Oil Extraction And Public Attitudes: A Conjoint Experiment In Turkana, Kenya

By: **Hye-Sung Kim** and Kennedy Mkutu

Abstract

A conjoint experiment is conducted to understand the impact of oil extraction on community perception. Data is collected from Turkana county in Kenya. No evidence for strong resentment toward oil extraction is found. The overall support is high but the support is higher among those living distant from oil wells. Priming about the environmental and social costs slightly decreases support.

Kim H-S, Mkutu K. Oil extraction and public attitudes: A conjoint experiment in Turkana, Kenya. The Extractive Industries and Society. 2021;8(3). doi:10.1016/j.exis.2021.100956. Publisher version of record available at: https://www.sciencedirect.com/science/article/pii/S2214790X21001180

The Extractive Industries and Society

Oil extraction and public attitudes: A conjoint experiment in Turkana, Kenya

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ARTICLE INFO

Keywords:
Oil extraction
Turkana
Kenya
Public opinion
Survey experiment

ABSTRACT

This study examines the impacts of economic, social and environmental consequences of oil extraction on public opinion in an economically and politically marginalised community in northern Kenya. We conduct a conjoint experiment on a sample of 801 respondents in urban and semi-urban locations in Turkana county and find that our respondents strongly support the oil extraction overall. Although priming about the environmental and social costs decreases local residents' support for oil extraction, the decrease is so small that the community's perception of oil extraction remains positive. However, the support is significantly higher among the respondents living in the neighbourhoods distant from oil wells in operation relative to those who live close to oil sites. In addition the responses to economic benefits of oil extraction also vary by respondents' distance from oil wells. Contrary to the existing literature, we do not find evidence for strong resentment toward oil extraction in Turkana county.

1. Introduction

The impacts of oil and natural resources extraction in developing countries with a new discovery of resource have been actively studied concerning various outcomes at a variety of scales from local to national including the impacts on poverty (Gamu et al., 2015), environmental and social effects (O'Rourke and Connolly, 2003), health outcomes (Schrecker et al., 2018) and a country's governance and conflict risks (Ross, 2015) among others. However, both empirical findings (Gamu et al., 2015) and the theoretical arguments vary: while the proponents of the "resource curse hypothesis" predict the negative consequences of extractive industry (Corden, 1984; van der Ploeg and Venables, 2013; Ross, 2015; Mehlum et al., 2006), others predict positive effects on the nation's economy and upon peace based on the "resource blessing hypothesis" and find evidence consistent with the hypothesis (Alexeev and Conrad, 2009; Brunnschweiler, 2008; Brunnschweiler and Bulte, 2009).

Evidence from oil producing countries in Africa also varies in terms of impact of oil extraction. Some identified positive impacts including increased job opportunities and thus higher income (O'Faircheallaigh, 2013; Mawejje, 2019) and increased access to local public goods such as roads, health centres and schools constructed by the oil producers as their corporate social responsibilities (CSR) (Byakagaba et al., 2019; Mawejje, 2019). Negative consequences, however, have been more frequently identified than positive consequences, including negative effects on bio-diversity such as fisheries (Baumuller et al., 2011; Karl, 2007; Reed, 2009), game areas (Karl, 2007), and grazing areas critical to pastoralists (Byakagaba et al., 2019); environmental degradation and water and air pollution due to oil spills and gas flaring (Karl, 2007; Opukri and Ibaba, 2008; Idemudia, 2009; Abii and Nwosu, 2009; Pegg and Zabbey, 2013; Mkutu et al., 2019); displacement from livelihoods (Clarke, 2009; Opukri and Ibaba, 2008; Agade, 2017); negative social impacts resulting from rapid immigration (Karl, 2007); and tensions over benefit distribution, which may result in social dislocation and conflict (Ackah-Baidoo, 2013; Arellano-Yanguas, 2011; Pegg, 2006; Kojucharov, 2007; Lo, 2010; Cash, 2012).

This study takes a political ecology approach, examining how and to what extent the various social, economic and ecological consequences brought by oil extraction, when primed, affect public attitude of the oil project by using a conjoint experiment embedded in a survey of 801 respondents across Turkana county. Turkana is a remote and marginalised county in Kenya where oil was discovered and exploration activities began in 2012, resulting in the first production and exportation in 2018. Then, the oil project hit several challenges in both international and domestic spheres and was put on hold in 2020. By 2021, the major

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https://doi.org/10.1016/j.exis.2021.100956
Received 27 March 2021; Received in revised form 19 June 2021; Accepted 20 June 2021

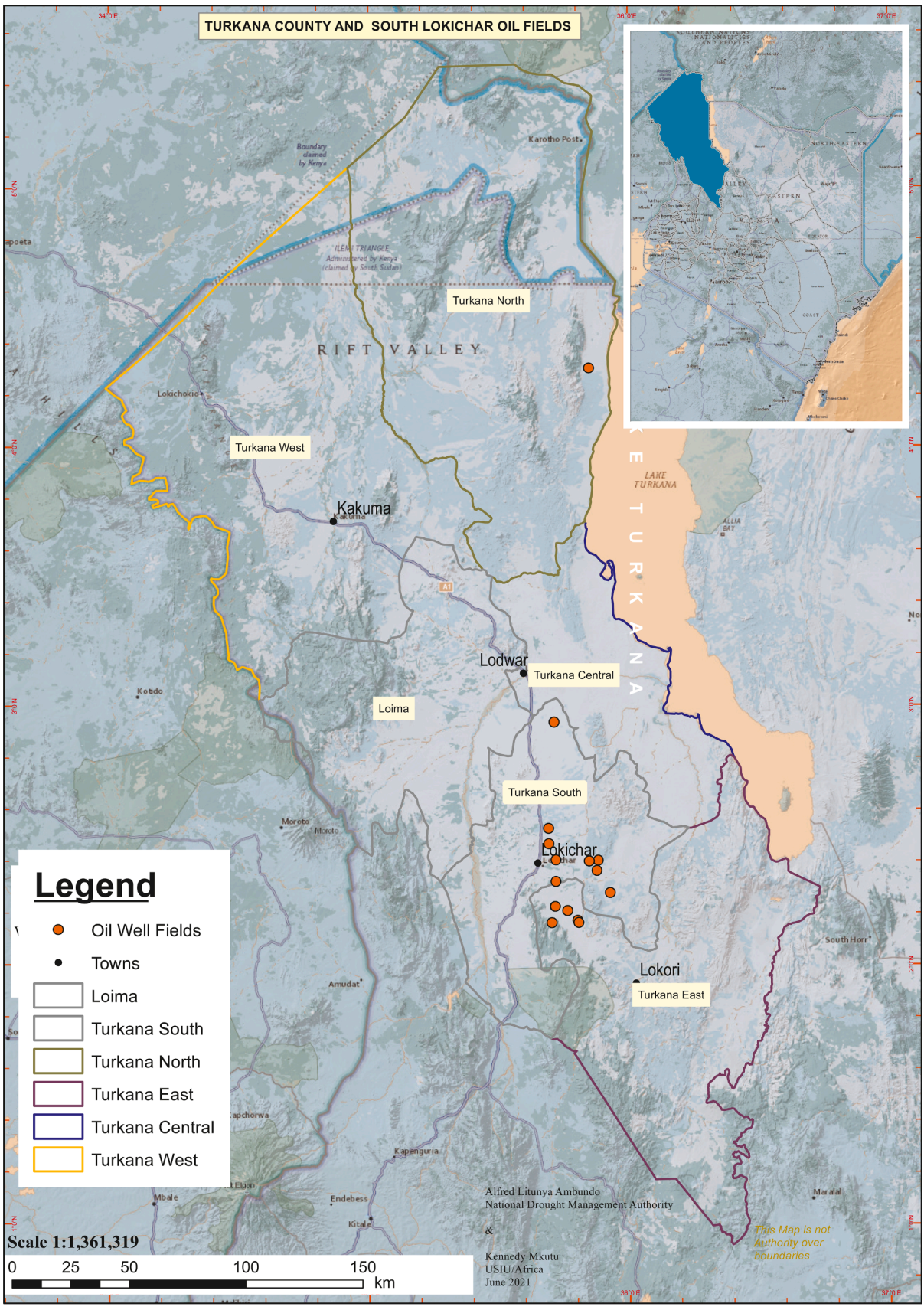

Fig. 1. Map of Turkana county and oil sites. Source: authors.

oil producer in Turkana, Tullow, has not yet resumed activities in Turkana and the future remains uncertain (Okoth, 2020).

We find that our survey respondents in Turkana have an overall high level of support for the oil project, although priming with a message on the environmental costs decreased local residents' support somewhat. When we disaggregate our data by proximity of residence to oil wells however, we find that the overall support of oil extraction is lower among the respondents living in the neighbourhood close to oil wells. In addition, priming of respondents about the economic benefits of oil extraction increased the support of those living near oil wells but not those living farther away. However, in either sub-sample, strong opposition to the continuation of oil extraction was rare. Although we were unable to use a completely random sample due to the low population density of Turkana county and the majority population being pastoralists who often move around, we empirically show that our findings do not result from sample selection.

Understanding what experiences the community members have had due to oil extraction and how such experiences have shaped their perception of oil extraction is important especially now that the future of the current oil investor in Turkana is uncertain so that the government of Kenya will probably pursue other partners for oil extraction and production. There has been strong resistance at various points in time from the local community in Turkana against the oil company, emanating from grievances over displacement, participation, local benefits, and local shares of oil revenue, as well as opportunism, using disruption of the project as a way to get other demands met by the government (Agade, 2017; Schilling et al., 2015). If such resistance and negative perceptions of oil investment are still present, the government of Kenya will need to identify their determinants and consider how to mitigate them, through policy measures which safeguard community rights and needs and impose these measures to the investor, and the provision of services.

The remainder of the paper is organised as follows. We first discuss the existing literature on the impacts of oil extraction and on the community perception of oil extraction in Turkana. We next present the research design followed by empirical findings and discussions on robustness check. We then conclude the paper.

2. Consequences of oil extraction and community perception in Turkana

Turkana county located in the north-western region in Kenya bordering Uganda, South Sudan and Ethiopia is known as one of the most politically and economically marginalised counties in the country (Friedrich-Ebert-Stiftung, 2012). Development indicators are low and reliance upon food aid is high due to the high frequency of droughts. The vast rangelands are predominantly inhabited by semi-nomadic Turkana pastoralists, although there is an increased number of settled people and non-Turkana residents in urban areas since the finding of viable oil in 2012 and a concurrent creation of county governments bringing an increased presence of political and business people in the county. The county is also conflict-prone along its international and local border areas, with pastoralists engaging in perennial inter-communal conflicts in the form of cattle raids or territorial conflicts, which have both livelihood-related and cultural motivations (Schilling et al., 2012; McCabe, 2004; Mkutu and Lokwang, 2017).

The year 2012 marked the announcement of commercially viable quantities of oil in Turkana, Kenya by British company Tullow Oil PLC and partners bringing excitement amongst Turkana people with the hope of better livelihoods as a result of revenue, employment and development. Exploratory drilling began in a number of sites as shown in Fig. 1 and 2018 saw the production of the first oil, which began to be transported to Mombasa for export (Mkutu and Mdee, 2020). By 2020, however, operations ground to a halt, due to various challenges being faced by the company together with the COVID-19 pandemic, including a drop in global oil prices, and the collapse of a bridge along the main road. As a result of the virtual cessation of oil activities in 2020, the booming hospitality industry local to the oil sites was hard hit and many lost their jobs (Okoth, 2020; Amadala, 2020). Given Tullow's decision in 2021 to leave Turkana to focus on western African countries, the future of oil investment in Turkana remains uncertain (Okoth, 2020).

In Turkana, both positive and negative impacts as a result of the oil project have been reported (Agade, 2017; Enns and Bersaglio, 2015, 2016; Mkutu, 2014; Mkutu et al., 2019; Mkutu and Mdee, 2020; Schilling et al., 2015; Schilling et al., 2018a) and the studies addressing the affected communities' perceptions of oil extraction also find mixed results (Ogwang et al., 2018; Byakagaba et al., 2019). As for positive impacts, Tullow Oil provided a number of benefits through their CSR program including educational bursaries and the communities began to look to Tullow Oil as the main provider of services (Enns and Bersaglio, 2015). Increased business and employment opportunities were also reported as positive effects of oil development in Turkana. For example, there was a boom in service industries and herders were able to sell their meat to hotels and restaurants (Agade, 2017).

However, some of the same authors also point out that the provision of jobs and benefits was not viewed entirely positively. For example, many workers from outside were hired for semi-skilled and skilled tasks and supplies which might have been obtained locally (such as beef) were brought from Nairobi (Agade, 2017). Although Tullow argue that all unskilled labour work went to local Turkana residents through a process of sharing of jobs between the various clans which involved local leaders (Agade, 2017), the local level job creation effect is not strongly felt by the local community given that the oil industry is not labour intensive and downsizing after the initial exploratory phase is common (Schilling et al., 2018b). Agade (2017) also finds strong grievances among the community members regarding the distribution of benefits from the oil project. In particular, the community members felt the economic opportunities tended to benefit elites,[1] people from outside of Turkana, and people with social connections, thus increasing inequalities (Agade, 2017), consistent with Schilling et al. (2018b; 445) who found that the distribution of "the benefits of resource extraction often mirror pre-dominant power structures."[2] Therefore, our study could find a variety of perceptions, both positive and negative depending upon who is interviewed and in what geographical location.

Various negative consequences have been documented since the oil extraction started in Turkana. First, the land taken for oil exploration led to displacement and limited access to existing resources and livelihoods, and as a result some pastoralist communities were displaced from their permanent settlements near wet season grazing grounds (Johannes et al., 2015). Second, some pre-existing, resource-based tensions and conflicts were exacerbated (Johannes et al., 2015). For example, conflict in the south of the county, with Pokot pastoralists from West Pokot and Baringo counties became very severe in 2014–2015, and territorial claims were heightened, with statements being made by community members and local politicians about which county would benefit from revenues for oil in Lokichar and gas in Silale (along the Turkana-Baringo border) (Agade, 2017).[3] Banditry increased along the A1 road from Lodwar, Turkana's main town, through Lokichar to Kitale in the south, as a spillover of these

[1] For example, local and national political elites were able to garner more of the opportunities created by the oil discovery than local community members, in particular, some of the tenders for services and supplies.

[2] The evidence of grievances among the community members was also found in 5 different interviews, with local administrators, a youth leader and a civil society worker, November 2020. This includes members of the local Turkana Drivers Association expressing a lament over a scheme designed to benefit local drivers eventually benefitting a politically connected family. Community members also expressed resentment and dissatisfaction over a revenue-sharing formula which allocated 5% of the oil revenue to local communities.

[3] An increase in certain conflicts, however, may also relate to a constitutional change which resulted in devolution of many functions and monetary resources to 47 newly created county governments in 2013 (Johannes et al., 2015; Tyce, 2020).

conflicts, and the same insecurities increased as a result of the redeployment of several National Police Reservists from community security to oil security (Agade, 2017). Third, oil extraction resulted in negative environmental consequences, which directly affected livelihoods (Johannes et al., 2015; Tyce, 2020; Mkutu et al., 2019), such as destruction of vegetation, poor air quality due to gas flaring, fracking leading to miscarriages among humans and animals and allegations of dumping of toxic waste, though the company noted that this was only mud waste, dumped with approval by the National Environment Management Authority (Mkutu et al., 2019). Fourth, various negative social changes were experienced by the people of Turkana as a result of sudden inflows of people from outside following new business and economic opportunities. These included rural-urban migration, begging, prostitution and correspondingly, an increase in HIV/AIDS and other sexually transmitted diseases. Moreover, some youth dropped out of school to take up the new opportunities and found themselves disadvantaged when the work was not sustained (Mkutu et al., 2019). Families, gender relations and communities were strained by the migration of female members of households away from home to set up small canteens and shops near the oil sites, though the potentially positive impacts of this phenomenon have not been examined (Agade, 2017).

Numerous qualitative studies based on a selected sample find exclusively negative local perceptions toward oil extraction. Schilling et al. (2018b) finds that negative impacts such as displacement and environmental degradation lead to tension and increase grievances among the local community members. Grievances among the local community members have led to a series of protests. The tension and conflict over benefit-sharing and distribution were exacerbated by inadequate local community participation processes at the outset, with local government being left out of the production-sharing agreement between the national government and the investor, and political elites initially dominating conversations between the investor and the community (Agade, 2017). Thus the first major protest took place in October 2013, which resulted in the closure of oil operations for three weeks, while numerous smaller-scale protests and road blocks, against Tullow Oil or sub-contractors occurred outside of project sites (Agade, 2017). By 2018 when the first trucks of oil began to leave for Mombasa, communities were still creating roadblocks, refusing to allow oil to leave the county unless their demands for better security and benefits were met (Reuters, 2018).

In addition, consistent with Schilling et al. (2018b), protests were carried out even by members of non-beneficiary or more "distant" communities aiming to maximise their own benefits (revenues and employment opportunities) from the oil project, on the basis of, for example, the oil being trucked through their land, and water for the project deriving from "their" hills (in West Pokot county) (Agade, 2021). Moreover, community members have also used road blocks to protest to the government about indirectly related issues such as security along the Turkana-West Pokot border (Agade, 2021). As Schilling et al. (2018b: 446) note, "the expected gains tend to be higher, when the level of satisfaction prior to the resource extraction is low," suggesting some opportunism in the protests, using them to address injustices unrelated to oil.

However, positive perceptions do not always make the news, and some positive impacts may be long-term impacts yet to be seen. Early positive impacts include the road and bridge renovations along the A1 road, a strategic development which links Western Kenya with landlocked South Sudan. This development was necessary for the purposes of oil transport and has also reduced (opportunities for) banditry (Agade, 2021). The road is also likely to reverse marginalisation to some extent (while also bringing new socio-ecological challenges which accompany urbanisation and land-use change). Further, qualitative studies focusing upon local problems may not provide the entire picture. Thus we attempt to take a broader county-wide quantitative perspective to contribute to the literature on the subject.

As noted, we anticipate that perceptions may differ by locality. Local communities may receive the most benefits but also suffer the most risks. However, more distant communities may also receive benefits such as better road connections and royalty payments, but do not suffer the risks. The literature on "locally unwanted land uses (LULUs)" and the "not in my backyard (NIMBY)" phenomena (Schively, 2007) may be relevant here in understanding local community perceptions and reactions. LULUs may be unwanted on the basis of negative impacts on health, environment, aesthetics or property values (Wexler, 1996), and may often be sited in areas where communities have less power to resist them (Mohai et al., 2009). Wexler (1996; 92) frames the NIMBY syndrome as "intense, emotional and usually organised opposition" to proposals of the LULUs. Such movements have been on the increase as societies have become more aware of environmental issues and hazards. The term NIMBY syndrome is itself a pejorative term implying a self-serving and unbalanced approach to understanding risks and benefits. However, accusations of NIMBYism may also be used to discount real and legitimate concerns of local community members (Slevin, 2019).

It is sometimes difficult to decide who is local. Whereas Schilling et al. (2018b) define "local community" as the community immediately surrounding the site of extraction, Slevin (2019) views that "community" may also be defined by a common interest or threat leading to resistance or protest. This suggests certain members of the same geographic community may find their livelihoods affected in very different ways by the extractive industry. For example, pastoralists may find themselves displaced from land and water sources while those in the hospitality industry capitalise upon the increased population and some households may experience both effects.

3. Research design

Having identified various positive and negative experiences of communities proximate to the oil project in Turkana since 2012, we now examine how such experiences over eight years have shaped their opinion of oil extraction. The existing literature on community perception of oil extraction in Africa has often used qualitative methods such as interviews and focus group discussions. Identifying causal effects of respondents' experiences on their attitudes based on these methods is challenging as factors that shape their experiences are also likely to affect their attitudes. Thus, we instead use an experimental design, particularly a conjoint experiment, which is used for the identification of relative causal effects of each value of multiple attributes (Hainmueller et al., 2014). Using a conjoint experiment, we identify relative causal effects of priming about the various social, economic and environmental consequences of oil extraction that the Turkana people may have experienced on their perception of oil extraction. Prior to describing more details on the experimental design, we first describe the sampling strategy of our survey in which the experiment is embedded.

3.1. Sampling

The experiment was embedded in a larger social and political opinion survey conducted from November 24 through December 10 in 2020 using person-to-person interviews.[4] We conducted computer-assisted person-to-person (CAPI) interviews of the residents of Turkana who are 18 or above across six constituencies in Turkana county. Due to the low population density and the population characteristics of the Turkana people, i.e. the majority of them are pastoralists who are mobile throughout the year, we were unable to depend on completely random sampling methods. In

[4] Because our survey is a cross-sectional survey rather than a longitudinal or panel survey, the results from our study reflect the respondents' attitudes at the time of the survey. Several characteristics of the timing of our survey are worth emphasizing: the survey was conducted over eight years after the beginning of oil-related activities in Turkana when Tullow's operation was suspended and already businesses and other daily activities were limited by the COVID-19 pandemic. These specific characteristics of the survey period may have impacted the responses.

Table 1
Conjoint experiment design.

Attributes	Levels (Alternatives)
Positive Effects	
Job creation	• NA
(4 conditions)	• Many new jobs were created and benefitted many Kenyans throughout the country.
	• Many new jobs were created and benefitted people of Turkana.
	• Many new jobs were created and benefitted people near the Lokichar basin.
Local Public Goods	• NA
(4 conditions)	• New classrooms and school facilities were built in Turkana.
	• New boreholes were dug in Turkana.
	• New development such as roads have taken place.
Local Economy	• NA
(2 conditions)	• New businesses have been created.
Negative Effects	
Access to Land and Resources	• NA
(3 conditions)	• Some residents of Turkana were displaced from their own land.
	• There has been a difficulty accessing pasture, water, and several important sites.
Environmental Costs	• NA
(4 conditions)	• There has been destruction of biodiversity such as vegetation and fish in some places.
	• There have been some negative health problems connected to oil extraction.
	• There was air pollution and water pollution resulting from oil extraction and production.
Social Changes	• NA
(2 conditions)	• An increased population and modern lifestyles due to population inflows to Turkana introduced new social problems.
Conflict/Tension over Benefits Distribution	• NA
(4 conditions)	• There were some tension between communities within Turkana County over sharing of benefits such as jobs and contracts as tenders.
	• There were some tensions between elites at the local, national and international level over opportunities coming from the oil industry.
	• Inter-communal tension between Turkana and Pokot increased.

Table 2
Example script of informational vignette.

Since the discovery of oil in Turkana in 2012, people have experienced several benefits from production of oil. In particular,
[Many new jobs were created and benefitted people near the Lochichar basin.] […] [New businesses have been created and new development such as roads have taken place.]
Although oil production and export led to many benefits, there have been some concerns as well. For example,
[Some residents of Turkana were displaced from their own land.] [There has been a difficulty accessing pasture, water, and several important sites.] […] [...] [There have been some negative health problems connected to oil extraction.] [An increased population and modern lifestyles due to population inflows to Turkana introduced new social problems.] [....] [There were some tensions between communities within Turkana County over sharing of benefits such as jobs and contracts as tenders.] [There were some tensions between elites at the local, national and international level over opportunities coming from the oil industry.] [....]

Notes. The value in every [] is randomly selected out of all available levels; […] indicates the control condition – no information – is selected for the particular attribute; The common prompt is italicised.

particular, we used convenience sampling to select 1–3 wards from each of six constituencies to select relatively dense settlements. However, pastoralists are more likely to reside in relatively scarcely populated areas and tend to be mobile. Therefore, they are likely to be under-sampled in our study. For example, in our sample, only 3.54% of the respondents selected herder as their occupation. If the types of experiences that pastoralists have as a result of oil extraction are different from non-pastoralists, they may also have different perceptions toward oil extraction. In this scenario, selection bias would exist and possibly bias our results.[5] The selected wards within each constituency are provided in Table A.1 in the Appendix. In each ward being sampled, however, we used a multi-stage random sampling method. First, in each sample ward, we randomly selected four enumeration areas where starting points were randomly drawn among the major markets or key markers near residential settlements. At each starting point, surveyors used a random walk method to sample a household. At each selected household, one respondent was randomly selected from the household roster listing all members of the household 18 years or older who were present at the time of interview. [6] A total of 801 respondents selected gave informed consent and participated in the survey. Table A.2 in the Appendix provides descriptive statistics of the survey data.

3.2. The experiment

In the experiment, the interviewer reads the script in the vignette to each respondent. In the vignette, various positive and negative consequences of oil discovery and extraction in Turkana are randomly varied. Although an experiment cannot randomly assign particular experiences *per se* to respondents, the experiment randomizes what experiences are to be "primed" to respondents. We categorize various consequences of oil extraction experienced by the residents of Turkana into seven attributes, drawing on the existing literature as well as our own pre-test data from focus group discussions and interviews conducted prior to the survey. These seven attributes are: *job creation, local public goods, local economy and business*, which are considered to be positive effects of oil extraction, and *limitation of access to land and resources, environmental costs, social changes*, and *conflicts over benefits' distribution*, which are negative consequences of oil extraction. For each attribute group, between two and four alternative consequences are identified as "levels" in the conjoint experiment (Hainmueller et al., 2014). Each vignette's script consists of seven attributes each of which has one of the randomly drawn alternatives. Table 1 presents the summary of the vignette structure that includes all seven attributes. The number of levels is provided in parenthesis below each attribute and all alternative levels are described in the column "Levels (Alternatives)."

Table 2 provides a sample script, which is composed of seven randomised attributes. For each attribute one alternative is randomly drawn from multiple levels. Each script is, therefore, one of 3,072 ($4 \times 4 \times 2 \times 3 \times 4 \times 2 \times 4$) possible scenarios. Because each respondent hears a new script with seven randomly drawn attributes, the content of the script therefore varies from one respondent to another.

Following the vignette, respondents are asked the following question to measure our main outcome: *"Do you support or oppose oil extraction and production to continue in Turkana?"* measured on a five-point Likert-scale response.

3.3. Estimation

We estimate the average marginal component effect (AMCE) of each value of each attribute by using the Ordinary Least Squares (OLS) estimation of the following regression equation (Hainmueller et al., 2014):

[5] In the results section, we will provide a robustness check result that examines whether our results vary between pastoralists and non-pastoralists.

[6] The survey is conducted in each of the three languages: English, Swahili and Turkana. Because the COVID-19 was an ongoing challenge throughout the survey, interviews were held outside with social distancing, and the interviewers carried extra masks. If a respondent did not have a mask, they were given one.

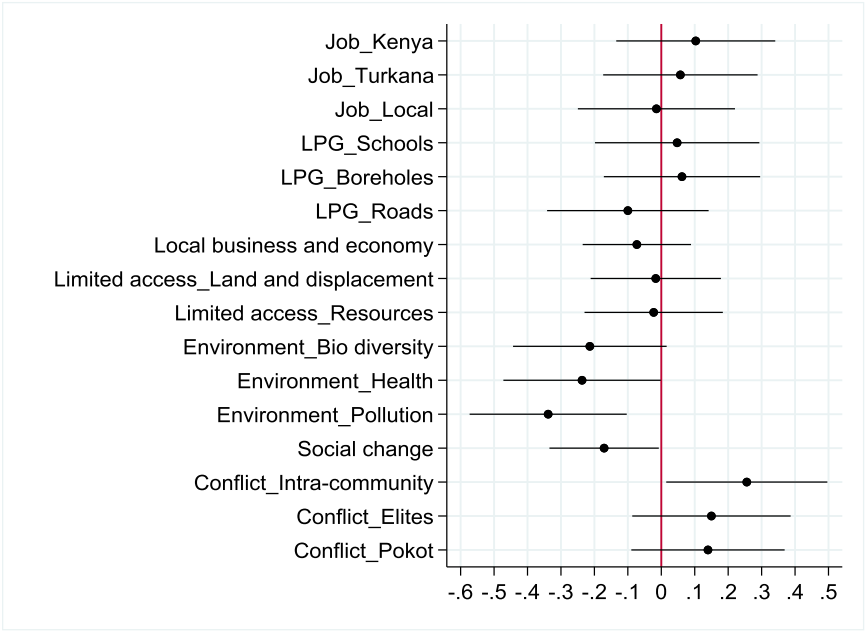

Fig. 2. Average marginal component effects (AMCEs) for non-urban sample. Notes. $N = 645$; Constant = 4.46; Point estimates and 95% confidence intervals are presented; Robust standard errors are used; The baseline category for each of seven attributes is the control condition (no content).

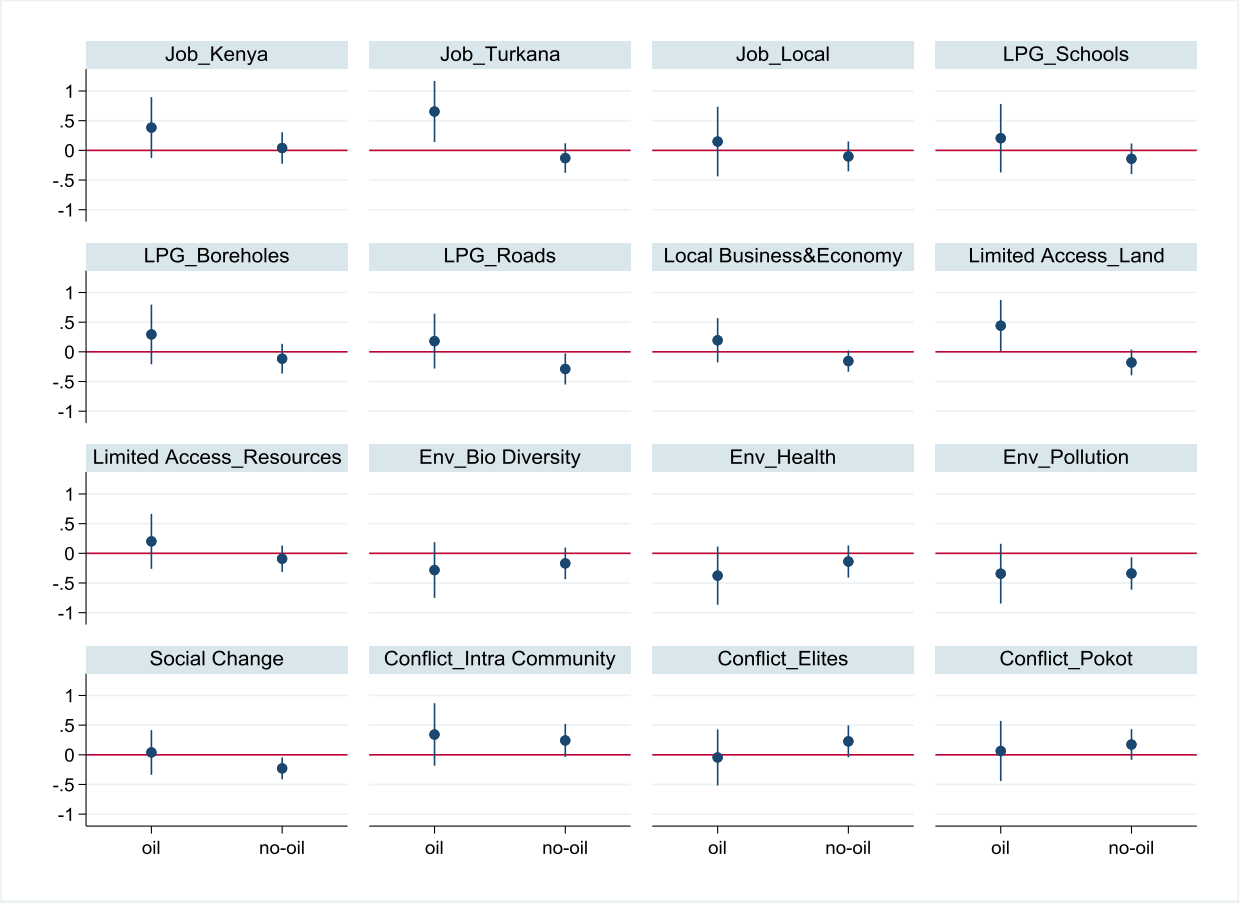

Fig. 3. Average marginal component effects (AMCEs) for non-urban sample by the presence of oil wells. Notes. Point estimates for each component and their 95% confidence intervals are presented for "oil" and "non-oil" sub-samples; Robust standard errors are used; The baseline category for each of seven attributes is the control condition (no content); Constant estimate for the wards in which oil wells are located or near to the respondents (Lochichar and Lokori/Kochodin wards): 3.462; Constant for the wards with no oil wells: 4.832.

$$Y_{ik,l} = \beta_0 + \sum_{k=1}^{7} \sum_{l=2}^{lk} \beta_{kl} x_{ikl} + \varepsilon_{ik,l}$$

where $Y_{ik,l}$ indicates our outcome of interest, a binary variable, with 1 if a respondent i supports continued oil development and 0 if opposes; k refers to one of 7 attributes, and l refers to a particular level, lk refers to the number of levels for an attribute k and $\varepsilon_{ik,l}$ is error term. The estimate of each β_{kl} will give us the estimate of AMCE of the particular level (l) of an attribute (k). The relative causal effects measured by AMCEs will allow us to understand what factor is more influential in affecting Turkana residents' perception toward oil extraction than other factors.

We also conduct sub-group analyses to examine whether the relative causal effect of each consequence of oil extraction on the local resident's support for oil extraction vary by the extent of direct exposures to the consequences (both positive and negative) of oil extraction, measured by geographical proximity to oil wells.

4. Results

We first present our main results based on the pooled non-urban sample, because the sample collected from the urban area, Lodwar town, though too small to present the estimation results as a separate sample due to low statistical power, shows substantially different behaviours and the results work as outliers when pooled with the non-urban sample. Then, we will present the sub-group analyses to examine whether proximity to oil extraction sites and therefore more extensive exposure to oil extraction influence respondents' perception of the impacts of oil extraction. We then provide results from the robustness checks to examine the extent to which our sample selection may have influenced our results.

4.1. Main results

Fig. 2 presents the AMCEs of priming about each consequence of oil extraction in Turkana on the residents' opinion of oil extraction using the non-urban sample.[7] The predicted average value of the outcome variable when all components were held at the control condition (no priming about any consequence of oil extraction), indicated by a constant regression coefficient, is 4.46, which is between the "support somewhat" and "strongly support" categories, indicating that overall, the residents of Turkana positively view the oil extraction.

Out of seven attributes, only two attributes affected outcome variables at the 95% confidence level, namely *environmental costs* and *social change*. As for the environmental costs, priming about each of the three types of environmental costs, namely (a) destruction of biodiversity such as vegetation and fish (biodiversity), (b) negative health effects (health), and (c) environmental pollution (pollution), decreased the support for the continuation of oil extraction. Priming about destruction of biodiversity decreased the average value of the outcome variable by 0.21 ($p < 0.1$), priming about negative health effects decreased the average value of the outcome variable by 0.24 ($p < 0.05$), and priming about environmental pollution decreased the respondent's support level by 0.34 ($p < 0.01$) relative to the control condition. As for social changes, priming about increased population inflows into Turkana together with inflows of modern lifestyles and subsequent social problems decreased the respondent's support level by 0.17 ($p < 0.05$) relative to the control condition.

In terms of relative causal effects, priming about environmental pollution including water and air pollution has the largest effect on responses relative to any other attribute values that are primed. The economic benefits, whether at the macro-level or local-level, whether job creation, local public goods provision or business creation in the local economy, did not have significant impact on the support level for ongoing oil extraction among the non-urban residents in Turkana. Priming about various types of conflict risks did not decrease support for ongoing oil extraction among Turkana's non-urban residents.

4.2. Difference between oil vs. non-oil samples

Because it is expected that the overall perception of oil extraction among the people of Turkana is likely to have been shaped by their experiences since oil extraction began, we expected that perhaps the respondents living near oil wells might display a NIMBY-type phenomenon, and perceive the negative consequences of the oil extraction more strongly than those living distant from oil wells. To test this hypothesis, we have conducted conditional analyses on the types of neighbourhood with one including oil wells in their ward (Lokichar and Lokori/Kochodin wards in our sample) called "oil" sub-sample and another with no oil wells in their ward referred to as "no-oil" sub-sample. Fig. 3 presents the AMCEs of priming about each consequence of oil extraction in Turkana on the residents' opinion of oil extraction by sub-samples.

The results show that the overall support for oil extraction is higher in the "no-oil" sub-sample relative to the "oil" sample. In particular, for the "oil" sub-sample, the predicted average value of the outcome variable when all components were held at the control condition (no priming about any consequence of oil extraction) is 3.46, which is between "neutral" and "support somewhat", while the predicted average value for the "no-oil" sub-sample is 4.83, which is between the "support somewhat" and "strongly support" category. The difference, 1.37, is over one scale difference and is statistically significant at $p < 0.01$ according to the difference-in-means test. This suggests that the overall support for oil extraction is higher in constituencies where respondents are less exposed to the direct consequences of oil extraction.[8].

Not only is there a difference in the overall level of support when all values were held at the control conditions, the relative causal effects in several components also vary between the two sub-samples. Priming about economic benefits increased the respondents' support for oil extraction in the oil sample, while it often decreased support in the non-oil sample even though not all coefficient estimates were statistically significant. The difference-in-means test shows statistically significant differences in AMCEs between the oil and non-oil samples in the following components: *job creation in Turkana* (difference = 0.91, $p = 0.01$), *road construction* (difference = 0.76, $p = 0.032$), *local business and economy* (difference = 0.505; $p = 0.053$), *limited access to land and displacement* (difference = 0.80, $p = 0.01$), and *social change* (difference = 0.50, $p = 0.06$).

Given that priming about positive economic effects from *job creation in Turkana, road construction,* and *local business of economy* somewhat increased the support for oil extraction in the oil sample but decreased the support in the non-oil sample (making the difference statistically significant), one potential explanation for the differences between sub-samples is that the respondents in the non-oil sub-sample may not see as desirable the economic benefits that they do not directly experience. In addition, priming about *limited access to land and displacement* increased the support for oil extraction among respondents in the oil sample but not in the non-oil sub-sample. This may be because the respondents who experienced displacement from land due to oil extraction were very few (only seven respondents, constituting less than 1% of the entire sample experienced displacement resulting from oil extraction), possibly leading the respondents in the oil sample to feel that they benefitted more from oil extraction as they did not personally experience displacement. Priming about *social change*, while having no influence on the support in the oil sub-sample, decreased the support of oil extraction in the non-oil sub-sample. On the other hand, priming about *environmental pollution*, decreased the support of oil extraction in the oil

[7] The coefficient plot is based on the regression model (1) in Table A.3 in Appendix using the non-urban sample.

[8] The coefficient plot for the oil and no-oil sub samples is based on the regression model (1) and (2) in Table A.4 in Appendix, respectively.

sub-sample while having no influence on the support in the non-oil sub-sample consistent with the NIMBY syndrome for LULUs.

4.3. Robustness checks

One of the potential explanations for why the overall support for oil extraction was fairly high may be due to the selection bias of our sample collected from a relatively densely populated area. Although an estimated 70% of the Turkana population is involved in pastoralism (Enns and Bersaglio, 2016), our sample collected from densely populated settlements significantly under-sampled the pastoralists in our sample (3.54% in our sample reported they are herders and 1.14% farmers). This sample is also highly female dominant (only 34% in our sample were male) because male pastoralists were frequently not present at home during the day when the surveys were conducted resulting in further under-sampling of male pastoralists.

Although the sub-sample of pastoralists ($n = 32$) is too small in size to detect any statistical significance of estimated AMCEs, if pastoralists' perceptions were substantially different from non-pastoralists, therefore being outliers, adding them in the sample can influence the overall results. To examine this possibility, we compared the AMCEs from the sample including pastoralists (Model (1) in Table A.5.) to the ones excluding pastoralists (Model (2) in Table A.5.) The results remain fairly robust, suggesting that the pastoralists' perception of oil extraction and their responses to each priming do not significantly differ from the non-pastoralists' in the sample.

Another explanation for why the overall support for oil extraction was fairly high may be due to having predominantly young respondents in our sample where the median age is 30, while the mean age is 33. Enns and Bersaglio (2016) demonstrated that the youth in Turkana have different perceptions toward oil extraction and are more willing to take advantage of the new opportunities generated by the oil industry compared to older generations. We conducted an additional sub-group analysis by age group (one less than and another greater than or equal to the median age) and the AMCEs are presented in Table A.5. in the Appendix (Model (3) for the younger and (4) for the older sub-group). Our respondents' average predicted support for oil extraction is high when all attributes are held at the control group regardless of the age group (the constant estimate is 4.37 among the younger respondents at $p < 0.01$ and 4.49 for the older respondents at $p < 0.01$), while the responses to different types of priming varied between the two groups. Regardless, our sub-group analysis does not support the idea that the overall, high-level support for continuation of oil extraction is due to having predominantly younger respondents in our sample.

5. Conclusions

The existing, largely qualitative, literature examining the impacts of oil extraction and community perception in Africa draws mostly from the interviews of selected groups of individuals. Although of much value, this literature often presents largely negative narratives of the affected community and implies that perceptions among the local community are negative overall. This study has examined the perceptions toward oil extraction of the residents of Turkana county, an economically and politically marginalised community located in the north-western region in Kenya, after over eight years of experience in various phases of oil extraction. In doing so, we have aimed to obtain more representative views across Turkana county and hence collected our sample from all six constituencies. We have conducted a conjoint experiment to examine the extent to which various positive and negative consequences of oil extraction affected the perceptions of Turkana residents.

We find that the overall perception of oil extraction in Turkana is fairly positive, although when priming about environmental costs and negative social change, the support for oil extraction slightly decreases. However, given that having direct exposure to the oil extraction both in terms of benefits and costs may lead community members to have a different perspective compared to those who are less exposed to it, we conducted sub-group analyses by proximity to the oil project by dividing administrative wards into ones with oil wells in operation and those without. We find that (a) the overall support for oil extraction is substantively higher among respondents in wards without oil wells in operation than those having oil wells, and (b) the respondents living in wards having oil wells tended to support oil extraction more when primed about certain economic benefits such as increased employment in Turkana. No sign of strong opposition to oil extraction among the residents of Turkana is found in this study.

This study makes two main contributions. First, it contributes to the existing literature on the impacts of oil extraction in Africa by showing that despite local protests and disruption of oil production in the early stage of an oil project, the overall community support for oil extraction can be high in the long term, even among directly affected communities proximate to the oil. Second, the existing literature on the community perception of oil extraction focuses on identifying what positive and negative impacts of oil extraction community members have experienced, while being limited to identifying which impacts are more important to the community members than others. Our study then contributes by using an experimental design, which allows us to identify relative causal effects of priming about different consequences of oil extraction on community perception.

We conclude by discussing two potential limitations of the study. First, it is possible that our results would have been different if the experiment was conducted at a different time. Because the negative impacts of oil extraction are known to have been stronger during the actual extraction phase (Atoufi and Lampert, 2020), the negative perception toward the oil extraction and the negative response to priming about environmental costs by residents of Turkana could have been stronger if our study was conducted during the extraction phase. A longitudinal study would allow us to examine whether and to what extent the timing of the survey affects the responses among the people of Turkana.

Second, although this study is based on a more representative sample relative to many existing studies on Turkana, this study uses a convenience sampling method to select neighbourhoods (wards) to include settlements with relatively high population density because, given the low population density of Turkana county and the majority population being pastoralists who often move around, using a completely random sample was not feasible. Our sampling substantially under-sampled mobile pastoralists, who are likely to be affected more by the environmental consequences resulting from the oil industry and this selection may potentially bias our results. However, our robustness check results suggested that the perceptions of pastoralists and non-pastoralists were not very different. In addition, our over-sampling of the neighbourhoods near oil-wells where the support for oil extraction is lower can imply that our results showing a fairly high-level of support for oil extraction are not likely to be caused by our sampling method. Regardless, we cannot completely rule out the possibility that random sampling may lead to less support for oil extraction. Thus, a future study using a more representative sample mirroring the proportion of the pastoralists in Turkana would give us more confidence in understanding the community's overall perception toward oil extraction as well as any variations among types of communities and interests.

6. Funding

The fieldwork and the first author's research support were funded by Gerda-Henkel Foundation [grant number AZ 07/KF/19]. The second author's research was supported by Deutsche Forschungsgemeinschaft (DFG) through the Future Rural Africa Project by Collaborative Research Centre (Universities of Bonn, Cologne and Bonn International Centre for Conversion).

Declaration of Competing Interest

None.

Acknowledgment

The authors thank Mr Augustine Lokwang Ekitela, Ms Evelyne Atieno Owino and Mr James Ilimo for their translations and outstanding fieldwork management, Ms Mary Imana, Ms Norah Namoru, Ms Purity Ekai, Mr Ekiru Lokai, Mr Jonathan Muya, Mr Joseph Ekaale and Mr Lokeun Sylvanus for conducting high-quality interviews during the fieldwork, and Dr Tessa Mkutu and Mr Matthew Burkhart for their excellent editing.

Appendix

Tables. A.1–A.5

Table A.1
Sampled wards and target locations by constituency.

No.	Constituency	Wards	Target Location
1	Turkana South	Lokichar	Lokichar/Kapese
2		Lobokat	Kainuk
3		Katilu	Kalemng'orok
4	Turkana East	Lokori/Kocodin	Nakukulas
5			Lokori
6	Turkana Central	Kerio Delta	Kalokol
7		Kalokol	Kerio
8		Lodwar	Lodwar
9	Turkana North	Lake zone	Kataboi
10			Lowerengak
11	Turkana West	Nanam	Nanam
12		Lokichoggio	Lokichoggio
13		Songot	Songot
14	Loima	Loima	Lorugum

Table A.2
Descriptive statistics of key pre-treatment variables.

Variable	Observation	Mean	Std. Dev	Min	Max
Age	767	33.88657	13.15727	18	80
Gender (male)	791	0.335019	0.472296	0	1
Born in_Turkana	788	0.936548	0.243929	0	1
Oil	793	0.218159	0.413257	0	1
Ethnicity (Turkana)	801	0.952559	0.212712	0	1
Education	Category	Frequency	Percent	Cumulative	
	No formal schooling	365	46.14	46.14	
	Standard 1	13	1.64	47.79	
	Standard 2	11	1.39	49.18	
	Standard 3	11	1.39	50.57	
	Standard 4	25	3.16	53.73	
	Standard 5	13	1.64	55.37	
	Standard 6	15	1.9	57.27	
	Standard 7	32	4.05	61.31	
	Standard 8	72	9.1	70.42	
	Form 1	6	0.76	71.18	
	Form 2	27	3.41	74.59	
	Form 3	22	2.78	77.37	
	Form 4	82	10.37	87.74	
	College	65	8.22	95.95	
	Some University	9	1.14	97.09	
	University completed	6	0.76	97.85	
	Graduate degree	8	1.01	98.86	
	Don't know	3	0.38	99.24	
	Refused to answer	6	0.76	100	
	Total	791	100		
Occupation	Category	Frequency	Percent	Cumulative	
	Farmer / farm worker	9	1.14	1.14	
	Herder	28	3.54	4.68	
	Trader / Hawker	48	6.08	10.76	
	Business person	116	14.68	25.44	
	Professional (lawyer, accountant, nurse, etc.)	16	2.03	27.47	
	Teacher	13	1.65	29.11	
	Government Worker	21	2.66	31.77	
	Artisan	7	0.89	32.66	
	Student	32	4.05	36.71	
	Housewife	126	15.95	52.66	
	Unemployed	276	34.94	87.59	
	Retired	3	0.38	87.97	
	Other	91	11.52	99.49	
	Don't know	4	0.51	100	
	Total	790	100		

Table A.3
Average marginal component effects (AMCEs) estimation results.

	(1) non-urban	(2) lodwar	(3) Pooled
1. Job_Kenya	0.103	-0.371	0.060
	(0.121)	(0.460)	(0.114)
2. Job_Turkana	0.057	-0.577	-0.006
	(0.118)	(0.376)	(0.112)
3. Job_Local	-0.015	-0.277	-0.024
	(0.120)	(0.322)	(0.110)
2. LPG_Schools	0.047	0.480	0.069
	(0.125)	(0.382)	(0.116)
2. LPG_Boreholes	0.062	0.335	0.097
	(0.119)	(0.333)	(0.112)
2. LPG_Roads	-0.100	0.193	-0.057
	(0.123)	(0.370)	(0.116)
3. Local Business and Economy	-0.073	0.221	-0.055
	(0.082)	(0.237)	(0.078)
4. Limited Access_Land and Displacement	-0.016	0.068	0.020
	(0.099)	(0.311)	(0.094)
4. Limited Access_Resources	-0.023	-0.143	-0.006
	(0.105)	(0.352)	(0.101)
5. Environment_Bio diversity	-0.214*	0.544	-0.124
	(0.117)	(0.339)	(0.110)
5. Environment_Health	-0.237**	0.275	-0.162
	(0.120)	(0.517)	(0.119)
5. Environment_Pollution	-0.338***	0.625	-0.222*
	(0.120)	(0.419)	(0.115)
6. Social change	-0.171**	0.227	-0.135*
	(0.083)	(0.268)	(0.080)
7. Conflict_Intra-community	0.256**	-0.499	0.149
	(0.123)	(0.385)	(0.116)
7. Conflict_Elites	0.150	-0.576*	0.042
	(0.121)	(0.307)	(0.113)
7. Conflict with Pokot	0.140	-0.221	0.082
	(0.117)	(0.338)	(0.109)
Constant	4.460***	4.167***	4.414***
	(0.187)	(0.495)	(0.177)
Observations	645	83	728
R-squared	0.029	0.157	0.016

Notes. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; The baseline category for each of seven attributes is the control condition (no content).

Table A.4
Average marginal component effects (AMCEs) estimation results by presence of oil.

	(1) Oil	(2) No Oil
1. Job_Kenya	0.384	0.040
	(0.259)	(0.135)
2. Job_Turkana	0.655**	-0.130
	(0.260)	(0.127)
3. Job_Local	0.149	-0.102
	(0.297)	(0.128)
2. LPG_Schools	0.205	-0.142
	(0.292)	(0.131)
2. LPG_Boreholes	0.294	-0.115
	(0.254)	(0.127)
2. LPG_Roads	0.180	-0.288**
	(0.234)	(0.134)
3. Local Business and Economy	0.195	-0.155*
	(0.188)	(0.091)
4. Limited Access_Land and Displacement	0.441**	-0.179
	(0.219)	(0.110)
4. Limited Access_Resources	0.202	-0.091
	(0.234)	(0.113)
5. Environment_Biodiversity	-0.282	-0.169
	(0.238)	(0.136)
5. Environment_Health	-0.375	-0.138
	(0.248)	(0.138)
5. Environment_Pollution	-0.342	-0.340**
	(0.255)	(0.139)

(*continued on next page*)

Table A.4 (*continued*)

	(1) Oil	(2) No Oil
6. Social change	0.040	-0.228**
	(0.190)	(0.093)
7. Conflict_Intra-community	0.342	0.242*
	(0.266)	(0.141)
7. Conflict_Elites	-0.044	0.227*
	(0.239)	(0.136)
7. Conflict_with Pokot	0.064	0.173
	(0.256)	(0.132)
Constant	3.462***	4.832***
	(0.410)	(0.195)
Observations	161	484
R-squared	0.129	0.053

Notes. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; The baseline category for each of seven attributes is the control condition (no content).

Table A.5
Robustness check.

	(1) all	(2) non-pastoralist	(3) age_below 30	(4) age_30 or above
1. Job_Kenya	0.103	0.121	0.155	0.072
	(0.121)	(0.124)	(0.207)	(0.149)
2. Job_Turkana	0.057	0.078	0.190	-0.043
	(0.118)	(0.121)	(0.196)	(0.151)
3. Job_Local	-0.015	0.023	0.197	-0.284
	(0.120)	(0.120)	(0.186)	(0.176)
2. LPG_Schools	0.047	0.045	0.148	0.055
	(0.125)	(0.130)	(0.206)	(0.164)
2. LPG_Boreholes	0.062	0.083	0.339*	-0.085
	(0.119)	(0.122)	(0.187)	(0.164)
2. LPG_Roads	-0.100	-0.060	0.103	-0.144
	(0.123)	(0.125)	(0.200)	(0.166)
3. Local Business and Economy	-0.073	-0.071	-0.190	-0.027
	(0.082)	(0.084)	(0.129)	(0.117)
4. Limited Access_Land and Displacement	-0.016	-0.015	-0.138	0.073
	(0.099)	(0.102)	(0.160)	(0.133)
4. Limited Access_Resources	-0.023	-0.026	-0.006	-0.054
	(0.105)	(0.108)	(0.155)	(0.152)
5. Environment_Biodiversity	-0.214*	-0.215*	-0.374**	-0.012
	(0.117)	(0.120)	(0.180)	(0.171)
5. Environment_Health	-0.237**	-0.202*	-0.430**	-0.091
	(0.120)	(0.122)	(0.190)	(0.178)
5. Environment_Pollution	-0.338***	-0.309**	-0.320*	-0.370**
	(0.120)	(0.122)	(0.177)	(0.182)
6. Social change	-0.171**	-0.195**	-0.185	-0.147
	(0.083)	(0.085)	(0.128)	(0.114)
7. Conflict_Intra-community	0.256**	0.257**	0.307	0.238
	(0.123)	(0.124)	(0.188)	(0.173)
7. Conflict_Elites	0.150	0.169	0.316*	-0.003
	(0.121)	(0.122)	(0.186)	(0.163)
7. Conflict_with Pokot	0.140	0.130	-0.088	0.232
	(0.117)	(0.119)	(0.193)	(0.154)
Constant	4.460***	4.425***	4.372***	4.490***
	(0.187)	(0.188)	(0.322)	(0.246)
Observations	645	620	286	314
R-squared	0.029	0.029	0.074	0.059

Notes. Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$;
We find that the positive AMCE of priming of some economic benefits (such as oil companies' provision of boreholes in the respondents' neighbourhoods) increase the younger respondents' support for continuous oil extraction (AMCE for Borehole is 0.4 at $p < 0.1$) but not the older respondents' support. In fact, the AMCEs for borehole as well as for some other economic effects, such as job creation in Turkana or near oil extraction sites, building a road and improving local economy were "negative" not positive, although these negative AMCEs were not statistically significant. In addition, younger respondents, when primed about negative environmental effects, their support for oil extraction decreased substantially and the negative AMCEs (-0.374 for the destruction of bio-diversity at $p < 0.05$, -0.43 for health effects at $p < 0.05$ and -0.32 for pollution at $p < 0.1$, respectively), while only the AMCE for the pollution (AMCE = -0.37) was statistically significant among the older respondent sample.

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