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Taxation for development: the impact of the Ebola epidemic on citizen support across Western Africa

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Abstract

We explore the impact of the Ebola epidemic on attitudes towards taxation for development in West Africa. Utilising representative surveys from before and after the peak of the crisis, we estimate the impact of Ebola using both objective (recorded case rates) and self-reported (knowing a friend/relative who was infected/died from Ebola) measures of exposure. In addition, we consider the indirect impact of Ebola on redistributive preferences through disruption to different domains of life, including: school, work, social gatherings and medical care. Our empirical analysis demonstrates that higher levels of Ebola exposure and disruption are associated with greater levels of support for taxation for development.

Keywords: Taxation, Preferences for redistribution, Ebola, Africa.

JEL-classification: D30, D63, H50, I15.

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1 Introduction

Preferences for redistribution play a fundamental role in the definition of institutions and the extent of government intervention. A growing literature has explored a diversity of determinants of these preferences, such as self-interest and insurance motives; beliefs about the drivers of one's economic position; experienced and expected mobility; perceptions of inequality; institutional and cultural context; or risk attitudes.[1] A key question in this field, still not fully addressed, is how redistributive preferences form, whether they are shaped by a specific environment and how they are updated when individuals are exposed to shocks. Empirical evidence suggests that economic, political, and natural factors do indeed affect beliefs and individual preferences for redistribution significantly. For instance, Alesina and Fuchs-Schündeln (2007) offer evidence that living in communist East Germany negatively impacted individual beliefs about luck's role on one's achievements. Giuliano and Spilimbergo (2014) look at the effects of experiencing an economic recession at a young age and find that individuals become more supportive of redistribution, left-oriented, and conscious of luck's role in determining one's economic position. Olivera (2014) and Cabeza and Decancq (2019) find that increasing unemployment levels correlate positively with preferences for redistribution and luck-oriented beliefs about one's success, respectively. Addressing the impact of a natural disaster, Gualtieri et al. (2018) observe a positive influence of the intensity of the 2009 L'Aquila earthquake in Italy on support for government intervention. Within an experimental setting, Cappelen et al. (2021a) find that the COVID-19 crisis makes respondents more likely to prioritise societal problems over their own, but also more willing to accept inequalities due to luck. This paper fits into the aforementioned literature by assessing whether the 2013-16 Ebola Virus Disease (hereafter, simply Ebola) outbreak in West Africa has reshaped attitudes towards taxation in the three most heavily affected countries: Guinea, Liberia, and Sierra Leone.

We argue that the context of the West African Ebola outbreak is relevant to the literature on shocks and redistributive preferences for several reasons. Firstly, the outbreak was the largest since the pathogen's discovery in 1976. This is notable because Ebola is one of deadliest diseases known to affect human-beings with a case-fatality ratio of around 50%.[2] By the official end of the epidemic in June

[1] See, among others, Fong (2001); Alesina et al. (2001); Corneo and Grüner (2002); Alesina and La Ferrara (2005); Alesina and Angeletos (2005); Alesina and Giuliano (2011); Luttmer and Singhal (2011); Durante et al. (2014); Kuziemko et al. (2015); Gärtner et al. (2017); Alesina et al. (2018).

[2] WHO Africa, accessed at [18/05/2022]: https://www.afro.who.int/health-topics/ebola-virus-

2016, there had been 28,646 cases and 11,323 deaths due to Ebola, the vast majority of which were concentrated in Guinea, Liberia, and Sierra Leone.[3] These figures are also likely to be under-reported due to the poor health surveillance systems in these countries. Furthermore, the impact of the epidemic on an already underfunded healthcare system also led to concomitant rise in mortality from other causes of death, such as HIV/AIDS, malaria, and tuberculosis (Parpia et al., 2016). Thus, the geographical location and the high case-fatality rates associated with the outbreak sharply contrast with previous works on the impacts of shocks on preferences for redistribution.

Secondly, aside from the large loss of life, the outbreak caused substantial economic and social disruption across these countries. Prior to the outbreak, each of the three countries had a experienced a relatively long period of economic growth, which had extended into the first half of 2014. Pre-crisis GDP growth estimates from the World Bank suggested that the economies of Guinea, Liberia and Sierra Leone would grow 4.3%, 6.8%, and 8.9% in 2015, respectively (World Bank, 2015). Instead, the economy of Sierra Leone contracted by over a fifth, while Liberia experienced no growth at all in 2015.[4] Overall, the World Bank estimates the total foregone economic output due to EVD for Guinea, Liberia, and Sierra Leone to be around $2.8 billion (World Bank, 2016). However, this figure does not reflect the true welfare costs of the epidemic, which several studies have found to be substantial (Kirigia et al., 2015; Huber et al., 2018; Da Costa, 2020). The outbreak also disrupted the agricultural labour supply, leading to declines in household consumption levels (Gatiso et al., 2018; De La Fuente et al., 2020); closed schools for extensive periods of time; and stopped cross-border trade completely (Mullan, 2015). In addition, it is likely that the Ebola outbreak exacerbated the existing poverty crises in these countries, where more than half of the population lives below the national poverty line (UNDG, 2015). The multidimensional nature of the crisis therefore allows us to draw parallels with recent shocks of a similar nature (e.g. the COVID-19 pandemic).

Lastly, while preferences for redistribution have been shown to play a crucial role in the political feasibility of institutional outcomes, most international attitudinal surveys, and thus empirical studies, focus on developed countries in the Western world. Yet, attitudes towards taxation are of particular interest in underdeveloped

disease

[3] Guinea: 3,811 cases and 2,543 deaths. Liberia, 10,675 cases and 4,809 deaths. Sierra Leone: 14,124 cases and 3,956 deaths. WHO Ebola situation reports accessed at [06/07/21]: https://apps.who.int/ebola/ebola-situation-reports.

[4] World Bank Development Indicators, GDP growth (annual %) accessed at [11/10/21]: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

regions, provided that, in this context, increased tax revenue, leading to a larger state capacity, could facilitate independence from international donors and boost development (see the discussion in pp.150-151 in Luttmer and Singhal, 2014). Some of the factors, among others, that impede revenue collection in such contexts include the existence of large informal sectors; dependence on natural resources or international aid; low levels of tax morale and weak political institutions (Besley and Persson, 2014; Luttmer and Singhal, 2014). Like many Sub-Saharan African countries, Guinea, Liberia and Sierra Leone have narrow tax bases that limit the capacity of the state to invest in public services. While tax revenues as a proportion of GDP had been expanding prior to 2013 (see Figure 1), the Ebola outbreak led to a sharp decrease in economic activity, employment and subsequent contraction of the tax base. Moreover, Guinea and Liberia have been unable to regain the momentum they had achieved prior to the epidemic with taxes as proportion of GDP remaining relatively constant up to 2019. Given the low levels of tax collection in these countries, it is not surprising that the healthcare systems were already severely underfunded prior to the Ebola outbreak. Among other effects, the Ebola epidemic led to a substantial increase in international donor aid for healthcare (DAH, Development Assistance for Health). While in 2013, DAH amounted to 12%, 14%, and 44% of total health spending in Guinea, Sierra Leone, and Liberia, respectively, in 2014 these figures rose to 31%, 50%, and 66% (see Figure 8 in the Annex). Understanding how the epidemic has affected redistributive preferences is therefore a priority for national governments and international donors alike.

Linking to the literature on preferences for redistribution mentioned above, we posit that the Ebola outbreak could affect redistributive attitudes by exposing individuals to a random spell of bad luck. As noted by Cappelen et al. (2021a), epidemics tend to generate health and income inequalities by chance. This, in turn, could make individuals more aware of the role of luck and circumstances in determining one's economic situation, leading to increased support for taxation to fund a more extensive state "safety net".[5] To investigate this empirically, we require two elements: individual attitudes towards taxation and a measure of Ebola exposure. We obtain the former from two rounds of the Afrobarometer survey, collected before and after the outbreak in each country. More specifically, we consider redistributive preferences as support for taxation to fund development. Concerning our measures of Ebola exposure, we first combine Ebola prevalence rates, measured at the subnational level, with the individual level data from the Afrobarometer. This allows us

[5] See Alesina and Angeletos (2005) for a theoretical formalization of this mechanism in the general context of social spending in a country and average public opinions about whether the drivers of one's economic position are more effort or luck-related.

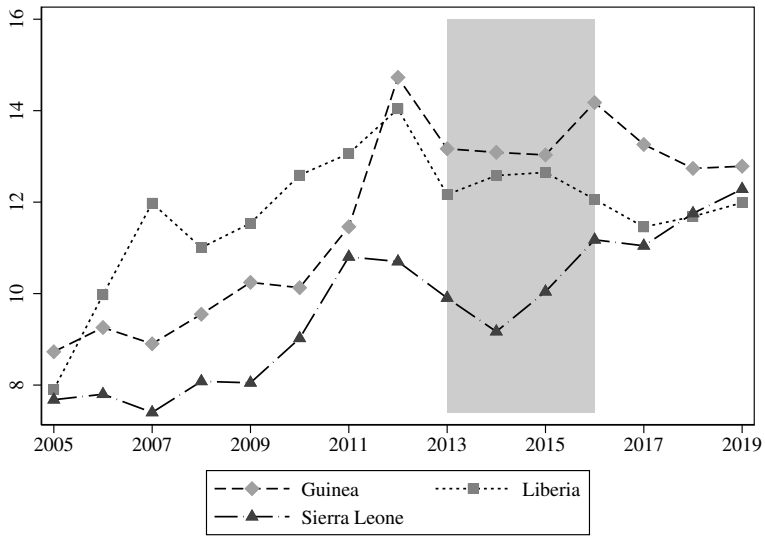

Figure 1: Tax revenues in West Africa. Source: IMF World Longitudinal Dataset. Note: shaded area corresponds to Ebola outbreak.

to test whether individuals living in regions more exposed to the epidemic shifted their preferences. However, this approach conceals heterogeneities in the experience of the epidemic among individuals living in the same region. Ebola case rates are also likely subject to under-reporting and subsequent measurement error. We therefore utilise a set of subjective measures from the Afrobarometer survey. These are self-reported exposure to Ebola (knowing a friend or relative who was infected with or died because of Ebola) and a measure that captures disruption caused by outbreak to different aspects of life, namely schooling, work, social activities and medical care. Evidence suggests that subjective measures may be a better predictor of redistributive preferences than objective indicators. Niehues (2014), for instance, finds that perceptions of inequality in a society are a better predictor of redistributive preferences than the actual distribution of incomes. Our twofold approach, combining Ebola rates and reported experience, allows us to capture several channels of the effects of the epidemic on redistributive preferences.

To preview our results, we find that individuals living in areas more exposed to Ebola display more support for taxation. At the individual level, being exposed to Ebola and incurring life disruption during the outbreak are also positively correlated with increased support for raised taxes to develop one's country. These effects are robust to controlling for several other confounders, such as trust in the govern-

ment.[6] After ruling out several possible mechanisms, we posit that the change in redistributive preferences was due to the impact of the Ebola epidemic, provided that citizens were made more aware about the role of (bad) luck in determining their life outcomes.

This paper makes three key contributions to the literature. First, it adds to the growing empirical evidence on the determinants of preferences for redistribution and the impact of shocks, such as natural disasters (e.g. Giuliano and Spilimbergo, 2014; Gualtieri et al., 2018). More specifically, we reveal another channel of the epidemic's impact on the affected countries, aside from the economic and health consequences, namely, attitudes towards taxation. Secondly, we exploit variation in self-reported exposure and level of disruption at the individual level. To our knowledge, such measures have not been employed to assess the impact of a epidemic on preferences for redistribution. As our results demonstrate, the direct (exposure) and indirect (life disruption) effects of an epidemic may both lead to a shift in redistributive preferences.[7] This may be of policy relevance for other shocks that affect not just health but other aspects of life, e.g. COVID-19. Thirdly, the paper assesses the impact of the Ebola outbreak on redistributive preferences in the context of development. It therefore adds to the understanding of the forces affecting the state's capacity to fund and improve public services through strengthened support for tax revenues within low-income settings. As noted by Besley and Persson (2014), the ability to raise taxes is at the core of a state's development.

The rest of the paper is structured as follows. Section 2 presents background information on the Ebola outbreak in West Africa. Section 3 introduces the data we employ in the empirical analysis, that includes the information on attitudes towards taxation, the regional Ebola case rates, and the self-reported exposure to Ebola and life disruption due to the epidemic. Section 4 describes the empirical strategy carried out to study the association between exposure to Ebola and preferences for redistribution. In Sections 5 and 6, we present the estimation of the different specifications and discuss mechanisms to explain our results. Finally, Section 7 concludes.

[6] Flückiger et al. (2019) show that the higher Ebola exposure is associated with more trust in government institutions and lower refusal to pay taxes. They hypothesise that the government's handling of the epidemic acted as a quality signal that enhanced state legitimacy in those areas most affected by the outbreak. In addition, Daniele and Geys (2015) find that trust in government institutions is associated with more support for paying higher taxes for increased social expenditures.

[7] Rees-Jones et al. (2020) also utilise a combination of objective and subjective measures in relation to the COVID-19 pandemic. However, their subjective measures refer to individuals risk perception (e.g. risk of getting COVID-19 or losing their job during the pandemic) and not experiences of the pandemic. Our measures, on the other hand, capture (ex-post) the levels of exposure and disruption caused by the Ebola outbreak, as self-reported by individuals.

2 Background

Ebola Virus Disease is a viral haemorrhagic fever that is spread through direct contact with bodily fluids. The disease is highly contagious and has a case-fatality rate of around 50%, although this figure has varied from 25-90% in the past (Coltart et al., 2017). The disease is not curable, which means its spread must be curtailed with prevention measures, such as social distancing, effective hand hygiene, and contact tracing/quarantining of infected individuals.[8]

There have been around 30 known outbreaks of Ebola Virus Disease since its discovery in the early 1970s, the largest being in West Africa between 2013 and 2016. The first cases were reported in the Gueckedou prefecture of Guinea in December 2013. A highly mobile population and porous borders meant that the virus gradually spread to urban centres in Liberia and Sierra Leone through 2014. This contrasted with previous outbreaks that had been largely limited to rural areas. Initially, government efforts to contain the epidemic were unsuccessful, leading to a rapid increase of cases by late 2014. Following this, the World Health Organisation (WHO) declared a Public Health Emergency of International Concern in August 2014. New interventions, alongside the enforced containment efforts and international support, helped to progressively control the outbreak, like the ban of certain mass cultural celebrations,[9] the adaptation of burial practices (in agreement with religious leaders), effective contact tracing and monitoring, and the engagement with local leaders to boost awareness campaigns that would reduce popular opposition and lead to behavioural changes. All these actions combined eventually help to stop the spread of the epidemic, limiting it to only localised outbreaks throughout the latter part of 2015 (Coltart et al., 2017). In 2016, the WHO officially declared the Ebola epidemic as over.

According to the WHO,[10] several elements were conducive to the initial spread of the epidemic, including (among others): a lack of knowledge among healthcare workers and the general population about the disease; the weakened public infrastructure following recent civil conflicts; the high volume of cross-border population movements; traditional burial practices;[11] poor state communication strategies;

[8] However, several vaccines have also been under development, with the first being approved by the United States in 2019.

[9] Public gatherings were prohibited from July 2014 to January 2015 in Liberia. A curfew was also put in place from 6pm onwards within the country.

[10] See WHO [accessed 24/05/22]: https://www.who.int/news-room/spotlight/one-year-into-the-ebola-epidemic and Coltart et al. (2017) for detailed reports.

[11] Blair et al. (2017) offer evidence that Liberians who trusted the government less took, on average, fewer precautions against Ebola and were less likely to follow the measures implemented to control the spread of the virus. Furthermore, the authors find no evidence to suggest that the understanding of the transmission mechanisms was a driver of such attitudes.

and a lack of community engagement from the outset. Demographic and socio-economic factors were also important drivers of the epidemic. For instance, Fallah et al. (2015) find that population density and poverty are highly correlated with exposure in Montserrado county, Liberia. Grépin et al. (2020) show that education levels at the individual and community level were also key correlates of exposure. However, their findings also indicate that wealthier households in Sierra Leone were more likely to be exposed to Ebola than those in Liberia.

Aside from these factors, the healthcare systems of the affected countries were largely unprepared to cope with the Ebola outbreak and were quickly compromised due to combination of healthcare worker deaths, increased demand for services, diversion of resources and the closure of facilities. As of 2013, government healthcare spending as a proportion of GDP was much lower in Guinea (0.5%), Liberia (0.6%) and Sierra Leone (0.9%) than the regional SSA average (1.7%) (IHME, 2021). Furthermore, a substantial proportion of total health care spending in these countries is financed through out-of-pocket expenditures.[12] In 2013, these expenditures accounted for as much as 71% of total health care spending in Guinea, 44% in Liberia and 76% in Sierra Leone (IHME, 2021). Low levels of funding meant that there were only 1 to 2 physicians per 100,000 inhabitants in these countries prior to the outbreak and this number was further diminished by the high numbers of deaths among working in the healthcare sector (Coltart et al., 2017, Table 2, p.7). By July 2015, 509 healthcare workers had died from EVD across the three countries, representing around 5% of total deaths during the outbreak (WHO, 2015). Besides the very high risk of infection health care workers (HCW) faced during the outbreak (up to 100 times higher compared with the general population, see Kilmarx et al., 2014, as cited in Coltart et al., 2017), they were unfortunately also subject to violence[13] and poor working conditions.[14]

[12] These are "payments made by individuals for health maintenance, restoration, or enhancement at or after the time of health care delivery, including health insurance co-payments or payments devoted to deductibles", to be distinguished from prepaid private health spending, which involve private health insurance schemes and free services offered by non-governmental agencies (Institute for Health Metrics and Evaluation (IHME), 2020, p.44).

[13] For instance, in Guinea, rumours spread that HCW were taking part in a conspiracy to introduce the virus or take blood or organs of patients at Ebola Treatment Centers (Coltart et al., 2017). Shortly after, a group of HCW were killed while implementing an information campaign in a village in Southern Guinea (www.bbc.co.uk/news/world-africa-29256443 [accessed 14 April 2022]).

[14] Sierra Leone was the country that suffered more health care worker losses, and the only one where strike action took place to request better safety conditions and wages. Burial workers had similar claims (Coltart et al., 2017).

3 Data

3.1 Afrobarometer survey

Throughout this paper, we utilize data from the Afrobarometer survey,[15] which is nationally representative of the adult population in each country. This survey is carried out in more than 30 African countries, gathering attitudes on democracy, governance, and society. We use data corresponding to rounds 5 and 6 for Guinea, Liberia and Sierra Leone. With a sample size of around 1,200 respondents per round and country, we obtain a data set of more than 7,000 observations. A random selection process is applied at every sampling level, with proportionate probability to the corresponding population size. The sampling universe targets all citizens aged 18 and above.[16]

The timings of the Afrobarometer surveys in Guinea, Liberia and Sierra Leone are of particular interest as they allow us to observe pre- and post-epidemic attitudes towards taxation. Figure 2 presents the absolute Ebola case counts (probable and suspected) in the three countries over time. These data are taken from the official WHO situation reports in each week of the crisis. The pairs of vertical lines represent the data collection periods for the fifth and sixth rounds of the survey. The graphs show that the Round 5 of the survey was carried out in mid-2012 in Liberia and Sierra Leone and early 2013 in Guinea. Round 6 of the survey was carried in mid-2015, after the peak of the epidemic had been passed in each country with a few sporadic cases thereafter. All of the eventual reported cases in Liberia had been reported by 6th May, the field collection date of the Round 6 survey. This figure was slightly lower in Sierra Leone (97%) and Guinea (89%).

3.2 Dependent variable

We obtain a measure of attitudes towards taxation from Rounds 5 and 6 of the Afrobarometer survey. Our main dependent variable is constructed from a question which presents respondents with two statements. The first reads: "Citizens must pay their taxes to the government in order for our country to develop". The second presents an opposing view: "The government can find enough resources for

[15] The Afrobarometer project is a non-profit network of more than 30 research institutes and universities coordinated by the Ghana Center for Democratic Development (CDD-Ghana).

[16] The method applied consists of a clustered, stratified, multi-stage, area probability sample. The sample stages include the drawing of secondary sampling units, the random selection of primary sampling units, the random selection of sampling starting points, the random selection of households, and finally, the random selection of an individual within the household (alternating man and woman to achieve gender balance). More details to be found in: https://afrobarometer.org/surveys-and-methods/sampling-principles.

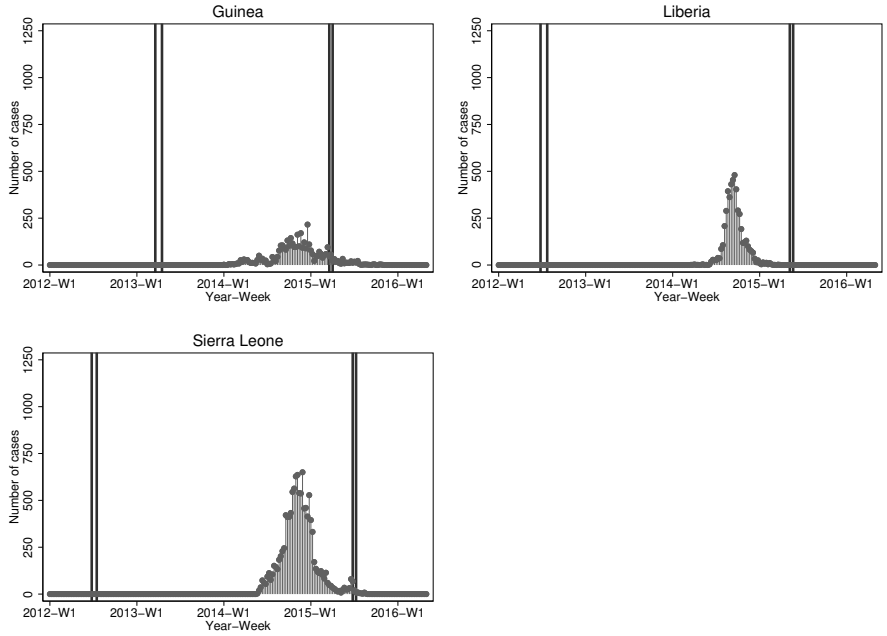

Figure 2: EVD case counts and timing of Round 6 of the Afrobarometer survey

development from other sources without having to tax the people." Respondents are asked to choose which statement corresponds most closely to the view and the degree to which they agree with the chosen statement. They can also opt to agree with neither of the statements. The two statements therefore provide a scale against which respondents' attitudes towards taxation can be assessed. Since very few individuals state that they agree with neither of the statements,[17] we create a dichotomous variable which is equal to one if individuals agree or strongly agree with statement 1 (i.e. support for paying taxes to develop the country) and zero otherwise. Looking at the proportion of individuals in each country and round supporting taxation for development, first of all, we notice that more respondents have a positive attitude towards taxation in Liberia and Sierra Leone than in Guinea (80% vs. 50%).[18] The proportion increases over time in Sierra Leone, remains relatively constant in Liberia and declines in Guinea. This preliminary analysis

[17] Only 50 respondents across the three countries (0.70% of the total) choose this option.

[18] Unfortunately, the Afrobarometer doesn't allow us to investigate further back in time the possible reasons for the differences in taxation attitudes between Guinea, on the one hand, and Liberia and Sierra Leone, on the other. Of course, the political history and culture of these three countries differs widely, and this probably explains, to some extent, the support for taxation of their citizens. In Sections 4 and 5, we will nevertheless look into some demographic and socio-economic factors that could help better understand the drivers of these opinions.

Table 1: Support for paying taxes to develop the country, by country and survey year

Country	Year of survey	Mean	S.D.	Count
Guinea	2013	0.52	0.50	1171
	2015	0.40	0.49	1197
Liberia	2012	0.81	0.39	1182
	2015	0.82	0.38	1189
Sierra Leone	2012	0.78	0.41	1178
	2015	0.94	0.24	1150

Notes: summary statistics for support for taxation variable. Coded 1 if individuals agree or strongly agree that "Citizens must pay taxes to the government in order for our country to develop" and 0 if they agree or strongly agree that "The government can find enough resources for development from other sources without having to tax the people." All statistics weighted using Afrobarometer sampling weights. S.D. is standard deviation.

suggests that the epidemic may have had disparate effect on attitudes towards taxation across the three countries. Still there may be potential confounders, e.g. trust in the government, driving these trends. We explore this further in later sections.

The phrasing of our main dependent variable question refers to "further develop the country", which seems adequate provided that our study focuses on three of the least developed countries in the world.[19] In Sen's words (1999), development involves the process of expanding the different freedoms of individuals. Achieving development thus entails the elimination of obstacles for freedom, such as poverty or the lack of economic opportunities, public services, and the institutions required to maintain peace. In this sense, development is a comprehensive target for governments to spend tax revenue on and an interesting angle to look at redistributive attitudes. However, most international opinion surveys exploited in the empirical literature on preferences for redistribution usually measure support for the reduction on income differences in society. For instance, the phrasing in the International Social Survey Programme (2019 "Social Inequality V") refers to the government's responsibility to reduce income differences between people with high and low incomes, on a 5-point agreement scale. This survey also includes a question addressing the progressivity of the taxation system. The European Social Survey has included in several rounds a question addressing the extent to which the government should take action to reduce income differences. Besides, in round 4 (2008), a question tackled agreement with higher taxes and social spending or

[19] Guinea, Liberia, and Sierra Leone are ranked in positions 175, 178, and 182 (out of a total of 189 countries) in the Human Development Index. See https://hdr.undp.org/en/content/latest-human-development-index-ranking.

lowered taxes and social spending. Also the World Values Survey contains a question on whether incomes should be made more equal or rather be encouraged as an incentive. Finally, the General Social Survey, with a US sample, allows to study attitudes towards the state's responsibility to reduce income differences.[20] While these questions are very relevant in Western societies, as they target one of the main challenges of the welfare state, we consider them to be less suitable for our study.

3.3 Ebola variables

3.3.1 Subnational prevalence rates

To assess the impact of the Epidemic across all three countries, we first utilise the subnational level data on the number of probable and confirmed Ebola cases from the World Health Organisation (WHO) situation reports. Prior to the dates of the Afrobarometer survey, these data are provided for 62 regions in total: 33 in Guinea; 15 in Liberia and 14 in Sierra Leone.[21] The WHO situation reports provide counts of probable and confirmed EVD cases. Since it is likely that the true number of Ebola cases was under-reported,[22] we sum both the probable and confirmed cases of Ebola (before the Afrobarometer survey dates) to give the total number of cases in each subnational region across the three countries. We then combine the total case figures with subnational population data from the closest official estimates to the outbreak years for each country to yield Ebola cases per 100,000 inhabitants.[23] Figure 3 presents a map of the case rates for all 62 regions in the three countries included in the analysis. In Guinea, the northern regions (prefectures) display the lowest case counts per 100,000 inhabitants. The worst affected regions are located along the south eastern border of the country, including Forecariah, Gueckedou and Macenta prefectures with 130, 131 and 248 cases per 100,000 inhabitants respectively. Relatively higher case rates (all above 280 cases per 100,000 inhabitants) are observed across much of Sierra Leone, with worst affected regions being located around the capital Freetown and Port Loko in the north-west of the country. A

[20] Some papers making use of the mentioned surveys are those by Fong (2001); Corneo and Grüner (2002); Alesina and La Ferrara (2005); Alesina and Giuliano (2011); Luttmer and Singhal (2011); Giuliano and Spilimbergo (2014).

[21] These regions correspond to different administrative levels in each country: 2nd level in Guinea and Sierra Leone and 1st level in Liberia.

[22] Meltzer et al. (2014) for example, estimate that the number of EVD cases may have been 2.5 times greater than the number actually reported across all affected countries by the end of 2014.

[23] Population data sources: 2014 Census, Institut National de la Statistique (Guinea); 2014 values for Liberia, World Bank Subnational Population Database (Liberia), accessed at: https://datacatalog.worldbank.org/dataset/subnational-population-database; and 2015 Population and Housing Census, Statistics Sierra Leone.

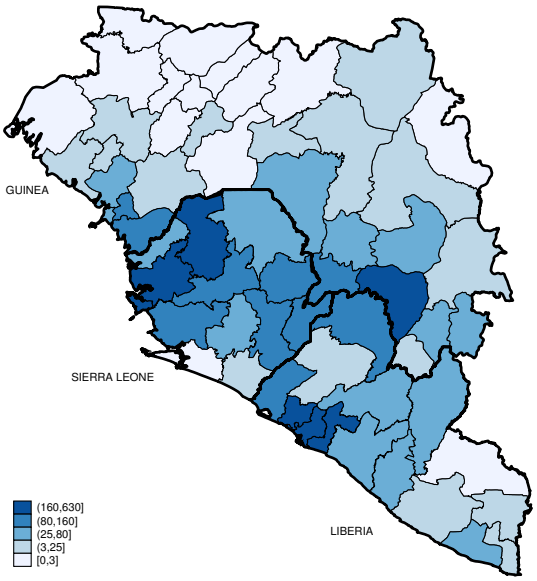

Figure 3: EVD cases per 100,000 inhabitants by subnational region, 2014-2015 (Source: own calculations from WHO situation reports and national statistics.)

similar pattern is observed in Liberia with Montserrado County, which contains the capital (Monrovia), being the worst affected region with a case rate of 190 per 100,000 inhabitants.

3.3.2 Self-reported measures

We make use of some special questions included in Round 6 of the Afrobarometer survey in Sierra Leone and Liberia to assess the impact of the Ebola epidemic at the individual level. Unfortunately, these questions were not asked in Round 6 of the survey in Guinea. The survey asks two questions regarding whether the respondent knew a close friend or relative who was infected or died of Ebola (coded yes or no). To proxy for direct exposure to Ebola, we create a dichotomous variable which takes the value of 1 individual answers yes to either of these questions and 0 otherwise. While it is conveniently recorded at the individual level, this variable has some limitations. For instance, it does not capture the number of cases a person was exposed to or cases that were not defined as close friends or family members. In addition, it is likely that many of the individuals that were exposed to the virus also died, therefore leading some sample selection bias. Finally, the survey lacks information on the size of respondents' social network and knowing more people would likely lead to being in contact with more cases. We address this limitation

by including several controls in our empirical analysis, such as an indicator for being "participative" (see Section 3.4), number of adults in the household, or level of education.

We believe that our measure of exposure complements our analysis employing the prevalence measure for at least two reasons. Firstly, case/mortality rates are defined for a specific geographical population (e.g. a province). Within a regression framework, the use of such rates assumes that all individuals within an area were exposed to the virus with equal intensity. However, it may be the case that some individuals living in high prevalence localities were not directly exposed to the virus. Self-reported Ebola exposure allows us to capture this individual heterogeneity in the experience of the outbreak. Second, case/mortality rates are likely subject to measurement error, which may also vary by region. Evidence suggests that the proportion of cases unreported ranges from 17% to 66% (Scarpino et al., 2015; Gignoux et al., 2015). Utilising a self-reported measure of exposure bypasses this issue to some extent but still raises the possibility of other measurement errors, as discussed above.

In addition, EVD also brought disruption to the lives of those who were not directly exposed to the virus. Round 6 of the Afrobarometer survey includes questions on whether an individual or a member of their family had been unable to attend school, work, social gatherings or access medical care (all coded 0 "Never", 1 "Just once or twice", 2 "Several times", 3 "Many times"). To capture this aspect of the crisis, we follow Crisman (2020) in constructing a "disruption" index using the first principal component of the four latter measures (e.g. unable to attend work, social gatherings, etc.). We scale this index from 0 to 1. Thus, an individual with a score of 1 experienced disruption across all domains "many times", while a score of 0 corresponds to having "never" experienced disruption in any domain. Figure 4 presents the summary statistics for each dimension of disruption considered.

Table 2 presents the summary statistics of the disruption indexed for individuals who were exposed to EVD and those who were not in each of the countries. Approximately, 40% of our total sample reports knowing a close friend or relative who was infected with or died from Ebola. This figure is slightly higher for Liberia (47%) than Sierra Leone (36%). Moreover, individuals who were not exposed to the virus directly incurred a substantial level of disruption in their daily lives, reflecting the widespread economic and social consequences of the outbreak discussed in the introduction.

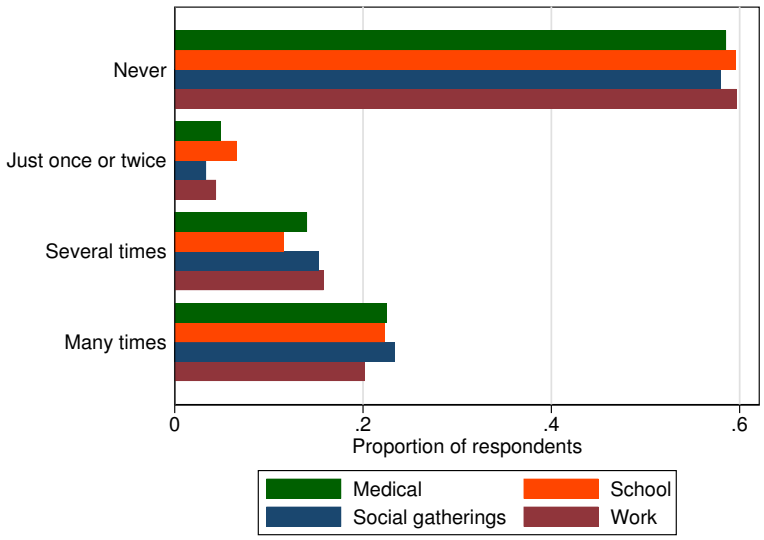

Figure 4: Dimensions of disruption due to EVD (Liberia and Sierra Leone). Source: author's calculation using Afrobarometer data (Round 6).

Table 2: EVD exposure and disruption index

		Disruption index	
Country	Exposed to Ebola	Mean	S.D.
Liberia	Yes (n=557)	0.70	0.27
	No (n=628)	0.65	0.31
Sierra Leone	Yes (n= 417)	0.71	0.35
	No (n=732)	0.62	0.39
Total	Yes (n=974)	0.71	0.30
	No (n=1360)	0.63	0.35

Notes: Ebola exposure defined as knowing a close friend or relative who was infected or died from Ebola. Ebola disruption index is the first principal component of the four variables reflecting level of disruption to work, social life, schooling and medical care. Results for round 6 (post Ebola) only. Summary statistics calculated using Afrobarometer sampling weights. S.D. is standard deviation.

3.4 Other explanatory variables

While our main focus is the impact of the Ebola pandemic, we also explore other elements that can influence support for redistribution, such as the level of trust in the institutions and assessment of the government's performance. Evidence on this topic is mixed. For instance, Kuziemko, Norton, Saez, and Stantcheva (2015) find, by means of a series of information provision experiments, that citizens'

doubts about the government's ability to handle taxes decreases their support for redistribution significantly. However, Di Tella, Dubra, and Lagomarsino (2016) observe instead that, when citizens' trust in the government increases, they favour lower tax rates. The recent work of Stantcheva (2021) presents evidence that respondents of an online survey who show more trust in the government are also much more supportive of higher taxation levels. Round 6 of the Afrobarometer includes a set of questions that collect individuals' opinions on the effectiveness of different institutions in controlling the Ebola outbreak and looking after Ebola victims. We find these questions insightful provided that the friends or relatives of those who were infected or died may have a heightened level of distrust of the government or the healthcare system.[24]

Prior studies in the African context indicate that trust in government institutions is a key determinant of individual's attitudes towards increased taxation. Bwalya (2020), for instance, analyses the Afrobarometer survey data across 12 Southern African countries and finds that trust in the government is associated with individuals' stated willingness to pay taxes for improving healthcare. Alongside tax compliance, Flückiger et al. (2019) also examine the impact of the Ebola outbreak on trust in government institutions. They find that the Ebola outbreak led to increased trust in different institutions (e.g. parliament, president and police) in the hardest hit regions. They argue that this effect is driven by the enhancement of individual perceptions of the state due to the implementation of Ebola containment measures. For this reason, we include a measure of trust in the president in our main regression analyses. Responses to the level of trust are recorded on a 4-point scale, ranging from "Not at all" to "A lot". The Afrobarometer survey also asks respondents to rate, on a 4-point scale from "Very badly" to "Very well", how they think the current government is handling matters such as "Improving basic health services". We include these responses as controls in our core analyses.

Tax morale, broadly understood as non-pecuniary motives driving compliance with tax duties (Luttmer and Singhal, 2014), could also offer insights to better understand support for redistribution. While the seminal work of Meltzer and Richard (1981) predicts that progressive taxation will increase tax morale of those who are benefited by such a scheme, there exists abundant literature indicating that a large

[24] For instance, at the peak of the epidemic in Liberia, many individuals were not informed whether their relative had died or not after entering a Ebola treatment centre. This led to the rumours being spread within communities that patients were disappearing or being killed in such centres (Omidian et al., 2014; Cohn and Kutalek, 2016). These rumours were a primary reason for many individuals to care for relatives infected with Ebola in their homes rather than informing the health authorities (Allen et al., 2015). Qualitative evidence from Sierra Leone also suggests that many people initially blamed medical centres for spreading the disease and felt let down by the response of the healthcare system (Elston et al., 2016).

proportion of citizens are inequality averse and support higher redistribution. For instance, Fong (2001) provides evidence that income level isn't enough to explain individual redistributive preferences. Besides, the results of Corneo and Grüner (2002) and Alesina and Giuliano (2011) confirm that higher taxation and redistribution can indeed be preferred by a majority. Other factors, such as individual history, cultural elements, prospects of mobility, or fairness beliefs, should not be disregarded. [25] In the context of developing countries, tax morale and compliance -and their connection with attitudes towards increased taxation- are of particular importance, provided that many governments still fail to raise enough revenue to provide adequate public services to their citizens (Fuest and Riedel, 2009). In this sense, Ali et al. (2014) highlight the fact that in developing countries tax non-compliance, closely connected to tax morale, is even more problematic than in developed areas. To capture tax morale, we include a control variable that is coded 1 if individuals think it is wrong to not pay taxes and 0 otherwise.

As mentioned in the previous section, a shortcoming of one of our exposure measures (the one indicating whether respondents know a relative or friend who was infected or died of Ebola) is the fact that we don't know how extensive respondents' social networks are. While this information falls beyond the scope of the Afrobarometer survey, we do have information about an element that has been identified as a determinant of preferences for redistribution, which is the level of interaction between people. Yamamura (2012) finds that people who are more engaged in community activities also tend to support higher levels of redistribution. We therefore include in our specifications an indicator of whether respondents belong to some voluntary association or community group and we take it as a proxy of their "participative" character.

Finally, the Afrobarometer survey includes a range of information on key demographic and socio-economic variables, such as age, sex, education level, employment status, ethnicity, religion and urban-rural location. It does not collect information on individual income or consumption levels. However, each respondent is asked about the assets that they own (e.g. radio, television, mobile phone etc.) and observations are made by the interviewer on the quality of their housing, access to sanitation and water supply source. We use the responses to these categories to create an asset-based wealth index, similar to that used in the Demographic Health Surveys (DHS). Following the approach of the DHS,[26] we construct the

[25] See Bénabou and Ok (2001); Alesina and La Ferrara (2005); Bénabou and Tirole (2006); Kenworthy and McCall (2008); Singhal (2008).

[26] See Filmer and Pritchett (2001) and Hodler et al. (2020). The latter employ the same approach with Afrobarometer data.

index using the first principal component of a PCA for asset and housing variables for each country separately. We then use the index to place each individual into a wealth quintile, given that relative position in the distribution is more likely to influence support for redistribution.

3.5 Sample descriptive statistics

In this section we offer descriptive information about the main variables in our analysis. Concerning the demographic characteristics, the sample is balanced in gender and respondents are, on average, 38 years-old. There are around 6 adults per household, and a majority of respondents live in rural areas (39% in urban). The predominant confession is Christian (43%) and the ethnic groups with more representation are the Malinke, Mende, Susu, and Temne. In terms of the socio-economic features, about a third of respondents declare to be unemployed at the time of the survey and almost 40% haven't completed any level of formal education. Only 15% of the sample has reached post-secondary training. Regarding the assets of the respondents' household, for instance, while more than two thirds of respondents have a radio, only 24% and 16% declare to have a television or a vehicle, respectively. As for the house utilities, as little as 11% of respondents have a toilet and less than 4% enjoy water at home. When looking at the characteristics of the area, less than 30% of respondents live in a region connected to the electricity grid, and just 13% have a sewage system. While as much as 90% have a school nearby, 40% don't have access to a health clinic. For more details about the sample, see Table 3.

4 Empirical strategy

We first assess the impact of the Ebola epidemic on attitudes towards taxation using the objective measure that captures regional prevalence rates. For ease of interpretation, we estimate the parameters of the following linear probability model using OLS:[27]

$$Y_{irt} = \alpha + \beta EbolaPrev_{rt} + \gamma X_{irt} + \delta_r + \delta_t + \varepsilon_{irt} \quad (1)$$

where Y_{irt} indicates support for increased taxation of individual i, living in region r, and in round t of the survey; $EbolaPrev_{rt}$ is the number of Ebola cases

[27] Note that core estimates are robust to alternative model specifications, e.g., logit and probit.

Table 3: Sample summary statistics

	Count	Mean	S.D.	Min	Max
Support for taxation	7067	0.71	0.45	0	1
Ebola exposure	2390	0.42	0.49	0	1
Ebola disruption index	2334	0.66	0.34	0	1
Age	7106	38.05	13.97	18	99
Female	7179	0.50	0.50	0	1
Adults in household	7165	6.16	3.47	1	35
Urban	7179	0.40	0.49	0	1
Christian	7179	0.43	0.50	0	1
Unemployed	7128	0.32	0.47	0	1
Education					
None	7133	0.39	0.49	0	1
Primary	7133	0.17	0.38	0	1
Secondary	7133	0.29	0.45	0	1
Post-secondary	7133	0.15	0.36	0	1
Ethnicity					
Malinke	7179	0.12	0.33	0	1
Mende	7179	0.12	0.32	0	1
Susu	7179	0.08	0.27	0	1
Temne	7179	0.01	0.30	0	1
Assets					
Radio	7179	0.69	0.46	0	1
TV	7179	0.24	0.43	0	1
Vehicle	7179	0.16	0.37	0	1
Mobile phone	7179	0.37	0.48	0	1
Personal computer	7179	0.06	0.24	0	1
Metal roof	7179	0.78	0.42	0	1
Formal housing	7179	0.57	0.50	0	1
Toilet in home	7179	0.11	0.31	0	1
Water in home	7179	0.04	0.19	0	1
Enumeration Area					
Electricity grid	7179	0.29	0.45	0	1
Piped water system	7179	0.37	0.48	0	1
Sewage system	7179	0.13	0.34	0	1
Cell phone service	7179	0.82	0.38	0	1
Post office	7179	0.08	0.27	0	1
School	7179	0.89	0.31	0	1
Police station	7179	0.34	0.47	0	1
Health clinic	7179	0.60	0.49	0	1
Market stalls	7179	0.47	0.50	0	1
Tarred/ paved road	7179	0.42	0.49	0	1

Notes: Ebola exposure and Ebola disruption index variables are only reported for Round 6 in Liberia and Sierra. All other variables are reported for Guinea, Liberia and Sierra Leone over both rounds. S.D. is standard deviation.

per 100,000 individuals in region r and round t;X_{irt} is a vector of individual/local level controls and ε_{irt} is the stochastic error term. The terms δ_r and δ_t capture region and round fixed effects, respectively.[28] Thus, we only exploit the variation of Ebola exposure within regions over time. Individual level controls include demographic, socio-economic, and attitudinal factors, namely, sex, number of adults in the household, residence in an urban area, age, professing the Christian religion, ethnicity, level of education, wealth quintile, being unemployed, being active in the community ("participative"), considering that evading taxes is wrong and punishable ("tax morale"), trusting the president, and considering that the government is doing well in improving health services ("govt. health"). For this regression, we cluster standard errors at the level of the treatment, in this case the regional level at which the Ebola case data is provided. All regressions are weighted using the sample weights included in the Afrobarometer.

We then estimate a second model using our subjective measures of Ebola impact, employing individual level data on reported Ebola exposure and life disruption:

$$Y_{irt} = \alpha + \beta_1 EbolaExp_{irt} + \beta_2 EbolaDis_{irt} + \gamma X_{irt} + \delta_{rt} + \varepsilon_{irt} \tag{2}$$

where Y_{irt} again is support for taxation; $EbolaExp_{irt}$ is a variable coded 1 if individual i reports to know a close friend or relative who was infected or died from EVD and 0 otherwise; $EbolaDis_{irt}$ is an index that captures the level of life disruption faced by individuals in the dimensions of work, education, social gatherings, and access to medical care, scaled from 0 to 1; and ε_{irt} represents the error term. Since we have individual level data for the subjective exposure measures, we control for region-round fixed effects through the term δ_{rt}. We cluster standard errors at the level of the sampling unit used in the Afrobarometer data collection, in this case the enumeration areas (EA).

To interpret coefficients in these models as causal there must be no other unobserved factors correlated with both attitudes towards taxation and the measures of Ebola impact or any reverse causation. One potential concern is that taxation preferences may be correlated with better local institutions and capacities to mitigate the impact of the Ebola outbreak. Following the collapse of the health system, local communities in Liberia played a key role in halting the spread of the epidemic through the use of different coping strategies, such as community task forces and surveillance measures (Abramowitz et al., 2015). In Sierra Leone, a tradition of decentralised local governance may have hastened the uptake of control

[28] Note that controlling for region-time fixed effects would absorb all the variation in Ebola case rates over time. We therefore control for region and round fixed effects separately.

efforts, such as restrictions on unsafe funeral practices and the enactment of local quarantines (Wilkinson and Fairhead, 2017). To partially account for such effects, we include a full set of local level controls capturing time-varying characteristics of each survey enumeration area (EAs, typically a village or smaller geographic unit). These controls capture each EAs level of development in several areas, such as whether there is a school, health clinic, police station, electricity grid, paved roads and sewage system present within the local area. Region, round and region-round fixed effects also control for any unobserved factors at the geographical level that may be correlated with redistributive preferences and our Ebola measures in each round of the survey.

An additional concern is that redistributive preferences may be correlated with individual behaviour and adherence to government control measures during the outbreak (e.g., local quarantines or social distancing). If individuals who are more redistributive are more likely to follow such measures, we would expect this effect to bias our estimates of Ebola exposure and preferences for redistribution downwards. While it is not possible to explicitly control for such effects, we can control for variables that may be highly correlated with behaviour during the epidemic, such as trust in the government. Using survey evidence from Monrovia, Blair et al. (2017) find that individuals that distrust the government were less likely to take precautions against Ebola exposure and adhere government mandated social distancing measures. They were also less likely to support measures intended to slow the spread of Ebola, such as safe burial practices. We therefore control for the level of trust prior to and after the epidemic, as proxied by trust in the president.[29] Round 6 also allows us to control for ratings of the government's response to the epidemic in Liberia and Sierra Leone.

Lastly, a limitation of our subjective exposure variable is that we do not have corresponding information on the size of an individual's social network within the Afrobarometer survey. One could argue that having a broader social network could increase the chances of knowing a close friend or relative who was infected or died during the outbreak. Social capital, more broadly defined, is also likely to be correlated with redistributive preferences (see Yamamura, 2012). We therefore include a control for whether the individual participates in community meetings to mitigate this effect.[30] The Afrobarometer survey also allows us to control for

[29] We also tested various other measures of trust in different government institutions (e.g. parliament, tax department, local government etc.). The results are robust to these different measures and to an PCA derived index based on first principal component of all aspects. However, the use of some aspects and the index reduces our sample size substantially due to non-response. We therefore use trust in the president as a proxy for overall trust in the government.

[30] We also note that the size of an individual's social network could be implicitly controlled for

the number of adults over 18 years of age (i.e., other family members) in the household. This is important because close contact between household members was a key driver of Ebola transmission (Agua-Agum et al., 2016).

5 Results

5.1 Ebola prevalence rates

In this section, we first discuss the link between attitudes for taxation and our objective measure of Ebola impact, that assigns respondents with the prevalence rates of the subnational unit where they live. We then look at the connection with the self-reported measures of exposure, namely, whether respondents know someone who was infected or died of Ebola, and the index capturing the level of disruption of some key life dimensions (going to work, attending school, accessing health, and participating in social gatherings).

Table 4 presents estimates of the relationship between Ebola case rates at the regional level and support for taxation. In line with previous evidence regarding the impact of shocks on redistributive preferences (e.g., Gualtieri et al., 2018), we observe that individuals living in subregions more affected by the Ebola epidemic are more likely to be supportive of raising taxes to develop their country, as compared to those residing in areas with lower prevalence. This relationship is robust to the inclusion of geographical and individual level controls, which we present in columns 2 (demographic and socio-economic), and 3 (also attitudinal, such as being participative, having strong tax morale, trusting the president, and assessing the government's performance in terms of healthcare positively). Note that the magnitude of the coefficient barely changes with the inclusion of the latter. This implies that other mechanisms aside from trust and assessment of government performance are driving the shift in redistributive preferences. While we cannot rule out the influence of other unobserved factors, we hypothesis that a shift in individual beliefs regarding the role of effort and luck in one's life may be a plausible channel. Focusing on the full model, we see that those residing in urban areas, having completed some level of education (as compared to those with no formal education), and those who consider that not paying taxes is wrong and punishable (labelled as "tax morale" in the specifications) are more likely to display a high level of support for taxation. On the contrary, respondents living in more populated households, who declare to be unemployed at the time of the survey, or who

through other socio-economic variables, such as age, education, wealth and so on.

are classified in the second wealth quintile, are less likely to favour higher tax levels as a means to further develop the country.[31]

We test the robustness of our results in the Annex by i) leaving one region out of the analysis at a time; ii) removing regions randomly until the effect dissappears; iii) utilising non-linear probability models (e.g., logit and probit); iv) calculating the logarithm of ebola prevalence rates (plus one) to minimise the impact of outliers and v) using lower administrative level data on Ebola prevalence collected by Soumahoro (2020).[32] Firstly, we find that the coefficients and level of significance remain relatively stable when one subnational region is removed sequentially from the dataset. Secondly, the coefficient remains statistically significant when just over a quarter (18 out of 63) of the subnational regions are randomly removed from the sample.

5.2 Self-reported measures of Ebola exposure and disruption

Table 5 presents estimates of the relationship between our measures of exposure and life disruption due to Ebola and support for increased taxation. Note that these specifications only refer to Liberia and Sierra Leone, given that these self-reported Ebola data are unavailable for Guinea. We first look at the correlation only controlling for the geographical characteristics of the respondent's area of residence and for region-round fixed effects. We then progressively add demographic, socio-economic, and attitudinal controls. Focusing on the full model, in column 5, the results suggest that individuals who know someone close who was infected or died of Ebola are about 3.4% more likely to support a tax raise to further develop their country than those who didn't. Similarly, those whose lives were most disrupted by the pandemic have, on average, 6.3% higher probability of favouring increased taxation (as compared to those who suffered no disruption). When testing the robustness of these positive relationships through the inclusion of individual level controls, we learn that some demographic, socio-economic, and attitudinal characteristics are also relevant drivers of taxation preferences. For instance, while respondents who live in more populated households are slightly less redistributive (-0.008***), the opposite is true for those who identify as Christian (0.032**) or live in an urbanised area, at a lower level of significance. Those who have completed primary education are also slightly more in favour of increased taxation

[31] We comment on the presence of heterogeneity in the impact of the Ebola shock on taxation attitudes in the Annex.

[32] These data are only available for Guinea and Sierra Leone but include case rates for 172 different subnational areas. Soumahoro (2020) collates data from WHO national offices in Guinea and from Fang et al. (2016) for Sierra Leone.

Table 4: Support for taxation for development and Ebola exposure.

	(1)	(2)	(3)
Ebola rates/100	0.038***	0.044***	0.046***
	(0.010)	(0.009)	(0.010)
female		-0.010	-0.009
		(0.011)	(0.011)
adults hh		-0.005***	-0.005***
		(0.002)	(0.002)
urban		0.039**	0.037**
		(0.016)	(0.017)
age 31-45		0.003	-0.000
		(0.012)	(0.013)
age over 45		0.009	0.008
		(0.015)	(0.015)
christian		0.007	0.009
		(0.015)	(0.016)
primary education		0.041**	0.042**
		(0.017)	(0.017)
secondary education		0.042***	0.043***
		(0.015)	(0.016)
postsecondary educ.		0.048**	0.049**
		(0.020)	(0.021)
quintile 2		-0.038**	-0.040**
		(0.019)	(0.020)
quintile 3		-0.022	-0.025
		(0.018)	(0.018)
quintile 4		0.013	0.014
		(0.019)	(0.019)
quintile 5		0.018	0.019
		(0.022)	(0.022)
unemployed		-0.065***	-0.063***
		(0.012)	(0.012)
participative			0.001
			(0.012)
tax morale			0.068***
			(0.018)
trust president			0.009*
			(0.006)
govt. health			-0.002
			(0.006)
constant	0.266***	0.325***	0.269***
	(0.055)	(0.061)	(0.064)
N	7067	6969	6700
R^2	0.2248	0.2356	0.2413

Weighted estimates, standard errors clustered by region between brackets.
EA controls and region-round fixed effects included in all specifications.

(with respect to those with no formal education, set as the reference category). Finally, the unemployed seem more averse to a tax raise than employed individuals in the sample. However, the sign, size, and significance of our main variables of interest, proxying Ebola impact, remain relatively constant after the inclusion of these controls.

5.2.1 Effectiveness of outbreak control and funding for Ebola

The analysis presented so far aims at shedding light upon the impact of Ebola on taxation attitudes, and therefore information from before and after the epidemic is required. We now exploit several questions addressing how the emergency was handled from Round 6 of Afrobarometer survey in Liberia and Sierra Leone, i.e., once the worst part of the epidemic had been overcome. These questions are of interest because greater support for taxation could be driven by respondents' perceptions of the government's response to the outbreak. Flückiger et al. (2019), for instance, find that state legitimacy (measured as trust in different institutions and a lower inclination to refuse paying taxes) improved in areas where Ebola outbreak control measures were perceived to be more effective. The questions capture each respondent's assessment of the "effectiveness to control the Ebola outbreak" of 1) the central government, 2) the local government, 3) local NGOs, 4) international organisations (such as Doctors Without Borders, the Red Cross, the World Health Organisation and the United Nations), and 5) governments of other countries (such as the United States or the United Kingdom). Responses to these questions were recorded on a four point scale ranging from "Not at all effective" to "Very effective". We dichotomise these responses to yield measures of whether the respondent thought the institution was effective or not. In table 6, we linearly regress these measures on the Ebola exposure/disruption variables and socio-economic controls from the last section.[33] The results reveal that individuals who suffered a higher degree of disruption to their lives due to the Ebola outbreak were more likely to state that the national and local governments were ineffective in controlling the Ebola outbreak. Meanwhile, those who knew a friend/relative who was infected or died from Ebola were more likely to state that local NGOs were effective in controlling the outbreak. Thus, we can argue that respondents' positive assessments of the government's performance does not seem to be driving the greater support for taxation among those highly exposed/affected by the Ebola outbreak, observed in the previous sections. Moreover, the inclusion of these variables as controls in

[33] We use linear regression for consistency with the previous sections and ease of interpretation. The statistical significance and sign of the estimates remains largely unchanged when we use non-linear probability models (e.g., logit).

Table 5: Support for taxation for development and Ebola impact.

	(1)	(2)	(3)	(4)	(5)
Ebola direct	0.036**		0.036**		0.034**
	(0.018)		(0.017)		(0.017)
Ebola disrupt		0.065***		0.067***	0.063***
		(0.020)		(0.022)	(0.022)
female			-0.012	-0.011	-0.011
			(0.013)	(0.013)	(0.013)
adults hh			-0.008***	-0.008***	-0.008***
			(0.002)	(0.002)	(0.002)
urban			0.032*	0.032*	0.031*
			(0.017)	(0.017)	(0.017)
age 31-45			-0.003	-0.002	-0.003
			(0.013)	(0.014)	(0.014)
age over 45			0.007	0.010	0.009
			(0.017)	(0.017)	(0.017)
christian			0.032**	0.033**	0.032**
			(0.016)	(0.016)	(0.016)
primary educ.			0.037*	0.039*	0.039*
			(0.021)	(0.022)	(0.022)
secondary educ.			0.025	0.026	0.025
			(0.019)	(0.019)	(0.019)
postsecondary educ.			0.000	0.003	0.002
			(0.024)	(0.024)	(0.024)
quintile 2			-0.038	-0.041*	-0.040*
			(0.023)	(0.024)	(0.024)
quintile 3			-0.030	-0.031	-0.031
			(0.022)	(0.022)	(0.022)
quintile 4			0.022	0.018	0.020
			(0.021)	(0.021)	(0.021)
quintile 5			0.006	0.004	0.005
			(0.025)	(0.024)	(0.025)
unemployed			-0.046***	-0.045***	-0.045***
			(0.014)	(0.014)	(0.014)
participative			0.022	0.024*	0.024*
			(0.014)	(0.014)	(0.014)
tax morale			0.028	0.031	0.031
			(0.024)	(0.024)	(0.024)
trust president			0.008	0.007	0.007
			(0.006)	(0.006)	(0.006)
govt. health			0.003	0.004	0.004
			(0.008)	(0.008)	(0.008)
constant	0.657***	0.652***	0.694***	0.680***	0.681***
	(0.062)	(0.061)	(0.089)	(0.088)	(0.088)
N	4699	4656	4418	4389	4389
R^2	0.0926	0.0928	0.1079	0.1083	0.1092

OLS weighted estimates, standard errors clustered by enumeration area (EA) between brackets. EA controls, region and round fixed effects included in all specifications.

Table 6: Ebola exposure and institutional effectiveness

	(1)	(2)	(3)	(4)	(5)
	Nat. govt.	Local govt.	Local NGOs	Intl. orgs.	Intl. govts.
Ebola direct	-0.026	0.037	0.050**	0.011	0.018
	(0.023)	(0.026)	(0.025)	(0.017)	(0.016)
Ebola disrupt	-0.113***	-0.096***	0.061	0.042	0.033
	(0.030)	(0.033)	(0.037)	(0.027)	(0.027)
constant	0.982***	0.894***	0.848***	0.863***	0.741***
	(0.087)	(0.092)	(0.096)	(0.063)	(0.064)
N	2236	2236	2236	2236	2236
R^2	0.1683	0.1596	0.1303	0.1586	0.1622

OLS weighted estimates, standard errors clustered by enumeration area between brackets. Full set of demographic and socio-economic controls included. Region dummies included. Results for Liberia and Sierra Leone only.

a single cross-sectional regression does not affect the significance or magnitude of the coefficients of our variables of interest, that is, the self-reported measures of exposure and disruption due to Ebola (see table 13 in Annex A.3).

Respondents were also asked whether they had confidence in the government's preparedness to respond to a new outbreak and whether the government should devote more resources to combating Ebola or focus on solving other problems. To further explore the preferences of those affected by the Ebola outbreak, we dichotomise the responses to these questions[34] and linearly regress each measure on the Ebola exposure and disruption variables introduced in the last section. Column 1 of Table 7 indicates that individuals who had their lives disrupted by Ebola are more likely to report that the government is unprepared for the next crisis. Meanwhile, column 2 suggests that individuals who were exposed to the virus or suffered disruption were more likely to agree that the government should devote resources to combatting Ebola even if it means less money is spent on other things, such as education. This suggests that the results from previous sections regarding taxation may be driven in part by affected respondents' desire to protect against future outbreaks.

[34] Responses to the former were on a four point scale ranging from "Not at all confident" to "Very confident". The latter asks individuals if they agree with one of two statements: A: "The government should devote many more resources to combating Ebola even if this means that less money is spent on things like education" or, B: "There are many other problems facing this country beside Ebola; even if people are dying in large numbers, the government needs to keep its focus on solving other problems". We dichotomise these responses into confident or not and agree with statement A or not.

Table 7: Ebola exposure, preparedness and funding

	(1)	(2)
	Govt. prepared	Fund Ebola
Ebola direct	0.028	0.137***
	(0.024)	(0.026)
Ebola disrupt	-0.180***	0.238***
	(0.040)	(0.038)
Ebola Nat. govt.	0.130***	-0.064*
	(0.036)	(0.033)
Ebola Local govt.	0.005	0.006
	(0.029)	(0.028)
constant	0.290***	0.602***
	(0.101)	(0.085)
N	2236	2117
R^2	0.1659	0.2741

OLS weighted estimates, standard errors clustered by enumeration area between brackets. Full set of demographic and socio-economic controls included. Region dummies included. Results for Liberia and Sierra Leone only. Ebola Nat. and local govt. refer to the respondents ratings of the control of the outbreak from Table 6.

6 Conclusion

In this paper, we have investigated whether a large health shock, namely the West African Ebola outbreak of 2013-2016, has shifted attitudes towards taxation in three heavily affected countries: Guinea, Liberia and Sierra Leone. Conditioning on a set of individual/local level covariates, as well as survey round and region fixed effects, our results suggest that this shock has affected attitudes towards taxation for development. Our results are robust to using different measures for Ebola exposure, either objective or self-reported. This finding reiterates the need to take into account individuals' self-reported experience of a shock when studying potential drivers of redistributive preferences. It therefore fills an important gap in the existing literature, which has largely focused on objective measures of impact (e.g., Giuliano and Spilimbergo, 2014; Olivera, 2014; Gualtieri et al., 2018; Cabeza and Decancq, 2019, among others).

Our results align closely with previous findings in the literature, mainly that large shocks can lead to an increase in support for taxation and redistribution (see Olivera, 2014; Cabeza and Decancq, 2019; Gualtieri et al., 2018). This result is obtained using both our objective measure of Ebola prevalence rates and self-reported measures of Ebola exposure and impact. Moreover, not only those who have been directly exposed to the virus display more support for taxation, individuals whose lives have been heavily disrupted also display more redistributive preferences. This

finding demonstrates that individuals' self-reported experience of an epidemic adds a relevant layer of information to the use of more objective measures, such as prevalence rates.

A limitation of this paper is that the precise mechanism driving the impact of the Ebola shock on citizens' attitudes towards taxation is difficult to ascertain from the available Afrobarometer data. However, we can rule out several possibilities commonly highlighted in the literature. For instance, controlling for the level of trust in government institutions does not alter the magnitude or significance of the explanatory variables that are at the centre of our analysis.[35] Nor does adding controls for level of government performance in areas of policymaking. One may expect, in addition, that the Ebola epidemic led to deterioration of living standards for many individuals thereby shifting their support for redistribution. However, the inclusion of individual wealth level and employment status in our specifications doesn't reduce the significance of the Ebola impact variables.[36] Thus, after ruling out these mechanisms, we posit that one, at least, plausible mechanism driving the impact of the Ebola shock on taxation attitudes is the exposure to a spell of bad luck that enhances individuals' awareness about the role of luck and circumstances for their economic situation. This, in turn, could lead to an increase of support for taxation as a form of social insurance against such shocks (see Gualtieri et al., 2018; Cappelen et al., 2021b). This interpretation aligns with the evidence presented in the previous section, whereby individuals who were more exposed to or had their lives disrupted by Ebola are more likely to support increased funding to combat future Ebola outbreaks.

Future studies in this line of research could address some of the limitations of our study and test whether the effects we find are long-lasting. Besides, the dataset we exploit is limited in that it doesn't contain information on beliefs about, for instance, the role of effort and luck for one's economic situation. As highlighted in the literature (see Alesina and Giuliano, 2011, for an overview), beliefs regarding the sources of inequality are integral to understanding redistributive attitudes. Such studies could also yield useful insights into the mechanisms driving redistributive preferences in the different domains explored within this study, such as development and healthcare.

[35] Our results are robust to using trust in different institutions and a trust index created from the first principle component of the institutional categories included in the Afrobarometer survey.

[36] We utilised self-reported measure of living standards in each round to test this effect. Like Gualtieri et al. (2018), we also test whether the individual's assessment of the economic conditions of their country also matters. We find that the magnitude and significance of the Ebola exposure/disruption variables are not altered by this controls.

A Annex

A.1 Robustness checks

i) Leave-one-out estimates

Figure 5 presents the estimates of the Ebola prevalence rates coefficient from equation 1 (alongside the corresponding p-values) when a single region is removed one at a time from the analysis. Each point corresponds to an estimate when a region has been left out. The region left out is labelled in the graph.

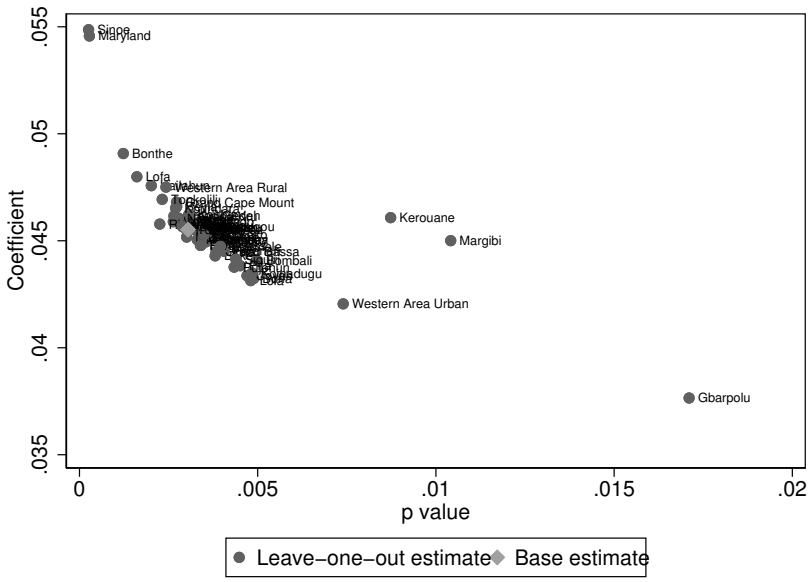

Figure 5: Leave-one-out estimates

ii) Randomly removing regions

Figure 6 re-estimates the model when we leave out multiple regions from the analysis. These regions are removed one at a time randomly to assess the stability of the coefficient. We observe that the statistical significance of the coefficient dissappears after 18 regions are randomly removed from the analysis. The main analysis in the paper includes 63 regions.

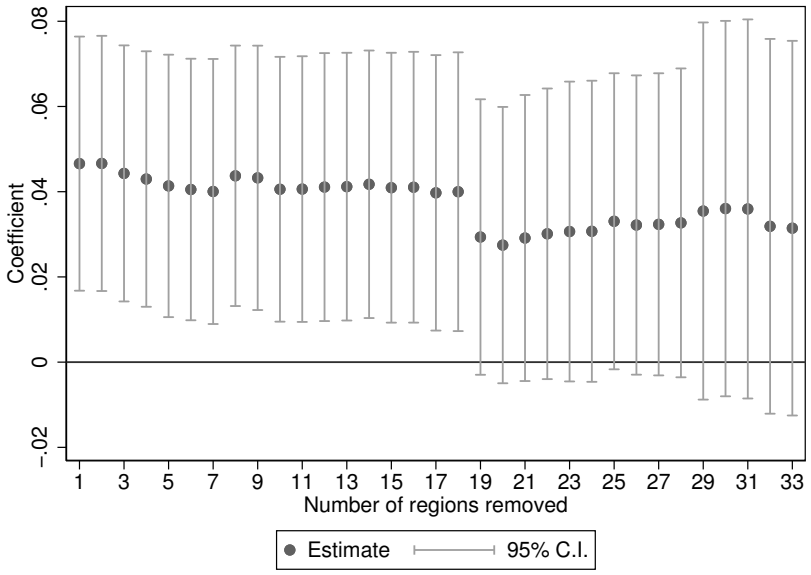

Figure 6: Leaving multiple regions out

iii) Logit/probit model estimates

Table 8: Ebola case rates: logit and probit estimates

	Logit	Probit
Ebola rates/100	0.384***	0.198***
	(0.096)	(0.056)
tax morale	0.410***	0.235***
	(0.129)	(0.077)
trust president	0.065*	0.039*
	(0.037)	(0.021)
govt. health	-0.010	-0.004
	(0.039)	(0.023)
constant	-1.043***	-0.659***
	(0.239)	(0.137)
N	6700	6700
Pseudo R^2	0.2050	0.2047

Standard errors clustered by region between brackets.
Full set of demographic and socioeconomic controls included.
Region and wave dummies included.

iv) Logarithm of Ebola prevalence

Table 9: Ebola case rates: logarithmic transformation

	(1)	(2)
log(ebola rates +1)	0.112***	0.113***
	(0.038)	(0.031)
participative		0.000
		(0.014)
tax morale		0.068***
		(0.023)
trust president		0.010
		(0.006)
govt. health		-0.002
		(0.006)
_cons	0.295***	0.274***
	(0.018)	(0.042)
N	7067	6700
R^2	0.2166	0.2419

Standard errors clustered by region between brackets.
Full set of demographic and socioeconomic controls included in column 2.
Region and wave dummies included.

v) Lower level administrative data

This table utilises lower level administrative data on Ebola prevalence rates from Soumahoro (2020). These data are only available for Guinea and Sierra Leone.

Table 10: Ebola case rates: lower level administrative data (Guinea and Sierra Leone)

	(1)	(2)
Ebola rates/100	0.038**	0.045***
	(0.015)	(0.010)
round	0.006	-0.020
	(0.033)	(0.028)
tax morale		0.091***
		(0.031)
trust president		0.014
		(0.009)
govt. health		-0.000
		(0.008)
constant	0.369***	0.262***
	(0.033)	(0.083)
N	3580	3424
Controls	No	Yes
R^2	0.3039	0.3308

Standard errors clustered by subregion between brackets.
Full set of demographic and socioeconomic controls included in column 2.
Sub-region and round fixed effects included.

A.2 Heterogeneous effects

Ebola rates The models presented in Section 5 could be masking differences in how the taxation attitudes of certain groups were impacted by the Ebola pandemic shock. In order to study these, Table 11 presents the estimation results of a set of models that include interaction terms between the measure of Ebola prevalence and the main demographic, socio-economic, and attitudinal characteristics. We find that, for instance, individuals who live in urban areas are less supportive of increased taxation as Ebola prevalence rates go up, as compared to those living in rural areas. The same is true for respondents categorised into the first wealth quintile when compared to the rest of respondents, classified into richer quintiles. Opposite to this, those who with no formal education are more likely to support

increased taxation where Ebola prevalence rates are higher, as compared to respondents who have some education. Also those who are unemployed and live in an area with higher Ebola rates are more likely to favour more taxation for development (as compared to those who state to be employed).

Life disruption index After looking at the results of the baseline model, we proceed to examine possible heterogeneities in how the Ebola shock affects individual taxation attitudes. We do so by interacting the variables of interest, being directly exposed to Ebola first, and life disruption due to the epidemic, after, with relevant demographic, socio-economic, and attitudinal indicators. In Column 4 of table 12, referred to our first proxy of Ebola exposure (knowing someone who was infected or died), we can see that, while the demographic and attitudinal interaction terms have no or little statistical significance, some socio-economic elements do add extra information. Namely, those who were directly exposed and state to have no formal education completed are more favourable to increasing taxation that those who have a higher level of education (0.073**). Also those who were exposed and are unemployed display a slightly more favourable attitude towards a tax raise than those who are employed, but at a lower level of statistical significance. Opposite to this effect, those in the lowest quintile of our wealth index who were exposed to Ebola are, on average, less supportive of a tax raise than those also affected but classified into higher wealth quintiles (-0.146***). When we estimate the same models including the interaction terms with the life disruption index, we confirm that demographic and attitudinal variables don't seem to reveal any systematic heterogeneities. Similarly, having no formal education and being unemployed do indicate stronger taxation preferences (than the more educated and employed), while those categorised into the lowest wealth quintile express weaker support for increased taxation (-0.215***).

Table 11: Support for taxation for development and Ebola exposure.

	(1)	(2)	(3)	(4)
Ebola rates/100	0.046***	0.073***	0.057***	0.041
	(0.010)	(0.017)	(0.017)	(0.028)
Ebola rates/100Xfemale		-0.004	-0.008	-0.006
		(0.009)	(0.009)	(0.008)
Ebola rates/100Xadults hh		0.000	-0.000	-0.000
		(0.002)	(0.002)	(0.002)
Ebola rates/100Xurban		-0.042***	-0.040***	-0.042***
		(0.012)	(0.013)	(0.013)
Ebola rates/100Xage over 45		0.004	-0.003	-0.003
		(0.010)	(0.010)	(0.010)
Ebola rates/100Xno formal educ.			0.036***	0.036***
			(0.012)	(0.012)
Ebola rates/100Xquintile 1			-0.038**	-0.037**
			(0.018)	(0.018)
Ebola rates/100Xunemployed			0.026**	0.025**
			(0.011)	(0.011)
Ebola rates/100Xparticipative				0.018*
				(0.011)
Ebola rates/100Xtax morale				0.010
				(0.018)
Ebola rates/100Xtrust president				-0.004
				(0.005)
Ebola rates/100Xgovt. health				0.004
				(0.005)
constant	0.269***	0.261***	0.266***	0.271***
	(0.064)	(0.065)	(0.066)	(0.068)
N	6700	6700	6700	6700
R^2	0.2413	0.2427	0.2445	0.2449

Standard errors clustered by region between brackets.

Full set of EA, demographic and socioeconomic controls included.

Region and round fixed dummies included.

Table 12: Support for taxation for development and Ebola impact: model with interactions (ebola direct).

	(1)	(2)	(3)	(4)
Ebola direct	0.036**	0.060*	0.039	0.040
	(0.017)	(0.036)	(0.038)	(0.078)
Ebola directXfemale		-0.000	0.004	0.002
		(0.025)	(0.025)	(0.025)
Ebola directXadults hh		-0.002	0.000	0.000
		(0.004)	(0.004)	(0.004)
Ebola directXurban		-0.036	-0.052*	-0.053*
		(0.028)	(0.028)	(0.029)
Ebola directXage over 45		0.029	0.026	0.026
		(0.030)	(0.031)	(0.031)
Ebola directXno formal educ.			0.073**	0.073**
			(0.031)	(0.031)
Ebola directXquintile 1			-0.144***	-0.146***
			(0.043)	(0.043)
Ebola directXunemployed			0.053*	0.052*
			(0.027)	(0.027)
Ebola directXparticipative				-0.024
				(0.025)
Ebola directXtax morale				0.019
				(0.058)
Ebola directXtrust president				-0.001
				(0.013)
Ebola directXgovt.health				-0.003
				(0.013)
constant	0.694***	0.692***	0.706***	0.706***
	(0.089)	(0.090)	(0.091)	(0.094)
N	4418	4418	4418	4418
R^2	0.1079	0.1084	0.1124	0.1126

Standard errors clustered by enumeration area (EA) between brackets.

Full set of demographic, EA and socioeconomic controls included.

Region-round fixed effects included.

A.3 Additional figures and tables

Figure 7: Health spending as %GDP. IHME (2021).

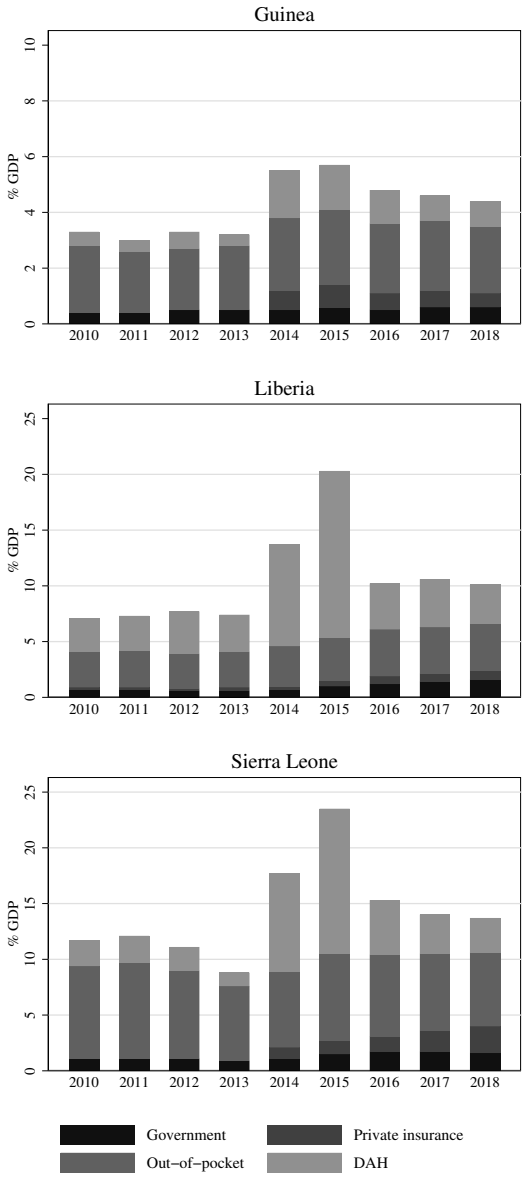

Figure 8: Total health spending by source. IHME (2021).

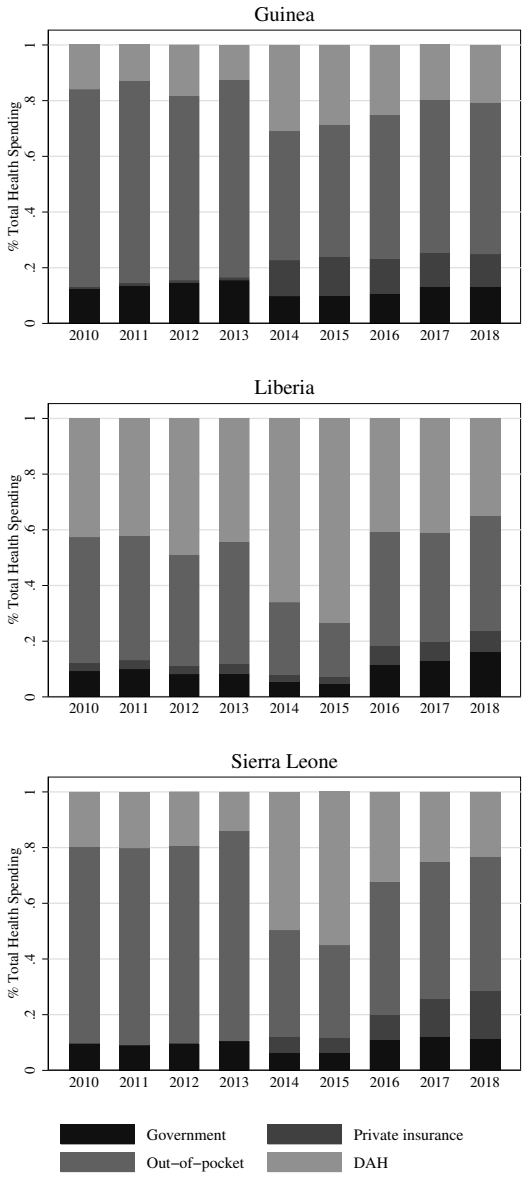

Table 13: Support for increased taxation: outbreak control.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ebola direct	0.035**	0.034**	0.035**	0.035**	0.036**	0.036**	0.033**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Ebola disrupt	0.064***	0.060***	0.064***	0.064***	0.066***	0.066***	0.059***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
National govt.		-0.040*					-0.053*
		(0.020)					(0.030)
Local govt.			-0.007				0.013
			(0.018)				(0.025)
Local NGOs				0.003			0.026
				(0.018)			(0.021)
Intl. orgs.					-0.030		0.018
					(0.030)		(0.052)
Intl. govts.						-0.046*	-0.054
						(0.027)	(0.043)
_cons	0.746***	0.785***	0.752***	0.744***	0.772***	0.782***	0.791***
	(0.064)	(0.067)	(0.068)	(0.067)	(0.071)	(0.069)	(0.072)
N	2207	2207	2207	2207	2207	2207	2207
R^2	0.1319	0.1342	0.1320	0.1319	0.1327	0.1338	0.1366

OLS weighted estimates, standard errors clustered by enumeration area between brackets.
Region fixed effects and full set of demographic, EA and socioeconomic controls included.

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