Original article

Citizens' participation in petroleum revenue management in Ghana

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ARTICLE INFO	ABSTRACT
	Many natural resource-rich developing countries have struggled economically. One of the common reasons is the lack of citizen participation in revenue management. This article responds to this concern by using an online geocoded survey to engage the public on petroleum revenue-funded projects in Ghana. It reflects critically on Ghanaians' knowledge about projects in their localities, surveys their opinions on how the government should involve the public in the projects' management, and determines their willingness to participate in engagements on the projects. The article makes three observations: First, Ghanaians do not know about petroleum revenue-funded projects in their localities. Secondly, Ghanaians want the government to involve them in selecting the projects' priority areas, types, and locations. Thirdly, Ghanaians are willing to participate in engagements on petroleum revenue-funded projects. The article concludes that petroleum revenue managers in Ghana should expand citizen engagement. In that regard, petroleum revenue managers should consider alternative methods such as online geocoded platforms to effectively engage citizens in managing petroleum revenue-funded projects.

1. Introduction

Research indicates that many countries have failed to grow and develop from natural resource wealth. The underlying reasons for such failures range from revenue mismanagement (van der Ploeg and Venables, 2012) and citizens' grievances in the producing regions (Humphreys et al., 2007) to a lack of citizen participation in revenue management (Brunnschweiler et al., 2021a; Ghose et al., 2018). Scholars like Shackleton et al. (2002) have recommended that local people play a more active role in natural resource management. To help resource-rich countries avoid the resource curse, natural resource revenue managers need to engage ordinary citizens (Darby, 2010; Ghose et al., 2018; Lujala et al., 2020b; Ofori and Lujala, 2015) that hold no elected or appointed positions in their communities. When ordinary citizens see their inputs in natural resource revenue management, they become part of it and can enhance it (Ogbe and Lujala, 2021). For instance, in petroleum revenue management, ordinary citizens could have a sense of ownership of the revenue-funded projects in their communities, be motivated to monitor the implementation of these projects, and contribute to maintaining them.

This article reports findings from a survey of Ghanaians concerning the Annual Budget Funding Amount (ABFA) for projects in Ghana. The ABFA is the part of petroleum revenue that has financed development projects in the country since 2011. Ogbe and Lujala (2021) indicated that as of 2018, the ABFA had funded about 400 community-based projects across Ghana. So, do Ghanaians know about the ABFA-funded projects in their communities? Furthermore, how do Ghanaians want to participate in the ABFA projects' management? These are the focus of this article. Specifically, it seeks to investigate the following research questions:

1. What are the conditions of petroleum revenue-funded projects in Ghana?
2. How can the government involve ordinary Ghanaians in managing petroleum revenue-funded projects in Ghana?
3. To what extent are Ghanaians willing to participate in engagements on petroleum revenue-funded projects?

The next section of the article presents a background encompassing petroleum revenue management and citizen engagement in Ghana. Thereafter, section three delves into the method and data. Section four concentrates on analysis, results, and discussion. Finally, section five concludes the article with a recommendation.

2. Background

The extraction of natural resources can generate revenues that can transform local and national economies. For example, Botswana, Malaysia, and Norway have strong economies due to natural resource endowment (Larsen, 2006; Lipkova and Hovorkova, 2018). Conversely,

natural resource extraction has contributed to armed conflicts (Le Billon, 2013; Lujala et al., 2007), corruption (Arezki and Bruckner, 2011; Bulte and Damania, 2008; Kolstad and Søreide, 2009), and underdevelopment (Cameron and Stanley, 2017; Ross, 1999) in many developing countries. For example, Nigeria (Humphreys et al., 2007), Bolivia (Auty, 1994), Sudan and Angola (Karl, 2007) have experienced conflicts, environmental degradation, increased poverty, and inequality despite their natural resource endowments. The irony of natural resource endowment leading to poor economic growth (Sachs and Warner, 1995) is what Richard Auty (Auty, 1993, p. 1) named the 'resource curse'.

One of the reasons for the resource curse is that natural resource-rich developing countries tend to over-depend on the export of natural resources while neglecting other sectors of the economy, for instance, manufacturing, agriculture, and services (Collier and Hoeffler, 2002; Humphreys et al., 2007; Sachs and Warner, 1995). Ablo (2019) indicates that with the failure to diversify their economies, these countries expose their national budgets to the volatilities of the international commodities market and the consequent adverse impacts on development. Furthermore, in many resource-rich developing countries, citizens are oblivious to how their governments spend the revenue (Natural Resource Governance Institute, 2015). Specifically, citizens are unaware of how much money their governments receive from the natural resource extractive companies, and they have no idea how (or on what) the governments spend this revenue. Thus, citizens do not influence revenue utilisation. In recent literature, the lack of citizen participation in natural resource revenue governance is one of the major causes of the resource curse in developing countries (Brunnschweiler et al., 2021b; Ghose et al., 2018; Kasimba and Lujala, 2019; Ofori and Lujala, 2015). While it may not be a straight line between resource extraction and negative development outcomes, the referenced scholars show that in countries with weak regulations and institutions, corruption, and mismanagement, natural resource extraction rather than encouraging development can lead to underdevelopment.

Researchers and policymakers have encouraged the governments of resource-rich developing countries to involve their citizens in utilising natural resource revenue to mitigate the resource curse (Cameron and Stanley, 2017; Epremian et al., 2016; Ghose et al., 2018; Ofori and Lujala, 2015). So, for improved natural resource revenue management, citizens need access to information, opportunities to question that information and provide feedback, and the freedom to demand better revenue use (Haufler, 2010; Kolstad and Wiig, 2009). Accordingly, some governments, including those of Angola, Bangladesh, Brazil, and Ghana have engaged their citizens in natural resource management using the media (print, audio-visual, and social) and townhall meetings, albeit ineffectively (Bockstael et al., 2016; Lujala et al., 2020a; Ovadia, 2018; Salam and Noguchi, 2006). For instance, citizens have often either lacked access to relevant information or opportunities to provide feedback concerning petroleum revenue management in Ghana (Gyampo, 2016; Kasimba and Lujala, 2019; Lujala et al., 2020a; Ofori and Lujala, 2015). Graham et al. (2019) indicate that the Public Interest and Accountability Committee responsible for informing and collecting feedback from Ghanaians regarding petroleum revenue utilisation experiences delays in financial disbursements from the Ministry of Finance in support of their activities which include public engagements. Consequently, in 2020, Ogbe and Lujala (2021) observed that the Committee holds only one public forum in each of the 16 regions in Ghana per year instead of at least the two required by the Petroleum Revenue Management Act.

Ghana has positioned herself structurally relatively well to avoid the resource curse particularly regarding petroleum revenue management. Ghana passed the Petroleum Local Content and Participation Law in 2013 to encourage local participation throughout the petroleum industry's value chain (Ablo and Otchere-Darko, 2022; Ayanoore, 2021). However, according to Ablo and Otchere-Darko (2022), implementation of the law is beset with considerable limitations such as

non-transparent and inaccurate contractual and employment data, limited partnerships, and institutional support for local companies. Nonetheless, Ghana has been compliant with the Extractive Industries Transparency Initiative (EITI) standard since October 2010 (Dashwood et al., 2022; GHEITI, 2021). On the one hand, the EITI requires extractive companies to publish their financial payments to governments. On the other hand, the EITI also compels governments to inform the public regarding revenue collection, allocation, and spending (Acosta, 2014; Haufler, 2010; Rustad et al., 2017). Thus, the EITI standards can empower civil-society actors through their inclusion in 'constituting and debating' transparency (Vijge, 2018, p. 13), which, in the end, can lead to better revenue governance (Arond et al., 2019). Scholars like Rustad et al. (2017) question EITI's effectiveness, especially regarding improving the developmental impacts of extractive industries (Le Billon and Spiegel, 2021). To Le Billon et al. (2021), the information disclosed by the government does not always reach the intended public because of poor information accessibility and dissemination. Governments must provide platforms for citizens' input, empower the marginalised and amplify their voices, and enhance inclusive decision-making in matters of natural resource revenue management (Fox, 2007; Fung et al., 2004). There is a need for different types of information disclosure avenues and empowerment platforms (Fenster, 2015; Fox, 2015; Heald, 2006). Ideally, such avenues or platforms should coordinate citizens' opinions about natural resource revenue management throughout countries faster than traditional methods such as assemblies or meetings.

Some researchers recommend information and communications technology (ICT) as a valuable tool that governments can use to engage citizens (Bott and Young, 2012; Kurniawan and de Vries, 2015; McKinley et al., 2017; Poncian, 2020; To et al., 2016). Fortunately, with the Internet- and Global Positioning System-enabled devices (mobile phones, tablets, or computers – smart devices), governments can inform citizens at their locations (McKinley et al., 2017) and collect citizens' opinions on location-specific projects (Bott and Young, 2012). Thus, smart devices can be an easy and economical way for governments to engage with a large number of citizens (To et al., 2016) and a platform for governments to address citizens' apprehension in specific places (Kurniawan and de Vries, 2015). However, there is a dearth of research on how natural resource-rich governments can leverage such technologies to engage citizens in revenue management. So, this article contributes to this research by engaging Ghanaians in the management of petroleum revenue-funded projects in Ghana through smartphones.

In Ghana, the Petroleum Revenue Management Act (PRMA), Act 815, and its amendment, Act 893, regulates oil and gas revenue administration (Armah-Attoh, 2015; Ogbe and Lujala, 2021; Petroleum Revenue Management Act, 2011; Petroleum Revenue Management (Amendment) Act, 2015; Sefa-Nyarko et al., 2021; Stephens, 2019). The PRMA is to monitor the judicious collection, allocation, and utilisation of petroleum revenue to culminate in a transformative impact on the lives of Ghanaians (Abraham, 2019; Edjekumhene et al., 2018; Gyampo, 2016; Lujala et al., 2020a; Ogbe et al., 2021; Sefa-Nyarko et al., 2021). Simply, it serves two main purposes. First, to help Ghana avoid the concomitant resource curse within the sector as other countries, like Nigeria (Amundsen, 2017; Idemudia, 2012; Olayungbo, 2019; Sala-i-Martin and Subramanian, 2013; Shobande and Enemona, 2021), experienced. Secondly, to help Ghana accrue immense benefits within the sector, as in Norway and Australia (Chandler, 2020; Hunter, 2014).

A key establishment in the PRMA (hereafter, the Act) is the Annual Budget Funding Amount (ABFA). The ABFA is the portion of petroleum revenue that is directed at funding developmental projects across Ghana. Its main objective is to promote economic progress, encourage financial uniformity, and improve uniform regional growth (Petroleum
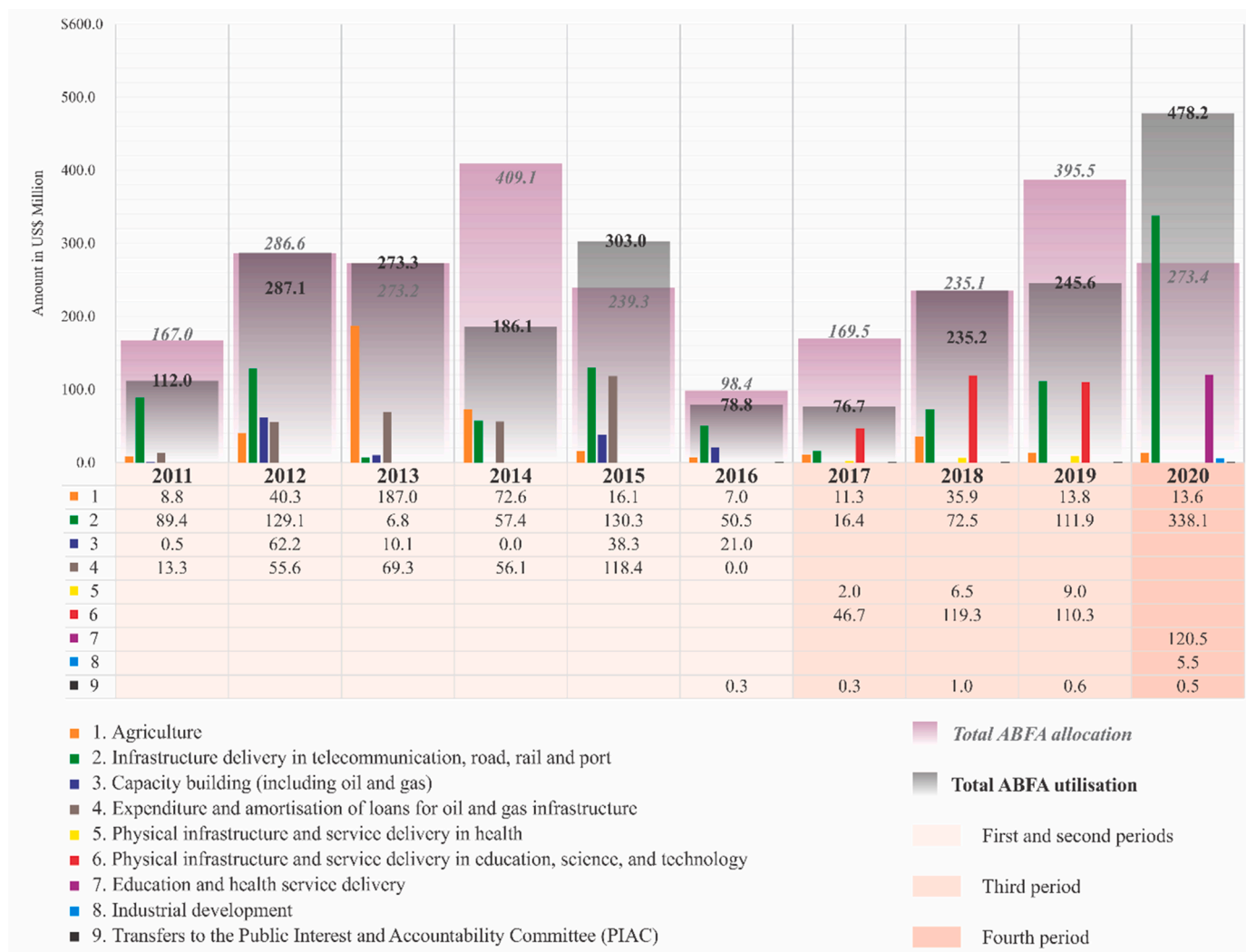
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	8.8	40.3	187.0	72.6	16.1	7.0	11.3	35.9	13.8	13.6
2	89.4	129.1	6.8	57.4	130.3	50.5	16.4	72.5	111.9	338.1
3	0.5	62.2	10.1	0.0	38.3	21.0				
4	13.3	55.6	69.3	56.1	118.4	0.0				
5							2.0	6.5	9.0	
6							46.7	119.3	110.3	
7										120.5
8										5.5
9						0.3	0.3	1.0	0.6	0.5

- 1. Agriculture
- 2. Infrastructure delivery in telecommunication, road, rail and port
- 3. Capacity building (including oil and gas)
- 4. Expenditure and amortisation of loans for oil and gas infrastructure
- 5. Physical infrastructure and service delivery in health
- 6. Physical infrastructure and service delivery in education, science, and technology
- 7. Education and health service delivery
- 8. Industrial development
- 9. Transfers to the Public Interest and Accountability Committee (PIAC)

Total ABFA allocation

Total ABFA utilisation

First and second periods

Third period

Fourth period

Fig. 1. Allocation, utilisation, priority areas, and spending periods of the ABFA from 2011 to 2020. Data sources: the PIAC and Ministry of Finance.

Revenue Management Act, 2011; Petroleum Revenue Management (Amendment) Act, 2015). From the Act, out of the yearly petroleum revenue[1] to the government, the ABFA should get not more than 70% of the benchmark revenue (Edjekumhene et al., 2018; Graham et al., 2019; Ogbe and Lujala, 2021; Ogbe et al., 2021; Sefa-Nyarko et al., 2021; Stephens, 2019). Graham et al. (2019) define the benchmark revenue as the remaining amount after deducting Ghana Oil Company's equity financing cost and share of the net carried and participating interest for investments from the total expected petroleum revenue.

There are two institutions with specific responsibilities regarding the ABFA. The first is the Ministry of Finance. This ministry manages petroleum revenue and supervises transfers to and disbursements from the ABFA. Additionally, Ogbe and Lujala (2021) state that for every spending period (three years), the ABFA funds projects from four of twelve priority areas.[2] More so, Ogbe et al. (2021) indicate that the ministry chooses and evaluates the priority areas for each period, and together with the district assemblies, it identifies the individual projects for ABFA funding. The second is the Public Interest and Accountability Committee (PIAC). The PIAC (a quasi-independent body) oversees the

Ministry of Finance's duties and engages Ghanaians regarding the ABFA. Specifically, from sections 51 to 57 of the Act, the PIAC is to ensure that the Ministry of Finance complies with the Act, supplies platforms for public awareness of petroleum revenue management, and independently assesses the governments' use of petroleum revenue (Petroleum Revenue Management Act, 2011; Petroleum Revenue Management (Amendment) Act, 2015).

At the end of 2020, the first year of the fourth spending period, the selected priority areas included agriculture, roads and other transportation infrastructure, health, and education. In this period, the total allocation to and utilisation of the ABFA were US\$ 2.5 billion and US\$ 2.3 billion, respectively (Fig. 1). The figures from the annual reports of the Ministry of Finance and PIAC regarding the ABFA utilisation within the period (compiled in Fig. 1) show that roads and other transportation infrastructure were the most funded priority area. It received a little more than US\$ 1 billion (44% of the total utilised ABFA). Some of the projects within this priority area include the construction of roads, bridges, and railways (Fig. 2A). Education and health (5th to 7th priority areas) were the next most funded area with about US\$ 414 million (18.2%). In 2020 alone, it received a little over US\$ 120 million (Fig. 1). Examples of projects within this sector include school facilities (Fig. 2B), healthcare centres (Fig. 2C), and the Free Senior High School (Free SHS)

[1] See Graham et al. (2019), Sefa-Nyarko et al. (2021), and Stephens (2019) for an elaboration on Ghana's petroleum funds and their corresponding revenue components.

[2] For all the priority areas, see Ogbe and Lujala (2021).

Fig. 2. Some ABFA-funded projects. Notes: The pictures are from PIAC's Facebook page (https://www.facebook.com/PIACGhana). A) Anyinasu-Sekyeredumase road in the Ashanti Region. B) Hostel facility (80-bed capacity) in Duayaw Nkwanta in the Ahafo Region. C) Community-Based Health Planning and Services compound in Ahankrasu in the Eastern Region. D) Anomabu Fisheries College.

programme.[3] The third most funded area was agriculture with projects like irrigation dams and fishing facilities (Fig. 2D). Agriculture received about US$ 406 million (17.8%) with its highest project funding in 2013 when the sector received US$ 187 million (Fig. 1). Industrial development was the least funded area receiving about US$ 5.5 million (0.2%). It is notable that the amended PRMA instructs the ABFA to fund the PIAC's activities to boost PIAC's financial capacity, particularly in engaging Ghanaians. Consequently, PIAC received about US$ 2.7 million of ABFA funding within the period.

Academics and practitioners of natural resource revenue management encourage citizen participation in revenue management (Brunnschweiler et al., 2021a; Darby, 2010; Graham et al., 2019; Kasimba and Lujala, 2019; Lockwood et al., 2010; Lujala, 2017; Ogbe and Lujala, 2021). In Ghana, the PIAC must inform Ghanaians about how much the ABFA receives, what projects it funds, and what opinions Ghanaians have regarding the ABFA (Petroleum Revenue Management Act, 2011). At the end of 2020, the PIAC published 18 reports (annual and semi-annual) from their regional and district engagements (PIAC, 2021). Regions and districts are the second and third political-administrative levels, respectively, in Ghana. The total PIAC engagements in the regions were 16, and the districts were 123. The main administrative towns in each of these jurisdictions usually serve as engagement venues.

Aside from the PIAC, Brunnschweiler et al. (2021a), Graham et al. (2019), Edjekumhene et al. (2018), Ogbe and Lujala (2021), and Ogbe et al. (2021) also surveyed Ghanaians concerning the ABFA. These scholars show that only a few Ghanaians know about the ABFA,

particularly regarding the projects it funds (Ogbe and Lujala, 2021). Moreover, those knowledgeable have some reservations about the projects funded (Ogbe et al., 2021; PIAC, 2017; Stephens, 2019). For example, they argue that the projects are insignificant to national growth because they were small in nature and sparsely distributed in the country. Yet, others opine that the revenue managers do not consult the project beneficiaries regarding the types or locations of the projects. This exclusion, according to Ogbe et al. (2021), makes it difficult for the intended beneficiaries to appreciate the projects.

Overall, the available literature seems silent in engaging Ghanaians regarding their knowledge of the ABFA-funded projects in their localities. For instance, can Ghanaians identify the ABFA-funded projects in their communities? Do they want the government to involve them in the projects' management (if yes, how)? These questions are vital to the ABFA management because, as Ogbe and Lujala (2021) argue, involving the community members in managing natural resource revenue can encourage citizens to monitor the funded projects. Moreover, it can lead to better and more equitable revenue management (Lockwood et al., 2010; Poncian and Kigodi, 2018).

3. Method and data

3.1. Online survey

The primary data for the article was from an online survey hosted on Survey123 for ArcGIS (https://survey123.arcgis.com). Survey123 is a geocoded platform that can record survey participants' locations. The participants were Ghanaians over 18 years of age living in Ghana. The survey items included: demographics (for example, age, gender, education), knowledge about petroleum revenue-funded projects, ideas about involving *ordinary community members* in the ABFA management, and willingness to participate in engagements on the petroleum
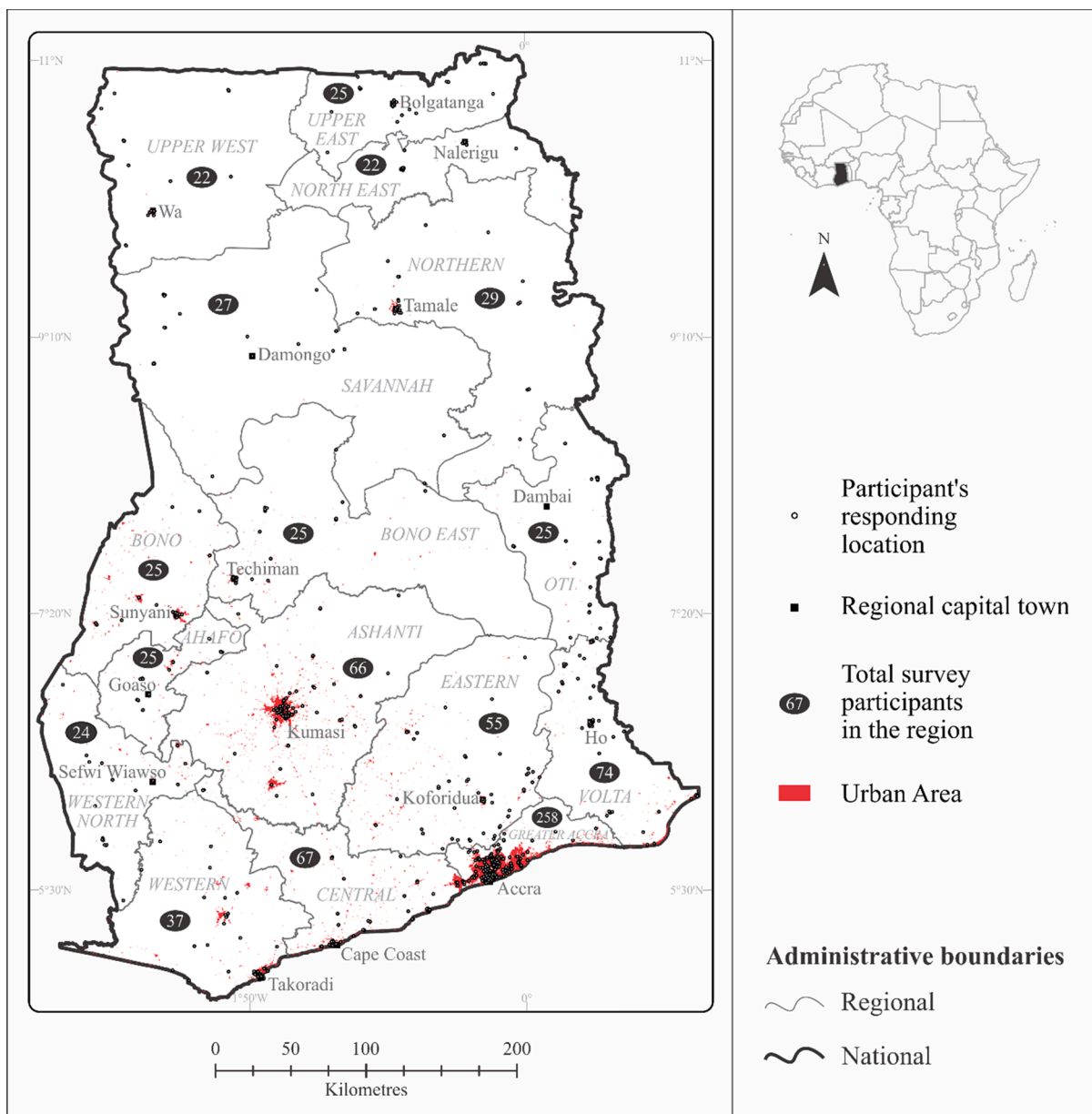
[3] The Free SHS programme absorbs all fees for all students at the senior high level. It received about US$ 111 million between 2017 and 2020. For more information on the Free SHS, see Ogbe et al. (2021).

Fig. 3. The survey participants' answering location, the overall participants for each region, in addition to urban areas in Ghana. Note: Each region had no less than 20 participants.

revenue-funded projects in Ghana (see Appendix for details). An ordinary community member is someone without an appointed or elected role in her/his community.

Any Ghanaian over 18 years of age having a GPS- and Internet-connected mobile phone (smartphone) could respond to the survey. The participants were volunteers who responded to a recruitment message from five research assistants and the lead researcher on social media (Facebook and WhatsApp) with a hyperlink to the survey. The first page of the survey was an informed consent page that the Norwegian Centre for Research Data approved. Consenting participants had access to the survey which took an average of 5 min to complete and ended with an appreciative "thank you" note. The survey prevented multiple submissions from an individual.

Overall, 806 individuals throughout the country participated in the survey. Fig. 3 indicates the 100-metre offset (to preserve anonymity) location of the participants that completed the survey. Survey data was downloaded from the Survey123 platform as a zipped shapefile, and ArcGIS Pro 2.9, StataMP 17, and Microsoft Excel for Microsoft 365 were

used to process and analyse the unzipped data. The article uses secondary geospatial data from Maphouse Ghana Limited (national, regional, and district administrative boundaries and regional capital towns) and the 2019 urban area dataset (ESA, 2020) from the European Space Agency's Climate Change Initiative Land Cover webpage (https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-land--cover?tab=form).

3.2. Methodological limitation

It is worth mentioning that the adopted online geocoded survey method for data collection has some limitations. The survey, distributed to an unknown audience who participated voluntarily, was biased towards the literate, those with access to the internet, and those who were interested in the subject. Nevertheless, Czepkiewicz et al. (2017) reason that self-selection and its associated biases in such a method can be problematic depending on the project's objective. As this article focused on existing petroleum revenue-funded projects and not on selecting

Table 1
Summary statistics for both the dependent and independent variables.

Variable		obs.	median	inter quartile range	min.	max.	coding
dependent	Condition of petroleum revenue-funded project	32					1 = completed (5%) 2 = completed, deteriorating (1%) 3 = completed, functioning (1%) 4 = deteriorating (1%) 5 = do not know (76%) 6 = functioning (4%) 7 = not functioning (1%) 8 = other (1%) 9 = uncompleted (7%) 10 = uncompleted, deteriorating, not functioning (1%) 11 = uncompleted, functioning (1%) 12 = uncompleted, not functioning (1%)
	Involvement of ordinary community members in petroleum managing revenue-funded projects	722					1 = Select the location of the petroleum revenue-funded project (28%) 2 = Select the petroleum revenue-funded projects (7%) 3 = Select the petroleum revenue-funded projects and their location (13%) 4 = Select the prioritised areas and the projects for petroleum revenue funding (5%) 5 = Select the prioritised areas for the petroleum revenue-funded projects (31%) 6 = Select the prioritised areas for the petroleum revenue-funded projects and their location (4%) 7 = Select the prioritised areas, the projects, and their location for petroleum revenue funding (12%)
	Level of willingness to participate in engagements on petroleum revenue-funded projects	785	4.3	0.7	1	5	1 = Very unwilling 2 = Unwilling 3 = Neither willing nor unwilling 4 = Willing 5 = Very willing
Independent	Age	806					Value: 1 = youth (76%)
	Gender	806					Value: 1 = female (42%)
	Education	806					Value: 1 = tertiary educated (89%)
	Position in the community	806					Value: 1 = no appointed or elected role (60%)
	Existing ABFA project	806					Value: 1 = know an ABFA-funded (17%)
	Rural Area	806					Value: 1 = living in a rural area (30%)
	Distance to nearest regional capital	806	18.4	41.7	0	122.98	Distance (km) from the participant's answering location to the closest regional capital town
	Distance to nearest urban area	806	0	0.1	0	63.12	Distance (km) from the participant's answering location to the closest urban area

Notes: Data sources: ESA (2020) for rural area coverage.

future ones, as Ogbe and Lujala (2021) suggest, the effect of the sampling bias is negligible.

3.3. Data and variables

The participants were educated with almost all of them (798) to the tertiary level. The mean age was 30 years. There were more men (468) than women (335) and 484 ordinary community members. More than half (659) of them did not know about any petroleum revenue-funded project in their locality. Only 34 of those who knew (141) reported on the conditions of the projects while only three uploaded a picture of a project. Further, the majority (722) of the participants indicated that the government should involve ordinary community members in managing petroleum revenue-funded projects. Finally, most of them were either willing (475) or very willing (252) to participate in engagements on petroleum revenue-funded projects. Table 1 indicates the summary statistics of the variables in the analyses.

3.4. Dependent and independent variables

The study has three dependent variables (Table 1) and two groups of independent variables: demographic and geographic. The *demographic* independent variables comprise the first five in Table 1. In the survey, the participants entered their age in figures, and indicated their gender,

their maximum level of education, and chose their role in the community (see the appendix for details). These variables were coded as four unique values: the first was *age* with the value 1 denoting *youth*. The Ghana Statistical Service defines youth as Ghanaians between the ages of 18 and 35 years. The second variable was *gender* with 1 representing a *female*. The third was *education* with all participants educated to the *tertiary level* having the value of 1. The fourth was *position in the community* with all participants who indicated that they were ordinary community members having the value of 1. Additionally, the participants who acknowledged an ABFA-funded project around their area were assigned a value of 1.

The *geographic* independent variables are the last three in Table 1. The first is for a participant in a rural area. Using the "select by location" tool in ArcGIS Pro, the participants outside the urban areas in the 2019 European Space Agency dataset (rural participants) had a value of 1, and the urban ones, 0. Additionally, the administrative regional capital towns and the urban area data helped rationalise the last two variables. These are the geodesic distances from where the participants answered the survey to the closest regional capital town and urban area.

Table 2

Survey participants' selected forms of ordinary community members' involvement in managing the petroleum revenue-funded projects and level of willingness to participate in engagements on petroleum revenue-funded projects.

	Select the location of the petroleum revenue-funded projects.	Select the petroleum revenue-funded projects.	Select the prioritised areas for the petroleum revenue-funded projects.	Willingness to participate in engagements on petroleum revenue-funded projects.
Youth	0.06	0.39	0.51**	0.19
	(0.23)	(0.32)	(0.2)	(0.17)
Woman	0.52**	-0.59*	-0.13	-0.76***
	(0.23)	(0.34)	(0.2)	(0.16)
Tertiary educated	-0.36	0.63	0.92***	0.5*
	(0.3)	(0.72)	(0.29)	(0.28)
No position in the community	1.14***	-0.68**	-0.44**	-0.64***
	(0.29)	(0.33)	(0.22)	(0.17)
Existing ABFA project	-1.12***	-0.63*	0.72***	0.07
	(0.42)	(0.35)	(0.21)	(0.22)
Rural Area	0	-0.01	0	0
	(0)	(0.36)	(0)	(0)
Closeness to nearest regional capital	-0.01	0.01	0.03**	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Closeness to nearest urban area	-2.03**	0.01	17.01***	2.11***
	(0.81)	(0.02)	(0.78)	(0.33)
Observations	204	51	225	785

Notes: Regression models with Robust Standard Error in parentheses and the odds ratio for.

* *p < 0.1*,.
** *p < 0.05*, and.
*** *p < 0.01* coefficients, respectively.

4. Analyses, results, and discussion

4.1. Analyses

The article applied tabulations (simple and cross), inferential tests, and regressions in analysing the variables. The first analysis comprised simple and crosstabulations to identify the summary statistics (i.e., frequency, median, minimum, and maximum values) of the variables in Table 1. The following analysis was to ascertain any significant variation between the administrative regions regarding dependent variables two and three, using the *Chi-squared test* and test two-sample *t-test* inferential statistics in Stata. Chi-squared test results for the categorical dependent variable two implied non-significant differences between the regions. Nevertheless, a two-sample *t*-test for the ordinal dependent variable three revealed significant differences between the regions. The Ahafo, Greater Accra, and Volta regions were significantly different at the *p < 0.01, p < 0.1, and p < 0.05* levels, respectively. Based on Tufte's 1983 classification (Tufte, 1983), Fig. 7 shows the geography of this variation.

The last analyses consisted of regressions to investigate how the second and third dependent variables relate to the independent ones. For the second dependent variable, the participants could make multiple selections from the three viable response options in the survey (see Appendix). So, the analyses focused on participants that opted for only one of the options (see Table 1 Codes 1, 2, and 5). These participants were then treated as three separate variables. Thus, participants who opted for ordinary community members selecting only the *location, the types*, or *the priority areas* of the petroleum revenue-funded projects (see Table 2). These variables are categorical, so the regression analysis was multinomial. For the third dependent variable, the participants indicated their level of willingness on a Likert scale. This dependent variable is ordinal, so the analysis was an ordered logistic regression as

commonly used by others (Cameron and Miller, 2015; Lujala et al., 2015). All the regression models had fixed effects on the *region* and cluster-adjusted *district* (261 in Ghana). According to Cameron and Miller (2015), doing so accounts for any within-cluster correlation or heteroscedasticity in the models.

4.2. Results and discussion

4.2.1. Condition of petroleum revenue-funded projects

A majority (659) of the participants were unaware of any petroleum revenue-funded project in their localities. The 141 who knew reported on 124 projects in the agriculture, education, health, and road priority areas (Fig. 4 and Fig. 5). The participants indicated that 32 of the projects were in at least one of the following conditions: completed, uncompleted, deteriorating, functioning, or not functioning (see the Appendix and Table 1). In the survey, the participants could select more than one option for the *area* and the *current state* of the project they knew in their localities. It was necessary because some localities might have more than one petroleum revenue-funded project (for instance, Fig. 5B and Fig. 5C) or a project belonging to more than one priority area (for instance, Fig. 2D– agriculture and education). Accordingly, some of the participants reported on 26 projects in one of the four priority areas and 14 projects that were, at the time, completed and functioning (Fig. 4). To easily indicate the geography of the projects in their priority areas and conditions in Fig. 4, the multiple selections (by the participants) were recategorized.

The participants' lack of knowledge regarding existing petroleum revenue-funded projects reflects the available literature. For example, in their research on the Dawa irrigation dam project, Ogbe and Lujala (2021) observed that the project's beneficiaries did not know that petroleum revenue financed it. More so, various related scholars observed that ordinary Ghanaians appear uninformed about petroleum revenue-funded projects because of their exclusion from selection and execution of the projects (Africa Centre for Energy Policy, 2017; Ahunu et al., 2018; Edjekumhene et al., 2018; Lujala et al., 2020a; Nyabor, 2018; Ogbe and Lujala, 2021).

Education projects seem readily noticeable petroleum revenue-funded projects on the ground because, probably, these projects usually have identification boards (Cudjoe, 2018) indicating the source of funding. PIAC's reports indicate that petroleum revenue is usually the sole source of funds for such projects. This is not the case in, for instance, road projects that have multiple sources of funding, including petroleum revenue (PIAC, 2017). Hence, it is more difficult for ordinary community members to know which road (or sections of a road) petroleum revenue financed to consider it a petroleum revenue-funded project.

4.2.2. Ordinary community members in petroleum revenue management

The participants indicated how they wanted the government to involve ordinary community members in managing the petroleum revenue-funded projects in Ghana.[4] Most of the participants (722) wanted the government to involve ordinary community members in at least one of the options. Moreover, 83 participants would like to have ordinary community members in all the options regarding petroleum revenue-funded projects in Ghana. These results are consistent with the observations of Edjekumhene et al. (2018), Lujala et al. (2020a), and Ogbe and Lujala (2021) that Ghanaians want to participate in the ABFA management.

The analysis of this variable indicates geographic and demographic variations. Geographically, the most frequently selected option (the most preferred form of ordinary citizen participation) varied across the regions. As Fig. 6 depicts, from nine regions, most of the participants had the opinion that ordinary community members should *select the location*

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[4] See the Appendix for the four response options and Table 1 for the summary statistics of the participants' choices.
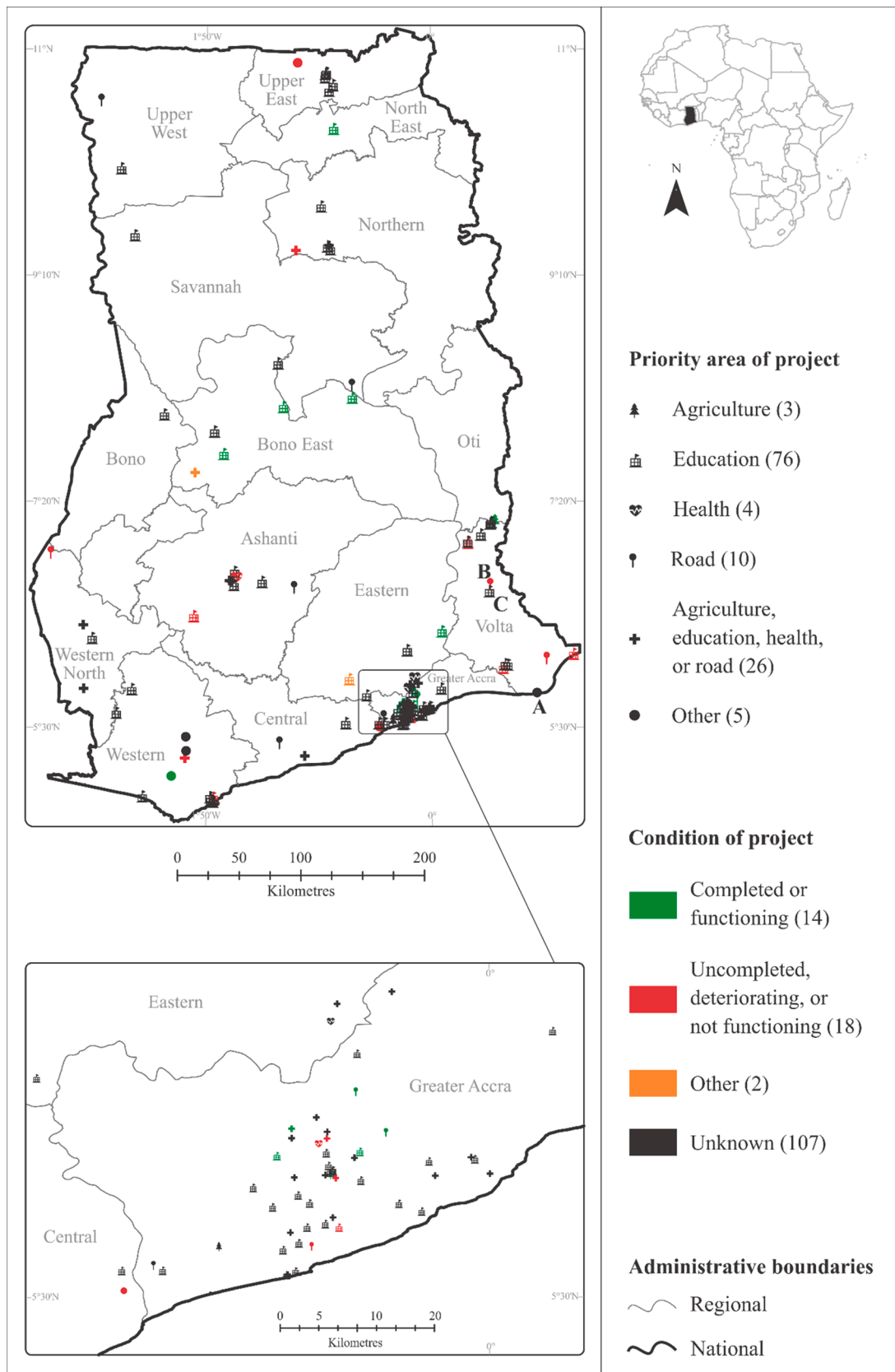
Fig. 4. Priority area and condition of the survey participants reported petroleum revenue-funded projects in Ghana. Note: The parenthesis after each area and condition of project indicates the total number of projects. See Fig. 5 for the pictures of projects A, B, and C.

Fig. 5. Survey participants' uploaded pictures of petroleum revenue-funded projects. Notes: See Fig. 4 for the locations of these projects. A) Sea Defence Wall at Keta. B) UHAS (University of Health and Allied Sciences, Ho) – Sokode Road. C) UHAS hostel.

of the petroleum revenue-funded projects. Likewise, most of the participants from five regions preferred ordinary community members to *select the prioritised areas* for the petroleum revenue-funded projects. However, most of the participants from the remaining two regions wanted ordinary community members to be part of two options: *select the projects* and *their location.*

Demographically, the participants varied regarding the three main response options. For ordinary community members *selecting the location*

of the petroleum revenue-funded projects, the first model of Table 2 indicates that women and participants without leadership positions in their communities were likely to choose this option. However, participants who knew about an existing ABFA-funded project and resided closer to urban areas were likely to ignore this option. Concerning ordinary members *selecting the petroleum revenue-funded projects,* the second model of Table 2 indicates that women, participants without leadership positions in their communities, and aware of an existing
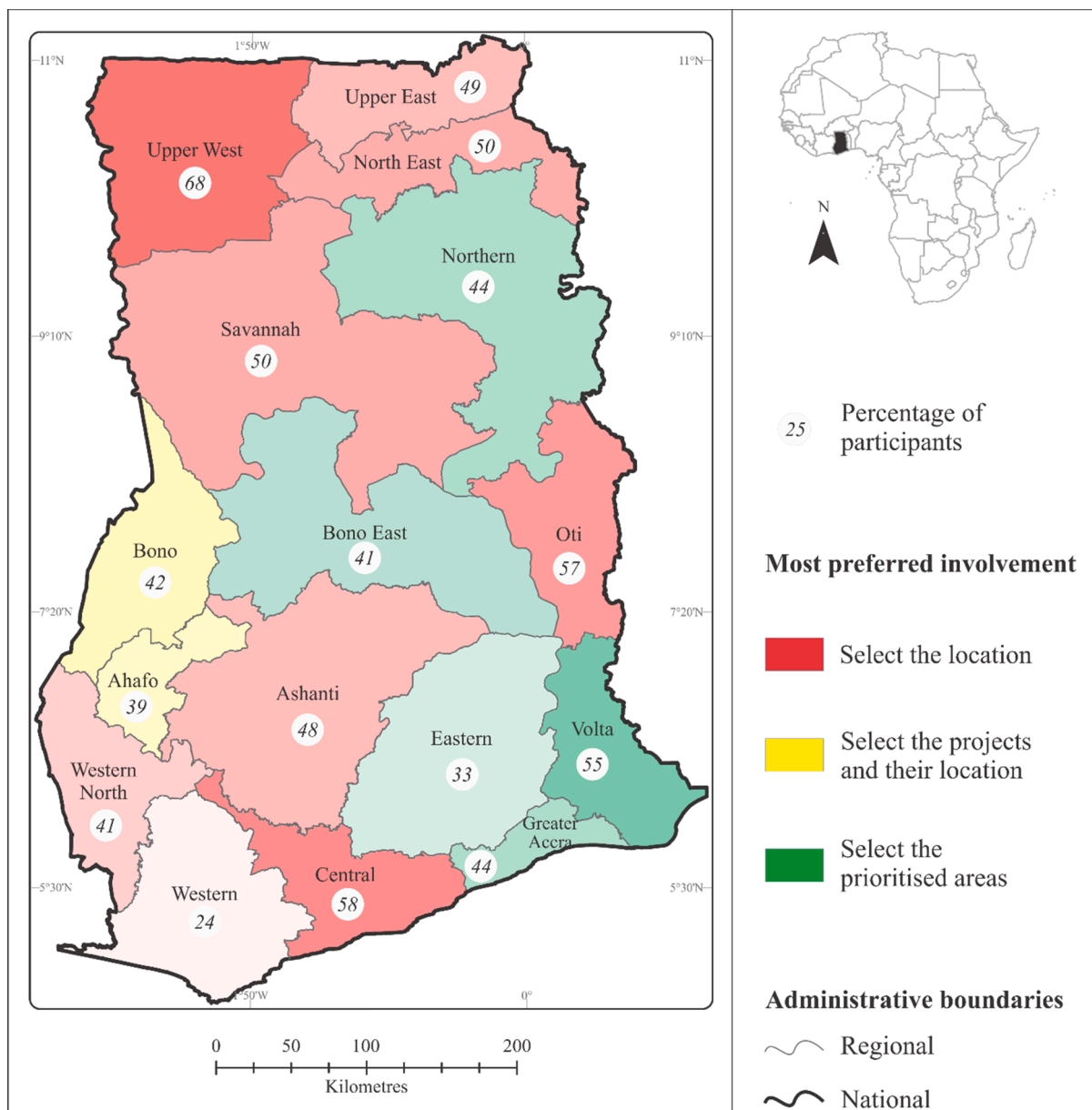
Fig. 6. Survey participants' most selected form of involving ordinary community members in petroleum revenue-funded project management at the regional level in Ghana. Note: The map also shows the percentage of the most selected form of involvement per region. The darker shades indicate regions with higher percentages.

ABFA-funded project were not likely to choose this option. Lastly, regarding the final option (model three in Table 2), tertiary educated, youth, participants who knew about an existing ABFA-funded project, and those living close to regional capitals and urban areas were likely to select this option. Conversely, ordinary community members were not likely to do so.

Generally, these results have the potential to enhance the scope of citizen engagement regarding petroleum revenue-funded projects in Ghana in two ways. First, from Fig. 6, the Ministry of Finance would have an idea of the spatial preference of how to engage Ghanaians regarding future petroleum revenue-funded projects. For example, while the participants in the Upper West and Central regions would prefer to select the locations of the projects, those in the Northern and Volta regions prefer the selection of the priority areas. Secondly, Table 2 gives the Ministry of Finance an indication of the demographical preference of engaging Ghanaians concerning these projects. For example, the youth and educated seem keener in selecting the priority areas, while women and ordinary community members prefer selecting the locations of the

petroleum revenue-funded projects.

4.2.3. Willingness to participate in engagements on petroleum revenue-funded projects

Table 2 shows the odds ratios for the regression analyses. The positive values imply a participant's willingness, and the negative ones suggest the opposite (unwillingness). With the odds ratios, one can intuitively understand the relationship between the independent and dependent variables. For instance, the odds ratio for gender in Table 2, is -0.76. This suggests that women are unwilling to participate in petroleum revenue-funded projects engagements by about a 0.8 level (see Table 1 for the scale).

Most of the participants were either willing (475) or very willing (252) to participate in engagements regarding petroleum revenue-funded projects in Ghana. Fig. 7 below indicates that each region recorded more than 20 participants willing to participate. The region with the significantly highest level of willingness is Volta, while Ahafo is the region with the significantly lowest level of willingness.
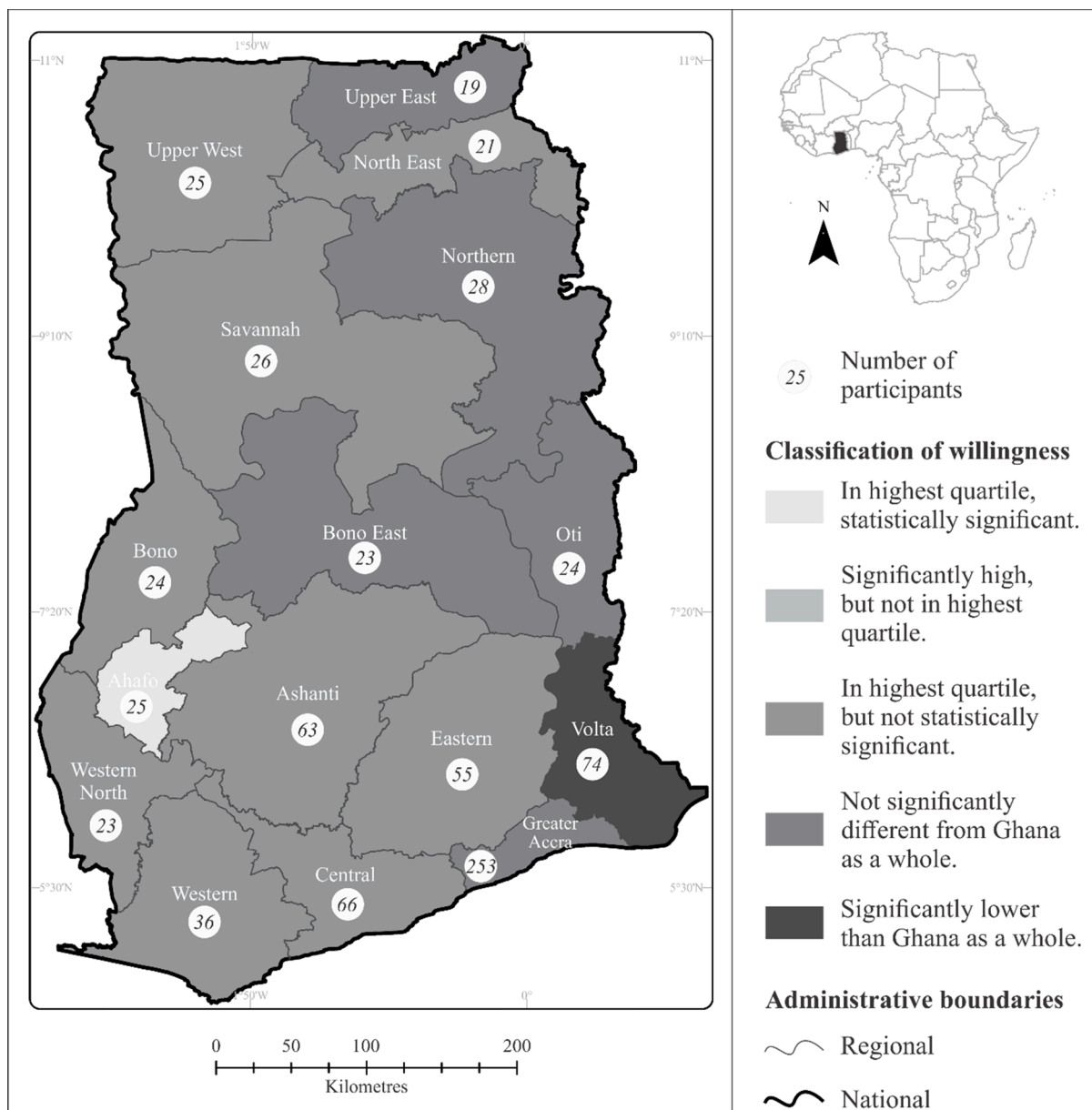
Fig. 7. Regional variation in the third dependent variable. Note: The map depicts a comparison of the mean values (*t*-test in quartile as there are 16 regions) and their respective odds ratios. It also indicates the total responding participants. The level of willingness directly corresponds to the intensity of the shade.

Nevertheless, from Table 2 (last model), we can observe that tertiary-educated and urban participants were significantly more likely to participate than women and participants without leadership positions in their communities.

Though not probed in the survey, the disparity in accessing natural resource revenue information in the country (Brunnschweiler et al., 2021a; Ofori and Lujala, 2015) might be a contributing factor in the variation noted above. For instance, the majority of the documents (print or audio-visual media) about petroleum revenue are in English (Ofori and Lujala, 2015). Hence, one needs the capacity to communicate in English to be willing to participate in such projects. More so, urban Ghanaians appear to be more willing to participate in such projects because most of the media outlets (radio, TV, and newspaper) are in urban areas (Yinimi et al., 2016). In addition, urban Ghanaians tend to be more informed regarding the sector than their rural counterparts (Lujala et al., 2020a). Nevertheless, as Brunnschweiler et al. (2021a) noted, women and ordinary community members tend to be less informed regarding petroleum revenue management in Ghana. This could explain the observation regarding women and the participants without leadership positions in the survey.

5. Conclusion

This article focused on petroleum revenue-funded projects in Ghana. It attempts to contribute to the scholarship and practice of petroleum revenue management by answering three questions. One, which of the projects do Ghanaians know about in their localities? Two, how do ordinary Ghanaians want the government to involve them in managing the projects? Three, how willing are Ghanaians to participate in engagements on the projects? The data suggest that most Ghanaians do not know about existing petroleum revenue-funded projects around them. However, Ghanaians want the government to involve ordinary citizens in managing petroleum revenue-funded projects in Ghana. More so, Ghanaians are willing to participate in managing petroleum revenue-funded projects.

To conclude, it is worth noting that the petroleum revenue managers

in Ghana should be willing to inform the citizenry and consider other citizen engagement methods regarding revenue utilisation for two reasons. First, Ghanaians are unaware of the petroleum revenue-funded projects in their localities. This observation connotes the inadequacy or deficiency in Ghanaians' participation in Ghana's petroleum revenue governance, which is a foundation for the resource curse as illustrated in the background section. Secondly, Ghanaians want to influence the utilisation of petroleum revenue. This observation seems to be a promising factor in that petroleum revenue managers can leverage for effective revenue utilisation in Ghana. One way to capitalise on Ghanaians' willingness to participate in petroleum revenue management for better revenue utilisation is for the government and the PIAC to consider engaging Ghanaians through online geocoded platforms. For instance, the PIAC could use Survey123 for ArcGIS to connect Ghanaians to the database of petroleum revenue-funded projects on the Ministry of Finance's website. Such an initiative would help Ghanaians to easily identify existing projects in their communities (when they so want) and thus, would enable reporting of the conditions of the projects back to the PIAC for effective management. Additionally, the PIAC and the Ministry of Finance could use Survey123 for ArcGIS to engage Ghanaians in influencing future revenue allocation by indicating their preferred petroleum revenue-funded projects. That way, Ghanaians would feel they are part of the petroleum revenue management, thereby mitigating possible resource curse.

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Availability of data and material

The datasets generated and/or analysed during the study are available in EUDAT repository (http://doi.org/10.23728/b2share.2e18d4 22c42947e1a31c06e14381755d).

Code availability

The Stata analyses' codes are in the same data repository.

Authors' contributions

Not applicable.

Ethics approval

Norwegian centre for research data approved this research (reference number – 973,892).

Consent to participate

The participants in this research gave their consents.

Consent for publication

The participants in this research consented to the publication of their responses.

Declaration of Competing Interest

None.

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Appendix

Survey questions with response alternatives and frequencies in brackets

Note: All response alternatives included the options 'Do not know' and 'Do not want to answer'.

1. What is your age?
(Numbers only)

2. Please choose your gender.
Male (471)
Female (335)

3. What is your highest level of education?
None (0)
Primary School (0)
Junior High School (2)
Middle School (17)
Secondary/Technical School (61)
Tertiary (720)

4. Which of the following best describes your position in your community?
Community member (484)
Paramount chief (1)
Chief (0)
Queen mother (0)
Chief's wife (0)
Unit Committee member (1)
Local Assembly member (4)
Youth leader (41)
Women's leader (7)
Religious leader (19)
Tribal (ethnic) leader (1)
Teacher (98)
Opinion leader (47)

5. Please choose your home region (the region you come from).
Ahafo (26)
Ashanti (96)
Bono (20)
Bono East (10)
Central (79)
Eastern (63)
Greater Accra (112)
North East (14)
Northern (34)
Oti (31)
Savannah (14)
Upper East (40)
Upper West (27)
Volta (174)
Western (42)
Western North (12)

6. Do you know about any petroleum revenue-funded project in your locality?
Yes (141)
No (659)

7. Which of the following areas is the petroleum revenue-funded project in your locality related to? You can select more than one option. (Note: Question asked only if the participant answered 'Yes' to Question 6).
Agriculture (3)
Education (76)
Health (4)

Road (10)

Other (5)

8. What is the current state of the petroleum revenue-funded project in your locality? You can select more than one option. (Note: Question asked only if the participant answered 'Yes' to Question 6).

Completed (7)

Uncompleted (10)

Deteriorating (2)

Functioning (5)

Not functioning (2)

Other (2)

9. If possible, could you take and upload a picture documenting the current state of the petroleum revenue-funded project in your area? (Note: Question asked only if the participant answered 'Yes' to Question 6).

(A single picture to upload)

10. In your opinion, how should the government involve ordinary Ghanaians in the management of the petroleum revenue-funded projects in Ghana? You can select more than one option.

The public should not be involved (43)

In selecting the prioritised areas for the petroleum-funded projects (204)

In selecting the petroleum-funded projects (93)

In selecting the location of the petroleum-funded projects (225)

11. If you are given a list of some petroleum revenue-funded projects in your locality, how willing are you to answer some questions about them through a survey like this?

Very willing (252)

Willing (475)

Neither willing nor unwilling (47)

Unwilling (7)

Very unwilling (4)

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