	7
Meetings org. by local leaders	0	0	1	5	2	2	0	0	3	8	3	3
Meetings org. by a community group	1	2	0	4	1	1	2	10	7	12	2	4
Meetings org. by another organization	0	3	4	2	3	3	0	15	7	8	1	3
other	1	0	0	1	2	1	3	0	7	4	0	2
Total (%)	200	200	200	200	200	200	200	200	200	200	200	200
Number of respondents	234	167	245	169	252	1067	65	20	29	26	91	231

Notes: As all respondents could list two main sources, the percent shares add up to 200%. The respondents were asked the following questions: i) Which of these people or meetings are the most important one for you when it comes to getting to know how revenues from oil, gas, and mining are handled in Ghana? Please rank two; and ii) Which of these people or meetings are the most important one for you when it comes to getting to know how revenues from oil, gas, and mining are handled in your area? Please rank two. Com. cit. = common citizen; UC mem. = Unit Committee member; DA mem. = District Assembly member; Trad. Leader = Traditional leader

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SA Table 3. Main media and personal information sources for general information and oil, gas, and mining revenues for those over and under 30-years

A) Main media information sources in percent (%)

	News about Ghana		News about own area		National revenue information		Local revenue information	
	30+	< 30	30+	< 30	30+	< 30	30+	< 30
No first source	1	1	8	6	1	1	15	14
No second source	10	11	35	36	25	17	41	26
Radio	89	76	63	56	89	83	77	74
Television	74	70	16	24	69	75	50	74
Internet (websites)	8	26	1	6	6	17	2	9
Social media	1	6	1	3	1	2	0	0
Cell phone	7	6	23	19	1	2	2	3
Newspaper	5	3	1	2	5	2	4	0
Billboard or poster	0	0	5	4	0	0	1	0
Information center	4	1	40	36	2	1	8	0
Information van	1	0	6	5	0	0	2	0
other	0	0	2	3	1	1	1	0
Total (%)	200	200	200	200	200	200	200	200
Number of respondents	2,959	504	2,952	504	937	126	200	35

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

B) Main personal information sources in percent (%)

	News about Ghana		News about own area		National revenue information		Local revenue information	
	30+	< 30	30+	< 30	30+	< 30	30+	< 30
No first source	6	6	3	3	51	63	30	54
No second source	13	15	6	8	65	74	45	69
A District Assembly member	52	36	50	37	20	15	41	26
A Unit Committee member	16	11	26	19	7	6	13	9
A Chief	13	6	22	12	5	1	20	3
Another local leader	10	2	16	7	6	2	13	9
A family member	19	27	14	26	4	3	3	0
A friend	36	58	21	43	20	20	13	11
Colleagues at work	12	13	5	9	6	4	2	0
Other villager or neighbor	11	20	28	28	7	10	7	11
Meetings org. by local leaders	4	2	6	4	2	1	3	0
Meetings org. by a community group	3	2	3	3	2	2	7	6
Meetings org. by another organization	2	1	0	0	3	0	1	3
Other	2	2	2	2	2	1	3	0
Total (%)	200	200	200	200	200	200	200	200
Number of respondents	2,953	504	2,951	504	931	126	196	35

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

SA Table 4. Main media and personal information sources for general information and oil, gas, and mining revenues for men and women

A) Main media information sources in percent (%)

	News about Ghana		News about own area		National revenue information		Local revenue information	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
No first source	0	3	9	5	1	0	17	5
No second source	9	17	36	34	24	27	41	25
Radio	88	87	60	68	88	90	74	88
Television	73	72	15	27	70	70	50	68
Internet (websites)	12	5	2	2	8	5	3	3
Social media	2	1	1	1	1	0	0	0
Cell phone	7	6	24	14	1	2	1	8
Newspaper	6	1	1	1	6	0	4	0
Billboard or poster	0	0	5	4	0	0	0	3
Information center	3	6	39	38	1	4	7	3
Information van	0	2	5	6	0	1	2	0
other	0	0	3	1	1	1	1	0
Total (%)	200	200	200	200	200	200	200	200
Number of respondents	2,744	770	2,741	766	916	157	195	40

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

B) Main personal information sources in percent (%)

	News about Ghana		News about own area		National revenue information		Local revenue information	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
No first source	6	5	2	5	52	58	29	53
No second source	14	9	6	7	67	63	46	60
A District Assembly member	53	37	51	38	21	15	41	28
A Unit Committee member	16	14	26	20	7	4	13	10
A Chief	12	10	22	13	4	5	19	8
Another local leader	9	9	15	10	6	5	13	10
A family member	15	40	10	35	4	7	3	0
A friend	40	38	23	30	20	22	12	15
Colleagues at work	13	8	5	6	6	3	2	3
Other villager or neighbor	9	24	28	30	6	15	6	13
Meetings org. by local leaders	4	3	6	2	2	1	3	0
Meetings org. by a community group	3	3	4	3	2	1	7	3
Meetings org. by another organization	3	1	0	0	3	0	2	0
Other	2	1	2	0	1	0	3	0
Total (%)	200	200	200	200	200	200	200	200
Number of respondents	2,739	769	2,741	765	910	157	191	40

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

SA Table 5. Most and least trusted media and personal information sources

A) Most and least trusted media in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents.

	Trusted media							Distrusted media					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All		Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
Distrust all	7	3	1	4	5	4	Trust all	29	37	24	35	49	34
Trust only one	14	10	5	15	16	12	Distrust only one	35	44	40	52	59	44
Radio	80	86	78	87	85	83	Radio	20	16	23	15	15	18
Television	72	75	77	70	71	73	Television	6	9	4	4	5	6
Internet (websites)	9	9	17	4	5	9	Internet (websites)	15	18	20	24	8	16
Social media	1	1	2	1	0	1	Social media	34	29	40	29	21	31
Cell phone	7	5	6	11	2	6	Cell phone	30	20	32	14	15	24
Newspaper	3	4	11	4	6	5	Newspaper	10	7	8	10	7	8
Billboard or poster	0	0	1	0	1	0	Billboard or poster	8	6	4	8	5	7
Information center	4	5	2	3	6	4	Information center	6	7	5	7	10	7
Information van	2	1	1	1	1	1	Information van	4	4	1	2	4	3
other	0	0	0	0	1	0	other	0	0	0	0	0	0
Total (%)	200	200	200	200	200	200	Total (%)	199	199	200	200	198	199
Number of respondents	1195	598	554	383	757	3487	Number of respondents	1136	558	554	376	707	3331

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

B) Most and least trusted people in percent (%) for all respondents combined (column All) and separately for the different categories of the respondents.

	Trusted persons							Distrusted persons					
	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All		Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
Distrust all	8	3	2	5	8	6	Trust all	30	36	40	34	49	37
Trust only one	12	7	6	9	12	10	Distrust only one	39	47	57	50	58	49
A District Assembly member	49	85	38	63	59	57	A District Assembly member	5	8	3	2	7	5
A Unit Committee member	13	28	32	8	19	19	A Unit Committee member	5	4	5	2	5	5
A Chief	24	33	22	43	33	29	A Chief	2	3	4	0	5	3
Another local leader	6	6	15	21	14	11	Another local leader	4	7	3	11	5	5
A family member	36	9	8	21	20	22	A family member	4	6	2	4	2	4
A friend	26	13	10	12	13	17	A friend	32	34	28	27	18	28
Colleagues at work	8	2	8	4	4	6	Colleagues at work	16	13	5	9	6	11
Other villager or neighbor	12	6	24	3	8	11	Other villager or neighbor	49	30	41	51	29	41
Meetings org. by local leaders	3	2	8	3	6	4	Meetings org. by local leaders	4	4	3	2	3	3
Meetings org. by a community group	2	4	4	3	3	3	Meetings org. by a community group	3	4	2	3	2	3
Meetings org. by another organization	1	1	3	1	1	1	Meetings org. by another organization	3	2	2	2	3	2
other	0	1	19	3	1	4	other	4	1	5	2	8	4
Total (%)	200	200	200	200	200	200	Total (%)	200	200	199	200	199	200
Number of respondents	1194	594	556	382	748	3474	Number of respondents	1124	566	552	375	712	3329

Notes: For questions asked, see Table 1 and 2. As all respondents could list two main sources, the percent shares add up to 200%.

SA Table 6. Most and least trusted media and personal information sources by age and gender

A) Most and least trusted media and people in percent (%) for under 30-years old and those who are older

	Trusted media		Distrusted media			Trusted persons		Distrusted persons	
	30+	< 30	30+	< 30		30+	< 30	30+	< 30
Trust none	4	4			Trust none	6	7		
Trust all			35	29	Trust all			37	39
Trust only one	12	11			Trust only one	10	11		
Distrust only one			46	37	Distrust only one			49	52
Radio	84	74	19	15	A District Assembly member	59	46	5	7
Television	74	72	6	5	A Unit Committee member	20	15	4	5
Internet (websites)	7	22	16	13	A Chief	31	20	3	3
Social media	1	3	30	43	Another local leader	12	5	5	4
Cell phone	6	6	22	36	A family member	20	32	4	3
Newspaper	6	5	9	5	A friend	14	32	27	31
Billboard or poster	0	1	7	7	Colleagues at work	5	9	11	9
Information center	5	2	7	7	Other villager or neighbor	10	16	41	38
Information van	1	1	3	3	Meetings org. by local leaders	4	3	3	3
other	0	0	0	0	Meetings org. by a community group	3	2	3	3
Total (%)	200	200	200	200	Meetings org. by another organization	1	0	2	2
Respondents	2,929	502	2,799	486	Other	4	2	5	2
					Total (%)	200	200	200	200
					Respondents	2922	500	2,805	475

Notes: For questions asked, see Table 5. As all respondents could list two main sources, the percent shares add up to 200%.

B) Most and least trusted media and people in percent (%) for men and women

	Trusted media		Distrusted media			Trusted persons		Distrusted persons	
	Men	Women	Men	Women		Men	Women	Men	Women
Trust none	3	11			Trust none	5	9		
Trust all			32	42	Trust all			39	33
Trust only one	10	20			Trust only one	9	12		
Distrust only one			44	47	Distrust only one			51	42
Radio	84	78	17	25	A District Assembly member	59	47	5	6
Television	75	67	5	10	A Unit Committee member	20	17	4	6
Internet (websites)	10	4	16	16	A Chief	32	20	3	2
Social media	1	1	34	22	Another local leader	12	8	5	5
Cell phone	6	6	27	12	A family member	17	39	4	5
Newspaper	6	3	8	10	A friend	16	18	27	32
Billboard or poster	0	1	7	4	Colleagues at work	6	6	10	12
Information center	4	7	7	7	Other villager or neighbor	10	15	40	44
Information van	1	2	3	5	Meetings org. by local leaders	5	3	3	4
Other	0	0	0	0	Meetings org. by a community group	3	3	3	4
Total (%)	200	200	200	200	Meetings org. by another organization	1	1	2	3
Respondents	2,725	755	2,620	710	Other	4	2	5	2
					Total (%)	200	200	200	200
					Respondents	2718	755	2,616	712

Notes: For questions asked, see Table 5. As all respondents could list two main sources, the percent shares add up to 200%.

1
2
3
4
5
6

SA Table 7. Respondents that had/had not in the past year received or heard any information from any source about how revenues from oil, gas or mining had been handled in Ghana and own area

A) In Ghana

	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
Had not heard (*N*)	972	432	311	213	490	2418
	81%	*72%*	*56%*	*56%*	*66%*	*69%*
Had heard (*N*)	234	167	245	170	258	1074
	19%	*28%*	*44%*	*44%*	*34%*	*31%*
Total	1206	599	556	383	748	3492

B) In own area

	Com. cit.	UC mem.	DA mem.	Trad. leader	Other leader	All
Had not heard (*N*)	1138	580	525	356	653	3252
	95%	*97%*	*95%*	*93%*	*87%*	*93%*
Had heard (*N*)	65	20	29	26	95	235
	5%	*3%*	*5%*	*7%*	*13%*	*7%*
Total	1203	600	554	382	748	3487

8

SA Table 8. Individual characteristics of informed citizens

SA Tables 8 and 9 show the results when variables are included for each category (Table 1) – individual, household, and geographic – separately. In SA Table 8, Models 1-3 show the results for National resource revenue management (NRRM) and Models 4-6 for local resource revenue management (LRRM). Models 1 and 4 include the variables for personal characteristics and Models 2 and 5 for social and role related aspects.

Models 3 and 6 include the variables that were significant or near significant in the previous models. The results show that although gender is strongly related to NRRM when only individual characteristics are included, its impact disappears when the role-related aspects are included in the estimation model. A similar effect can be observed for LRRM.

	(1)	(2)	(3)	(4)	(5)	(6)
	National resource revenue management			Local resource revenue management		
Age	1.002			0.995*		0.994*
	(0.78)			(-1.74)		(-1.95)
	0.438			0.085		0.053
Gender	0.778***		1.034	0.855*		0.988
	(-3.94)		(0.39)	(-1.94)		(-0.15)
	0.000		0.699	0.054		0.883
Ethnic majority	1.009			1.085		
	(0.14)			(0.85)		
	0.891			0.399		
Education	1.010			0.972		
	(0.57)			(-1.23)		
	0.569			0.219		
English literacy skills	1.181***		1.197***	1.164**		1.096*
	(3.11)		(4.60)	(2.22)		(1.82)
	0.002		0.000	0.028		0.072
Travel to Accra	1.267***		1.287***	0.988		
	(3.23)		(3.39)	(-0.12)		
	0.002		0.001	0.902		
Occupation mining		1.825**	1.909**		2.824***	2.633**
		(2.01)	(2.01)		(2.67)	(2.38)
		0.047	0.047		0.009	0.019
Household head		1.121	1.107		0.903	
		(1.57)	(1.09)		(-1.09)	
		0.120	0.276		0.276	
Common citizen		0.676***	0.703***		0.766***	0.782***
		(-5.56)	(-4.90)		(-2.87)	(-2.66)
		0.000	0.000		0.005	0.009
Interest in politics		1.075***	1.058***		1.017	
		(3.59)	(2.72)		(0.63)	
		0.000	0.008		0.533	
Observations	3,431	3,469	3,462	3,427	3,464	3,432

Table shows results for probit regressions, coefficients are shown in odds ratio. Robust
t-values are in parentheses and p-values are given under t-values. Estimations use
two-stage clustering (districts and electoral area).
*** p<0.01, ** p<0.05, * p<0.1

SA Table 9. Household and geographical characteristics of informed citizens

SA Table 9 shows the results for NRRM (Models 1 and 2) and LRRM (Models 3 and 4). Models 1 and 3 include the variables for household characteristics and Models 2 and 4 for geographic aspects.

	(1)	(2)	(3)	(4)
	National resource revenue management		Local resource revenue management	
HH size	1.003		1.000	
	(0.35)		(0.01)	
	0.726		0.990	
HH living conditions	1.100***		1.055	
	(3.44)		(1.43)	
	0.001		0.155	
HH TV	1.261**		1.098	
	(2.61)		(0.71)	
	0.010		0.478	
HH radio	1.614***		1.481*	
	(3.65)		(1.81)	
	0.000		0.073	
HH involved in mining	1.125		1.687***	
	(1.04)		(3.85)	
	0.302		0.000	
Distance to regional capital		0.998**		0.997**
		(-2.36)		(-2.12)
		0.020		0.036
Urban area		1.180***		0.916
		(2.84)		(-0.96)
		0.005		0.341
Presence of mining company		1.405***		1.569***
		(4.68)		(4.55)
		0.000		0.000
Observations	3,420	3,425	3,415	3,422

Table shows results for probit regressions, coefficients are shown in odds ratio. Robust t-values are in parentheses and p-values are given under t-values. Estimations use two-stage clustering (districts and electoral area).
*** $p<0.01$, ** $p<0.05$, * $p<0.1$*

SA Table 10. Characteristics of informed citizens. National resource revenue management. Robustness analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
English skills	1.141***	1.131***	1.140***	1.141***	1.154**	1.140***	1.136***	1.139***
	(3.18)	(2.87)	(3.10)	(3.16)	(2.55)	(3.15)	(2.98)	(3.13)
	0.002	0.005	0.002	0.002	0.012	0.002	0.003	0.002
Travel to Accra	1.242***	1.236***	1.241***	1.241***	1.244***	1.233***	1.254***	1.247***
	(2.72)	(2.68)	(2.71)	(2.72)	(2.73)	(2.64)	(2.81)	(2.76)
	0.007	0.008	0.008	0.007	0.007	0.010	0.006	0.007
Occupation mining	1.558	1.533	1.556	1.558	1.559	1.537	1.553	1.625
	(1.44)	(1.41)	(1.43)	(1.45)	(1.44)	(1.39)	(1.44)	(1.54)
	0.152	0.162	0.154	0.151	0.152	0.166	0.153	0.127
Common citizen	0.675***	0.657***	0.678***	0.675***	0.675***	0.704***	0.674***	0.673***
	(-6.17)	(-5.56)	(-5.51)	(-6.17)	(-6.16)	(-4.85)	(-6.22)	(-6.21)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Interest in politics	1.037*	1.036*	1.036*	1.037*	1.037*	1.034	1.036	1.036*
	(1.68)	(1.67)	(1.67)	(1.71)	(1.69)	(1.58)	(1.63)	(1.66)
	0.096	0.098	0.098	0.090	0.094	0.118	0.105	0.099
HH living conditions	1.059*	1.063**	1.059*	1.060*	1.060**	1.061**	1.058*	1.057*
	(1.97)	(2.07)	(1.97)	(1.96)	(2.00)	(2.03)	(1.91)	(1.91)
	0.052	0.041	0.051	0.052	0.047	0.044	0.058	0.059
HH TV	1.041	1.011	1.041	1.038	1.044	1.048	1.038	1.038
	(0.40)	(0.11)	(0.40)	(0.36)	(0.42)	(0.46)	(0.36)	(0.37)
	0.692	0.916	0.691	0.717	0.676	0.647	0.719	0.712
HH radio	1.420**	1.432**	1.420**	1.420**	1.418**	1.414**	1.411**	1.419**
	(2.43)	(2.47)	(2.43)	(2.43)	(2.42)	(2.40)	(2.37)	(2.42)
	0.017	0.015	0.017	0.016	0.017	0.018	0.019	0.017
Distance to regional capital	0.999	0.998	0.999	0.999	0.999	0.999	0.999	0.999
	(-1.41)	(-1.49)	(-1.41)	(-1.38)	(-1.41)	(-1.40)	(-1.29)	(-1.31)
	0.163	0.139	0.162	0.170	0.161	0.165	0.200	0.192
Urban area	1.093	1.095	1.092	1.093	1.093	1.093	1.096	1.101
	(1.41)	(1.43)	(1.41)	(1.41)	(1.41)	(1.41)	(1.45)	(1.53)
	0.161	0.155	0.162	0.160	0.161	0.161	0.149	0.128
Presence of mining company	1.334***	1.306***	1.333***	1.327***	1.333***	1.328***	1.320***	1.346***
	(3.63)	(3.37)	(3.57)	(3.43)	(3.61)	(3.56)	(3.46)	(3.60)
	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.000
Age		0.998						
		(-1.04)						
		0.299						
Gender			0.992					
			(-0.12)					
			0.901					
Ethnic majority				1.018				
				(0.25)				
				0.800				
Education					0.995			
					(-0.29)			
					0.776			
Household head						1.080		
						(1.02)		
						0.310		
HH size							0.996	
							(-0.45)	
							0.652	
HH involved in mining								0.930
								(-0.55)
								0.582
Observations	3,384	3,343	3,384	3,384	3,380	3,384	3,350	3,374

Table shows results for probit regressions, coefficients are shown in odds ratio. Robust t-values are in parentheses and p-values are given under t-values. Estimations use two-stage clustering (districts and electoral area). *** p<0.01, ** p<0.05, * p<0.1

SA Table 11. Characteristics of informed citizens. Local resource revenue management. Robustness analysis

	(1)	(2)	(3)	(4)	(7)	(5)	(6)	(8)	(9)	(10)
Age	0.994*	0.994*	0.994*	0.993**	0.994*	0.995	0.994*	0.994*	0.994*	0.994*
	(-1.84)	(-1.84)	(-1.83)	(-2.10)	(-1.84)	(-1.52)	(-1.88)	(-1.86)	(-1.87)	(-1.85)
	0.068	0.068	0.070	0.038	0.068	0.130	0.062	0.065	0.063	0.066
English skills	1.053	1.057	1.053	1.119	1.065	1.058	1.057	1.044	1.057	1.057
	(1.00)	(1.07)	(0.99)	(1.57)	(1.22)	(1.07)	(1.06)	(0.83)	(1.06)	(1.06)
	0.320	0.286	0.326	0.120	0.226	0.287	0.293	0.411	0.292	0.291
Occupation mining	1.634	1.641	1.634	1.626	1.620	1.680	1.651	1.647	1.622	1.692
	(1.12)	(1.13)	(1.12)	(1.12)	(1.08)	(1.17)	(1.14)	(1.14)	(1.12)	(1.19)
	0.266	0.260	0.266	0.266	0.283	0.242	0.257	0.258	0.265	0.237
Common citizen	0.787**	0.776***	0.787**	0.774***	0.780***	0.759***	0.776***	0.795**	0.786**	0.788**
	(-2.56)	(-2.65)	(-2.54)	(-2.75)	(-2.68)	(-2.82)	(-2.68)	(-2.54)	(-2.59)	(-2.54)
	0.012	0.009	0.012	0.007	0.008	0.006	0.009	0.012	0.011	0.012
HH living conditions	1.033	1.033	1.033	1.036	1.042	1.032	1.034	1.034	1.034	1.035
	(0.91)	(0.91)	(0.92)	(0.98)	(1.16)	(0.89)	(0.93)	(0.94)	(0.93)	(0.99)
	0.364	0.363	0.361	0.330	0.248	0.377	0.352	0.347	0.354	0.323
HH radio	1.392	1.393	1.392	1.395	1.416	1.398	1.409	1.389	1.402	1.412
	(1.47)	(1.48)	(1.47)	(1.48)	(1.57)	(1.50)	(1.56)	(1.46)	(1.53)	(1.55)
	0.143	0.142	0.143	0.143	0.119	0.137	0.122	0.146	0.128	0.123
HH involved in mining	1.431**	1.432**	1.432**	1.431**	1.448**	1.432**	1.428**	1.440**	1.436**	1.427**
	(2.24)	(2.25)	(2.24)	(2.23)	(2.31)	(2.24)	(2.21)	(2.25)	(2.27)	(2.23)
	0.027	0.026	0.027	0.027	0.023	0.027	0.029	0.026	0.025	0.028
Distance to regional capital	0.998	0.998	0.998	0.998*	0.998*	0.998	0.998	0.998	0.998	0.998*
	(-1.63)	(-1.63)	(-1.60)	(-1.66)	(-1.90)	(-1.63)	(-1.63)	(-1.60)	(-1.63)	(-1.80)
	0.107	0.107	0.113	0.099	0.060	0.105	0.106	0.112	0.105	0.074
Presence of mining company	1.414***	1.418***	1.413***	1.414***	1.416***	1.421***	1.420***	1.390***	1.417***	1.416***
	(3.40)	(3.41)	(3.22)	(3.37)	(3.41)	(3.45)	(3.44)	(3.17)	(3.41)	(3.41)
	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001
Gender		1.028								
		(0.32)								
		0.751								
Ethnic majority			1.003							
			(0.02)							
			0.981							
Education				0.970						
				(-1.27)						
				0.205						
Travel to Accra					0.866					
					(-1.35)					
					0.180					
Household head						0.918				
						(-0.84)				
						0.402				
Interest in politics							0.978			
							(-0.84)			
							0.404			
HH size								1.004		
								(0.33)		
								0.744		
HH TV									0.968	
									(-0.24)	
									0.810	
Urban area										0.879
										(-1.34)
										0.183
Observations	3,353	3,353	3,353	3,349	3,352	3,353	3,331	3,320	3,353	3,353

Table shows results for probit regressions, coefficients are shown in odds ratio. Robust t-values are in parentheses and p-values are given under t-values. Estimations use two-stage clustering (districts and electoral area). *** p<0.01, ** p<0.05, * p<0.1

SA Table 12. Geographic distribution of NRRM and LRRM

See also the map below.

Region	NRRM	LRRM
Upper East	41%	8%
Ashanti	40%	4%
Brong-Ahafo	34%	1%
Northern	31%	2%
Western	28%	12%
Eastern	28%	13%
Greater Accra	28%	9%
Upper West	26%	3%
Volta	24%	5%
Central	22%	10%
Mean	30%	7%

SA Figure 1. Geographic distribution of NRRM and LRRM

The maps show the geographic distribution for the two dependent variables, NRRM (Map A) and LRRM (Map B), at the region level, using standard deviation from the mean as the classification method. The map shows the regions that existed before 2019 (Ghana has had 16 regions since February 2019).