

Attitudes toward vehicle carbon taxes in Ghana

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Abstract

Governments worldwide are considering increasing taxes on carbon-emitting activities – such as driving automobiles or traveling in airplanes – to reduce their nations' carbon footprints. In this study, we interviewed just under 3,300 Ghanaian households to collect their views on carbon taxes. Most Ghanaians express support for carbon taxes, particularly if the proceeds are used for development projects such as education finance or the construction of roads or medical facilities. Poorer households in particular feel that carbon taxes would not increase their overall tax burden much. A majority of respondents view vehicle emissions as a significant problem and agree that governments should impose taxes to control vehicle emissions. Our findings highlight the potential for carbon taxes to serve as development policy, so long as broad stakeholder consultations are undertaken beforehand.

1 Introduction

Adverse climatic events are now commonplace, occurring at increasing rates and durations, leaving in their wake the destruction of lives and properties. This has spurred the push for cleaner production systems across nations. However, clean production systems require a cleaner transportation sector. The transport sector contributes approximately a quarter of global carbon dioxide (CO_2) emissions (ICCT, 2020). While CO_2 emissions from the African transport sector have been historically low, it has been growing more than twice the global rate (IEA, 2021) and it is set to increase further with the growing middle class and the associated increasing motorization rates.

A major concern is that even as electric vehicle uptakes pick up elsewhere, the increasing motorization in Africa is set to be dominated by internal combustion engines (Ayetor et al., 2020). Even more concerning is the fact that the fleet of vehicles in Africa is aged with obsolete emission control technologies. In Ghana, for example, 80 percent of newly registered vehicles are used vehicles, with an average age of not less than 7 years. Similar situations prevail in other major African countries such as Ethiopia, Kenya, and Nigeria (Martyn and Tromp, 2016).

These trends suggest transport sector emissions in Africa will be substantially high and at odds with global emission targets unless immediate and effective policy interventions are implemented. One set of such policy measures is carbon taxes. While the theoretical foundations of these instruments are well-established (Timilsina and Dulal, 2008), their feasibility/acceptability and effectiveness, particularly in the African context, are largely undocumented. The recently introduced vehicle tax, known as the “luxury vehicle levy” in Ghana, provides a unique context to explore both the feasibility and effectiveness of carbon taxes in an African context. In 2018, the Ghanaian Parliament passed the Luxury Vehicle Act, 2018 (Act 969) which came into force on August 1. The tax, which was levied on vehicles with a capacity of 3.0 liters and above, was payable annually. However, barely a year after it was introduced, it was withdrawn following public protests.

This study therefore explores the impact of two vehicle taxes: carbon taxes and luxury vehicle taxes. Specifically, we explore the citizens’ general support for these taxes and their preferences on the government’s use of such taxes for developmental projects. We also study how vehicle taxes affect people’s incomes, tax burden, and attitudes toward driving and vehicle purchases. Lastly, the study considers the perceptions surrounding vehicle emissions. We try to understand all this by looking at how the answers differ by socioeconomic and demographic characteristics of the respondents.

There are at least two potential benefits to trying to understand individuals' perceptions of tax policies and their economic and behavioral impact. First, this sheds some light on individuals' support for the tax system, especially in a developing country context like Ghana. From here, we can learn about people's perceptions of the government's efficiency and trustworthiness in administering revenues from taxes. Similarly, we can obtain information about what citizens consider to be the government's priorities in the use of proceeds from such taxes. Considering that revenue generation is a major challenge for governments in developing countries ([Dzansi et al., 2022](#)), an assessment such as this could provide much-needed insights into shaping tax policy across different sectors. Second, this study offers the opportunity to assess how support for national policies such as taxation is shaped by demographic factors such as income, education, and geographic location. People's demographic characteristics have been shown to shape certain attitudes such as support for tax policies ([Stantcheva, 2021](#)). This study could potentially assist in identifying which groups need information and where such information should be targeted.

Our findings show that a large percentage of Ghanaians in our sample support the introduction of a luxury vehicle/carbon tax to fund developmental projects such as the free SHS program, road infrastructure, health facilities, and provision of more medical professionals, although there was more support for the introduction of a carbon tax than for a luxury vehicle tax. In terms of the impact of the carbon taxes on income, tax burden, driving behavior, and vehicle purchases, our findings indicate that a relatively small proportion of the respondents expect that such a tax would likely lower their income, cause them to drive less, make them less likely to acquire a new car or make it more likely to buy a smaller car than they had anticipated. These findings were similar across the respondents' geographic location, education level, or car ownership status. Additionally, a significant proportion of respondents indicated that carbon taxes would bring more revenue to the government and would not increase their overall tax burden; although highly educated persons were less likely to agree that the tax will provide the government with an additional revenue. Lastly, there was broad agreement amongst most of the respondents that vehicle emissions are a problem in Ghana and across the world and that, taxes can be used by the government to control emissions. The responses slightly varied among urban and rural dwellers on one hand and low- and high-educated respondents on the other hand. Similar variations were also observed for the responses between low-educated (high-educated) car owners and low-educated (high-educated) non-car owners.

This paper contributes to several strands of emerging literature. First, the literature on the use of environmental taxes, specifically, carbon taxes in controlling negative externalities has received wide attention ([Baranzini and Carattini, 2017](#)). Following the conceptualization of taxes that

deter actions that produce undesirable externalities by [Pigou \(1920\)](#), many economists have agreed that social welfare can be enhanced by taxing the production or consumption of goods and services that generate negative externalities. A body of theoretical work has subsequently formalized the approaches to identifying the optimum level of setting such environmental taxes including [\(Baumol, 1972\)](#).

Although the theoretical foundations on the cost-effectiveness of carbon taxes have largely been documented in the literature [\(Ekins, 2009\)](#), there is little empirical evidence on the effectiveness of these taxes in controlling emissions. This limited evidence is mainly because of the small number of countries that have implemented carbon taxes and the difficulty in estimating the causal impact of carbon taxes on emissions. Nonetheless, some jurisdictions such as the United Kingdom, British Columbia, Denmark, Finland, and Sweden which have implemented carbon taxes have attempted to evaluate its effect on overall Green-House Gas (GHG) emissions by measuring reductions in GHG emissions [\(Sumner et al., 2011\)](#). [Haites et al. \(2018\)](#) also examined the level of emissions (from 1991 to 2015) in 12 jurisdictions that implemented carbon taxes. They found small reductions in the overall levels of emissions although cautious of implying causal evidence since other factors could potentially contribute to the carbon tax effects.

More recently and closely related to our study, is the strand of the literature that focuses on the public acceptability and support for carbon taxes [\(Baranzini and Carattini, 2017; Carattini et al., 2018; Ewald et al., 2021; Kallbekken and Sælen, 2011; Sommer et al., 2022; Zhang et al., 2021\)](#). This strand of literature consistently finds that the support for carbon taxes is very low [\(Baranzini and Carattini, 2017; Baumol and Oates, 1971; Umit and Schaffer, 2020\)](#). Some factors have been identified as influencing the acceptability of environmental taxes. [Dresner et al. \(2006\)](#) document that little understanding of the purpose and function of environmental taxes results in public opposition towards these taxes. They find evidence that generally, the public solely sees environmental taxes as another means of raising revenue instead of its main purpose of reducing pollution. Resistance to carbon taxes has also been attributed to self-interests and distributional impacts [\(Baranzini and Carattini, 2017; Gaunt et al., 2007\)](#). [Gaunt et al. \(2007\)](#) find that car owners are more likely to reject carbon taxes. There has also been concern about the burden of carbon taxes falling disproportionately on persons in lower-income groups (?). Contrary to existing evidence, our study finds popular support for the luxury vehicle and carbon tax. This contrast in the findings might be attributed to a general misperception about these taxes and additionally, the fact that most of the individuals in our sample do not believe that the incidence of these taxes falls directly on them.

The evidence on the effect of carbon taxation in developing countries is very limited, mostly because developing countries account for a relatively small proportion of global emissions (Institute for Fiscal Studies, 2021). Much closer to Africa is the case of South Africa which recently introduced a carbon tax following years of public debates and consultation. The tax is levied on persons or entities that engage in activities resulting in greenhouse gas emissions equal to or above the thresholds specified by the tax for different activities or sectors. Prior to the introduction, several studies sought to estimate the potential costs and benefits of this tax across different dimensions such as overall emissions levels, export competitiveness, and national welfare (Alton et al., 2014; Arndt et al., 2014). These studies show evidence of a substantial reduction in greenhouse gas emissions due to carbon taxes.

The current dearth of evidence on the effect of carbon taxes in reducing emissions and the public support for such a tax in a developing country context, therefore, presents a gap in the existing literature. Our study seeks to provide some evidence of public support for vehicle taxes and the factors that affect public attitudes towards carbon taxation in a developing country context. In line with our study, a recent study by (Zhang et al., 2021) analyzed the factors driving public support for carbon taxation across some countries including South Africa. Using a sample of Twitter data from individuals in Europe, the USA, South Africa, Canada, and Australia, their results indicate that education, trust in government, and the perceived impact of tax on individuals and businesses are the main drivers of attitudes towards taxes. To the best of our knowledge, this study by (Zhang et al., 2021) is the first to investigate public attitudes toward carbon taxation using data from an African country. Our study improves on this recent literature by using survey data from adult Ghanaians to examine the acceptability of carbon taxes across different socio-economic variables. The remainder of the paper is structured as follows. Section two presents the study's methodology. Section three discusses the findings while Sections four and five present the conclusions and policy recommendations respectively.

2 Survey Methodology

This survey was primarily set out to assess the views of Ghanaians on the potential introduction of a luxury vehicle/carbon tax. In this section, we outline the sampling procedure used for this survey, briefly discuss the recruitment and training of enumerators, and finally, provide a basic description of the demographic composition of respondents such as the locality, sex, age, and regional distribution of the sample.

2.1 Data and Sampling

The data used in this study is a survey data of Ghanaian households that was collected purposefully for the study. The survey sought to assess the views of Ghanaians on the potential introduction of a luxury vehicle/carbon tax.

The data was collected from households in seven of Ghana's sixteen administrative regions. For the purpose of the study, the country was zoned into three: northern, middle, and coastal. Two regions were selected from the northern zone (Northern region and Savannah region), two from the middle zone (Ashanti region and Bono region), and three from the coastal zone (Greater Accra region, Volta region, and Western region). According to the 2021 Population and Housing Census, these seven regions represent 60.9 percent of the country's population (GSS, 2021). The study's sampling was designed to obtain a representative sample of 3300 households from the seven regions. A two-stage cluster random sampling approach similar to that used by the Ghana Statistical Service to draw nationally representative samples was used.

The first-stage sampling involves sampling census Enumeration Areas (EAs) from the seven regions. The sampling frame at this stage was a complete list of all EAs in these regions obtained from the 2021 Population and Housing Census. The frame contained information on each EA's location, type of residence (urban or rural), and estimated size (number of households). The EAs were stratified by region (7) and type of residence (2), giving a total of 14 strata. A total of 151 EAs were randomly and independently sampled from the strata using probability proportional to the size to allocate the total number of EAs per stratum. In the second stage, an average of 22 households were sampled from each of the 151 EAs.

One person was interviewed in each household and the target responded was the head of the household or the spouse if the head was not available. We successfully interviewed 3,287 households.

2.2 Enumerator Recruitment, Logistics, and Training

Twenty-four (24) enumerators were engaged and tasked with the responsibility of interviewing an adult individual from each of the 3,300 households. Enumerators were divided into 7 different teams and each team was assigned to one region. Each enumerator was assigned between 100 and 200 respondents (households) to interview within 25 days. Enumerators were also provided with mobile Tablets with pre-installed software for data capturing. Questionnaires were administered through Survey CTO software which was installed on the mobile tablets. Also, to build cooperation and ensure the confidentiality of respondents, enumerators were given ID cards to identify them. For data quality purposes, the data was back-checked every day of the survey for the accuracy and consistency of responses.

Before the enumerators began fieldwork, a two-day training was organized for the enumerators to acquaint themselves with the survey instrument (questionnaire) and to give them adequate preparation. There were three separate sessions of training. In the first session, the research team gave a general overview of the study and explained the rationale behind the study. The second session involved taking the enumerators through the entire survey instrument question by question explaining the reasoning behind each question and how to get the best possible response from the respondents. In the last session, the enumerators were trained on the use of the tablets and the accompanying software for recording the responses from the respondents. This was followed up with a practical session whereby the enumerators were guided to simulate actual fieldwork. The enumerators were divided into two groups one group played the role of interviewers while the other group acted as respondents. Finally, a pre-test of the questionnaire by the enumerators with actual respondents (households) was done to afford the enumerators with interactions with households.

2.3 Basic Description of Sample

Table 1 describes the basic demographic characteristics of our respondents with a split by type of locality shown in Appendix Table A1. In general, urban households dominated our sample with approximately 62 percent of respondents residing in the urban center whereas 38 percent lived in rural communities. There were almost identical shares of females and males. The age distribution of our sample also revealed that 8 percent of the respondents were under 25 years; more than half of the respondents were between 25 and 44 years; one-fifth of the respondents were between the ages 45 and 54; approximately 11 percent were between 55 and 64 years; and finally, 8 percent of the respondents are 65 years and above.

Table 1: Basic Description of Sample

	Number of respondents	Percent of respondents
Type of Locality		
Rural	1237	37.6
Urban	2050	62.4
Sex		
Male	1636	49.8
Female	1651	50.2
Age range		
24 years and below	262	8.0
25 - 34 years	755	23.0
35 - 44 years	994	30.3
45 - 55 years	642	19.6
55 - 64 years	373	11.4
65 years and above	253	7.7
Education level		
No formal education	610	18.6
Basic education	1458	44.4
Senior High/Secondary education	827	25.2
Tertiary education	343	10.4
Other	49	1.5
Region		
Western	380	11.6
Greater Accra	865	26.3
Volta	313	9.5
Ashanti	1000	30.4
Bono	213	6.5
Northern	350	10.6
Savannah	166	5.1

Notes: This table presents the demographical distribution such as the locality type, sex, age, education level, and regional distribution of our sample. Other level of education includes respondents who have had some level of Koranic education and adult education or who have attended a School for the Blind.

Regarding the education level of the respondents, less than a fifth (19 percent) of the respondents have had no formal education. Furthermore, 44 percent of the respondents have had basic education, a quarter of the respondents have completed senior secondary,

and 10 percent have been to a tertiary school. Just over 2 percent of the respondents have completed other levels of education such as Koranic, adult education, and School for the Blind. Approximately 12 percent of the respondents were in the Western region, more than one-fourth of the respondents were in the Greater Accra, the Volta region made up 10 percent, 30 percent of the respondents were in the Ashanti region, 7 percent were in the Bono region, 11 percent were in the Northern region, and finally, 5 percent were in the Savannah region.

3 Results and Discussion

In this section, we conduct an empirical analysis of the data we collected from the field. We start with a discussion of citizens' views on the imposition and the use of a luxury vehicle or carbon tax. We will follow up with the perceptions of citizens on the impact of the imposition of a carbon tax on personal income, government revenues, and car ownership. Lastly, we will talk about citizens' opinions on vehicle emissions.

3.1 Imposition and the Efficient Use of Proceeds from Carbon/Luxury Vehicle Tax

First, we asked the respondents to indicate the extent to which they agree with the imposition of a luxury vehicle/carbon tax, as well as their preference for three or four possible ways the government could invest the proceeds from the tax. More specifically, we inquired from the respondents whether the government should consider imposing a carbon tax and use the proceeds to fund three projects namely, free secondary schooling, building more roads, and hiring more health professionals as well as building more health facilities. For luxury vehicle tax, the respondents were presented with the same three possible uses of the proceeds from a luxury vehicle tax in addition to one more project; using the proceeds to plant more trees to prevent flooding. The responses to these questions are summarized in Table 2 as well as Figures 1 and 2. In Table 2, we report the percentage of respondents saying they either somewhat or strongly agree with each of the statements for the whole sample and also by locality and education level of respondents. For Figures 1 and 2, we check the variations in responses for four groups of respondents; respondents who are lowly educated and own a car, respondents who are lowly educated and do not own a car, respondents who are highly educated & own a car, and lastly, respondents who are highly educated & does not own a car.

As shown in the top panel of Table 2, the respondents were more likely to favor a policy where the government imposes a luxury vehicle tax and uses the proceeds to invest in road infrastructure and the health sector (i.e., recruit more medical staff and build more health facilities) though all the policies received overwhelming support from the respondents. This is evidenced by the fraction of respondents that either somewhat or strongly agreed with each of the statements. More specifically, more than three-quarters of the respondents support the imposition of a luxury vehicle tax and that is used to fund the free secondary school program. However, 82 percent of the respondents said the government should consider levying a tax on luxury vehicles to help pay for more road projects and health facilities and recruitment of health personnel. The policy

Table 2: Citizens View on the Imposition and the Use of Luxury Vehicle and Carbon Tax by Locality and Education Level

		Percent saying somewhat/strongly agreeing						
		Full sample	Locality		Education		Gender	
			Urban	Rural	Low	High	Male	Female
<i>Impose a luxury vehicle tax and use it to...</i>								
... fund free secondary school	76.1	73.4	80.7	79.8	69.4	77.2	76.0	
... build more roads projects	81.5	79.5	85.0	84.0	77.0	82.4	81.4	
... pay for more medical facilities & staff	82.1	80.2	85.1	84.3	78.0	83.5	82.0	
... plant more trees to prevent flooding	71.8	69.8	75.1	74.5	66.9	72.8	71.7	
<i>Impose a carbon tax and use it to...</i>								
... fund free secondary school	79.5	77.2	83.3	81.7	75.4	82.1	79.4	
... build more roads projects	83.1	81.3	86.2	84.7	80.3	85.3	83.1	
... pay for more health medical & staff	83.6	81.5	87.0	84.9	81.2	85.6	83.6	

Notes: This table reports the percent of citizens who support the government to impose a luxury vehicle/carbon tax and use the proceeds to invest in the free SHS program, improve road infrastructure, expand health facilities and recruit more health personnel, and promote activities that protect the environment by respondents' education level, locality, and gender. Low education means respondents who have completed at most basic education (i.e. completed Junior High School) education and high education are respondents who have completed at least Senior High School (SHS) education

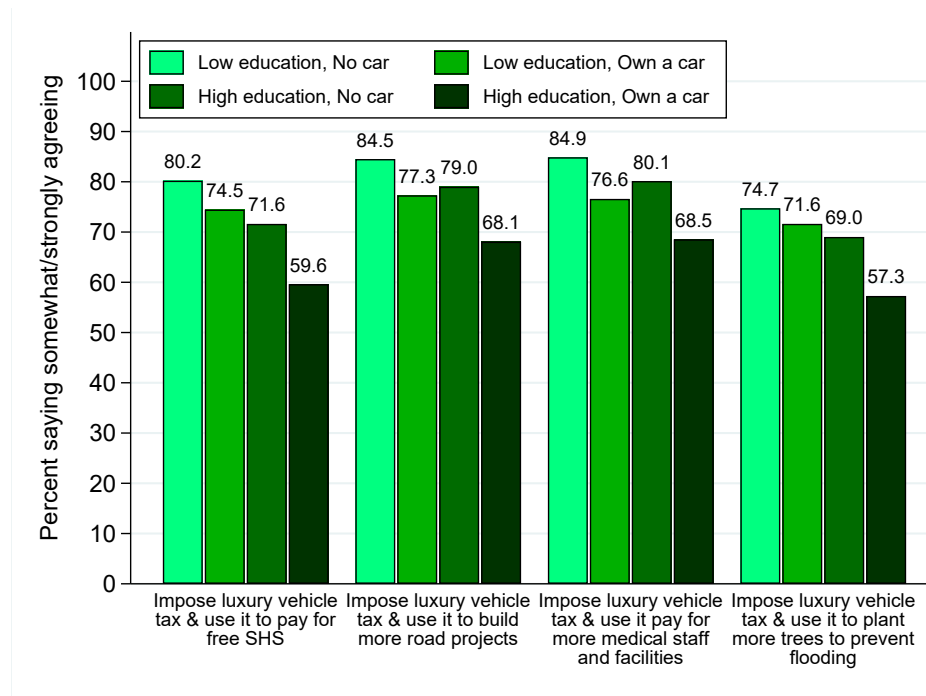
that enjoyed the least support from the respondents was using the proceeds from a possible imposition of a luxury vehicle tax to plant more trees to prevent flooding. This is expected as projects such as planting trees to prevent flooding are peripheral to the needs of citizens. The support for all policies was stronger in rural and lowly educated households. Moreover, the support for the policies was weaker for respondents who are highly educated & own a car and stronger for the opposite group, that is, respondents who are lowly educated & do not own a car as depicted in Figure 1.

Furthermore, there were no significant differences in responses when the question was posed to the respondents as to whether the government should consider imposing a carbon tax and use the revenues to fund the free SHS program, build more roads and health facilities, and employ

more medical staff. In detail, nearly 4 in 5 of the respondents support using the revenue from a possible imposition of a carbon tax to fund the free SHS program as displayed in the bottom panel of Table 2. Comparatively, more than four-fifths of the respondents support the use of revenues from a carbon tax to build more road projects (83 percent) and health facilities as well as hire more medical personnel (84 percent). Again, the support was much stronger in rural and low-educated households compared to urban and high-educated households across all policies. Similarly, owning a car and having a higher education reduces the likelihood of a respondent supporting a policy of imposing a carbon tax to fund free SHS, build more roads and health facilities, and hire more health workers. On the other hand, low education and not owning a car are associated with a high likelihood of a respondent supporting all three policies as shown in Figure 2.

We also disaggregated our responses into regions to explore the variations in responses across regions and to see where the policies receive the most support between the Volta and Ashanti regions. The summarized responses are reported in Appendix Table A7. The latter reason was that the incumbent government drew strong political support from the Ashanti region while the largest opposition got a larger share of votes from the Volta region in national elections. The Northern region gave the largest support for the imposition of a luxury vehicle tax to fund free SHS, build more roads and health facilities, and hire more medical personnel. The region(s) that gave the least support to these policies varied between the Greater Accra and Bono regions respectively. Whereas respondents from the Greater region weakly supported imposing a luxury vehicle tax and using it to fund free SHS and plant more trees to prevent flooding, respondents from the Bono region offered the least support for using the proceeds from a luxury vehicle tax to build more roads and health facilities and hiring more medical workers. Respondents from the Savannah region had the highest likelihood of supporting using proceeds from a carbon tax to help fund free SHS, build more roads and health facilities, and hire more medical staff while respondents from the Greater Accra region gave the least support. Given that the Savannah region is the poorest among the regions in our sample, this is not surprising because respondents in the regions stand to benefit the most from these interventions that are seen as pro-poor. Respondents from the Volta region were more likely to support all the policies than respondents from the Ashanti region. This difference may have been driven by the significantly high proportion of rural (urban) respondents from the Volta (Ashanti) region (please see Appendix Table A1).

Figure 1: Citizens' Views on the Imposition and Possible Uses of a Luxury Vehicle Tax by Car Ownership and Education

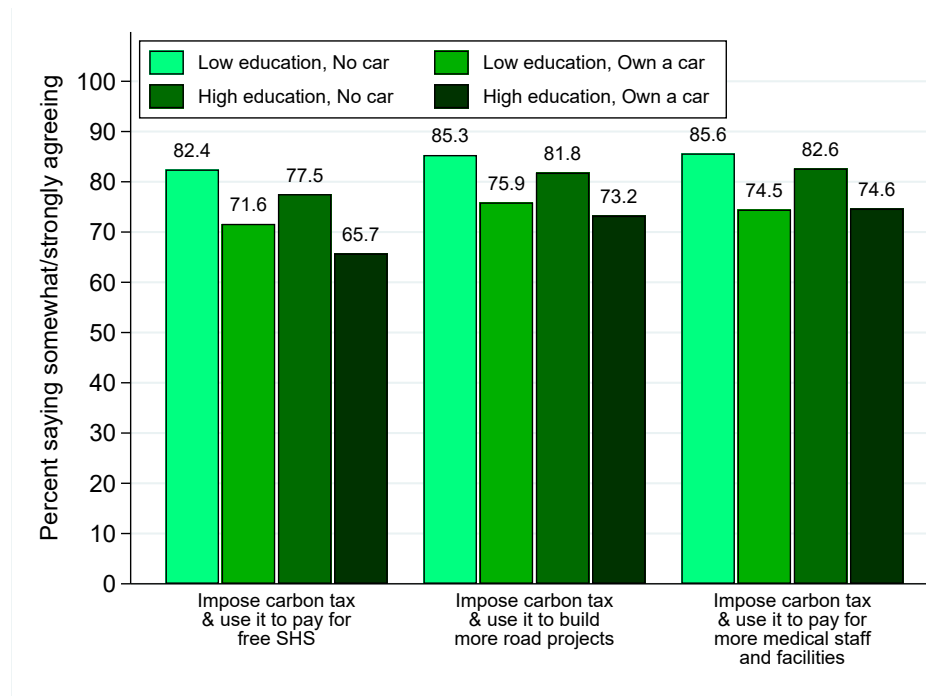


Notes: This figure reports the percent of citizens who support the government to impose a luxury vehicle tax and use the proceeds to invest in the free SHS program, improve road infrastructure, expand health facilities and recruit more health personnel, and promote activities that protect the environment by respondents' education level and ownership of the car. Low education means respondents who have completed at most basic education (i.e. completed Junior High School) education and high education are respondents who have completed at least Senior High School (SHS) education.

3.2 The Impact of an Imposition of a Carbon Tax

Moving on, we also asked respondents to tell us the potential impact of a carbon tax on their overall tax burden, personal income, potential car ownership in the short term, driving behavior, and government revenues. Specifically, we asked respondents to indicate the extent to which they agree that the imposition of a carbon tax would; not increase their overall taxes, likely reduce their income, make it less likely to buy a car in the next 12 months, make it more likely to buy a smaller car, make it more likely to drive less and bring more revenues to the government to improve the economy. The answers to this set of questions have been summarized in Table 3 and Appendix Table A9 and Figure 3. As we did previously for citizens' view on the imposition and possible uses for a luxury vehicle/carbon tax, in Table 3, we also controlled for respondents' locality and educational level. Appendix Table A9 gives the regional distribution of the percentage of respondents who either somewhat or strongly agree with

Figure 2: Citizens' Views on the Imposition and Possible Uses of a Carbon Tax by Car Ownership and Education



Notes: This figure reports the percent of citizens who support the government to impose a carbon tax and use the proceeds to invest in the free SHS program, improve road infrastructure, expand health facilities, and recruit more health personnel by respondents' education level and ownership of car. Low education means respondents who have completed at most basic education (i.e. completed Junior High School) education and high education are respondents who have completed at least Senior High School (SHS) education.

the statements. In Figure 3, we explore the differences in responses among four groups of respondents; low-educated respondents who do not own a car, low-educated respondents who own a car, high-educated respondents who do not own a car, and high-educated respondents who own a car.

First, 29 percent indicated the imposition of a carbon tax will make it less likely for them to buy a car, 36 percent said they are more likely to buy a smaller car when the carbon tax is imposed, and just one-third stated if a carbon tax is imposed, they are more likely to drive less as reported in Table 3. The share of respondents who said the imposition of a carbon tax will make it less likely for them to buy a car varied slightly on the locality and education level of respondents. However, the likelihood of saying that a carbon tax will make it more likely to buy a smaller car or drive less was marginally lower among rural and low-educated respondents than among urban and high-educated respondents. Also, for Panel A of Figure 3, high-educated

Table 3: The Impact of an Imposition of a Carbon Tax on Prospective Car Ownership, Personal Income, and Government Revenues by Locality and Education Level

	Full sample	Percent saying somewhat/strongly agreeing					
		Locality		Education		Gender	
		Urban	Rural	Low	High	Male	Female
<i>A carbon tax would...</i>							
... NOT increase my overall tax	72.9	72.1	74.1	74.4	70.0	79.5	72.7
... make it less likely to buy a car	28.8	28.6	29.0	29.1	28.2	28.1	28.8
... make it more likely to buy a smaller car	36.3	38.6	32.4	35.1	38.4	36.0	36.2
... make it more likely to drive less	33.7	35.2	31.2	32.6	35.6	32.7	33.7
... likely reduce my income	35.3	36.2	33.7	33.3	38.7	33.7	35.4
... bring more revenue to the government	83.9	81.6	87.7	85.6	80.9	86.4	83.9

Notes: This table presents the percent of respondents who either somewhat or strongly agreed that a carbon tax would; make it less likely for them to buy a car in the next 12 months, make it more likely to buy a smaller car and drive less than anticipated, NOT increase their overall taxes, likely reduce their income, and bring more revenues to the government. Low-educated are respondents who have completed at most Junior High School (JHS) and high-educated are respondents who have completed at least Senior High School (SHS).

respondents who own a car were the least likely to say that a carbon tax will make it difficult to buy a car in the next 12 months with low-educated respondents who own a car being the group who were more likely to agree with the statement. Again, high-educated respondents who own a car were more likely to agree that a carbon tax will make them buy a smaller car than they would otherwise, followed by low-educated respondents who own a car, then high-educated respondents who do not own a car, and lastly, low-educated respondents who do not own a car in that order. Finally, the share of respondents who said a carbon tax would make them drive less was higher among low- and high-educated respondents who own a car while it was the least among low-educated respondents who do not own a car. Therefore, the majority of the respondents think the imposition of a carbon tax will have little or no impact on their potential to buy a car and their driving behavior.

Further, 84 percent of the respondents believe that the imposition of a carbon tax will bring more revenue to the government to undertake developmental projects. Also, 73 percent of the respondents stated that the imposition of a carbon tax would not increase their overall

taxes because they do not drive and take airplane trips. Only 35 percent of the respondents said that the imposition of a carbon tax would likely reduce their incomes. Urban and highly educated respondents were less likely to agree that a carbon tax would not reduce their incomes and also, provide the government with an additional revenue stream to manage the economy, though a significant proportion of highly-educated-urban respondents agreed to both statements. However, urban, and highly educated respondents were more likely to confirm that a carbon tax would likely reduce their income. Thus, the respondents believe that the imposition of a carbon tax would not reduce their incomes, increase their overall tax burden because they do not drive and take airplane trips, and would provide more revenues to the government. Also, respondents who own a car and are highly educated were less likely to agree that a carbon tax would not increase their overall tax burden and bring more revenues to the governments as shown in Panel B of Figure 4. In contrast, urban and highly educated households were more likely to agree that the imposition of a carbon tax would reduce their income. Thus, the majority of the citizenry believes that the imposition of a carbon tax will have a moderate impact on their income and overall tax burden but will likely improve government revenues. This is not surprising, a few of the respondents we surveyed said they own a car or plan to buy a car (see Appendix Tables A2 and A3). Also, urban, and highly educated households who own a car were less supportive of the imposition of a carbon tax.

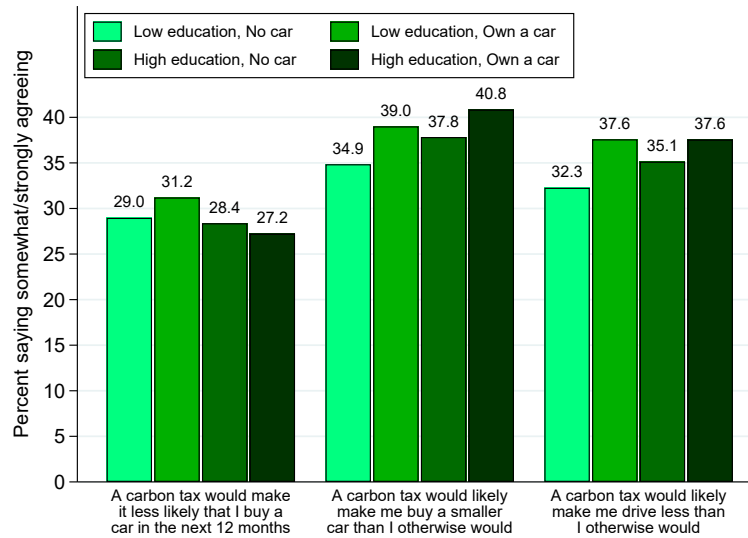
3.3 Citizens' Views on Vehicle Emissions

The last thing we were interested in finding out from the respondents was whether vehicle emissions were only a problem in Ghana or the world and whether governments should impose taxes to control this emission problem. Consistent with the previous analysis, the responses were subdivided based on respondents' locality and level of education which is reported in Table 4. Again, we investigated the difference in responses among low-educated respondents who (do not) have a car and high-educated respondents who (do not) own a car as depicted in Figure 4.

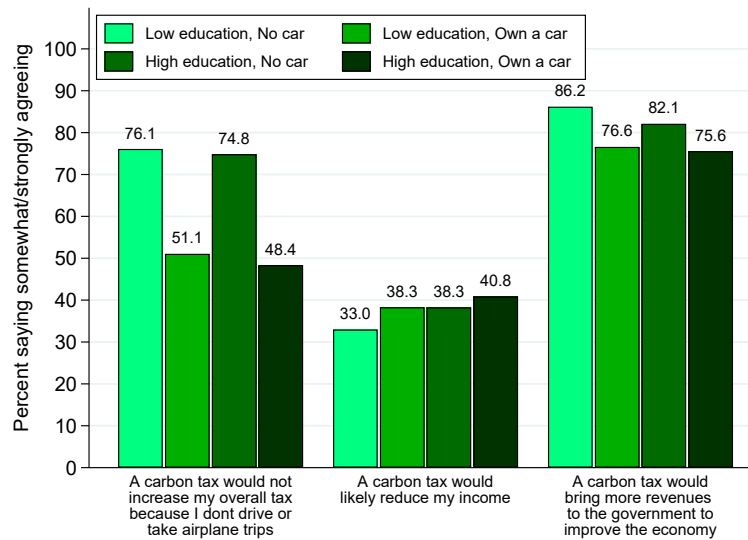
From Table 4, 91 percent of the respondents somewhat/strongly agree that vehicle emissions are a problem in Ghana, 87 said vehicle emissions are a problem for the world, and 81 percent want governments to impose taxes to control emissions. Though there were no significant differences in the responses provided by people with high and low education levels, the fraction of respondents who said vehicle emissions are a problem in Ghana and for the world was slightly higher among rural dwellers than urban residents. Also, urban respondents were about 5 percentage points less likely to agree that the government should impose taxes to control emissions. Again, there was little difference in responses from low and high-educated

Figure 3: Citizens' Perceptions on the Impact of a Carbon Tax Imposition by Car Ownership and Education

(a) Panel A



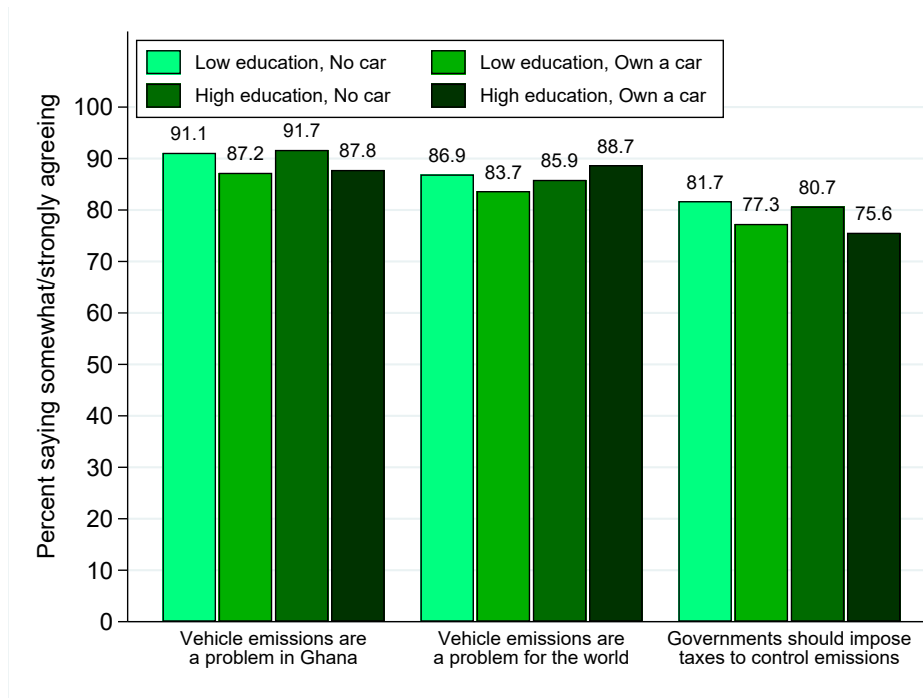
(b) Panel B



Notes: This figure plots the percent of low-educated (high-educated) respondents who own or do not own a car who agree that a carbon tax would; make it less likely to buy a car in the next 12 months, likely make them buy a smaller car than anticipated, likely make them drive less than anticipated, NOT increase their overall taxes, likely reduce their income, and would bring more revenues to the government.

respondents who want the government to impose taxes to control emissions.

Figure 4: Citizens' Views on Vehicle Emissions by Car Ownership and Education



Notes: This figure plots the percent of low-educated (high-educated) respondents who own or do not own a car saying vehicle emissions are a problem in Ghana and for the world and governments should impose taxes on carbon-emitting activities such driving a car or traveling in airplanes by four groups of respondents.

The percentage of respondents who agreed with each of the statements varied significantly among the regions surveyed as shown in Appendix Table A8. For example, 81 percent of respondents in the Northern region think vehicle emissions are a problem in the Ghana region compared to 99 percent in the Volta. Similarly, the share of respondents who think vehicle emissions are a problem for the world was 78 percent in the Greater Accra region while in the Volta and Savannah regions, the ratio was 97 percent. Also, 64 percent of respondents from the Greater Accra region said the governments should impose taxes to control emissions in contrast to 96 percent in the Savannah region.

4 Conclusions

In this paper, we surveyed to measure citizens' views on the impact of vehicle taxes on the purchase and use of efficient cars in Ghana. A nationally representative sample of 3,500 households was drawn from 151 enumeration areas across 88 districts in 87 regions of Ghana

Table 4: Citizens View on the Vehicle Emissions by Locality and Education Level

	Percent saying somewhat/strongly agreeing						
	Full sample	Locality		Education		Gender	
		Urban	Rural	Low	High	Male	Female
Vehicle emissions are a problem in Ghana	90.9	89.7	93.0	90.9	91.0	91.1	91.0
Vehicle emissions are a problem for the world	86.6	84.0	90.8	86.7	86.4	85.1	86.8
Govts should impose taxes to control emissions	80.8	79.0	83.8	81.4	79.7	81.6	80.9

Notes: This table presents percent of respondents who somewhat or strongly agreed that vehicle emissions are a problem in Ghana and for the world and that the government should impose a tax on carbon-emitting activities such as driving a car and taking airplane trips by respondents' locality and level of education. Low-educated are respondents who have completed at most Junior High School (JHS) and high-educated are respondents who have completed at least Senior High School (SHS).

to achieve our objective. An adult in each of the 3,500 sampled households was interviewed for the study. First, we asked respondents the extent to which they agree the government should consider imposing a luxury vehicle/carbon tax and use it for developmental projects. The respondents were offered three possible uses of the proceeds from a carbon tax namely, to fund the free SHS, build more road projects and health facilities as well as hire more medical personnel. For the use of proceeds from a luxury vehicle tax, respondents were given the same three options in addition to one more option of using the proceeds to plant more trees to prevent flooding. Second, we asked respondents how a possible imposition of a carbon tax would impact their; incomes, overall tax burden, potential to buy a car, and driving behavior. Lastly, we inquired about the opinions of the respondents regarding vehicle emissions. That is, whether vehicle emissions are a problem in Ghana and for the world and whether governments should impose taxes to control emissions.

The survey's findings were intriguing. To begin with, the majority of respondents agree that the government should levy a luxury vehicle/carbon tax to assist in funding the free SHS program (77 percent), building more road infrastructure (82 percent), and paying for more health facilities and medical professionals (82 percent). Additionally, using the proceeds from a luxury tax to plant more trees to prevent flooding receives the least support from our respondents among all the development projects (72 percent). This is expected as such projects are peripheral to the immediate needs of citizens. Interestingly, introducing a *carbon tax* to pay for any of the

three developmental initiatives received marginally more approval from our respondents than using proceeds from a *luxury vehicle tax* to fund the same programs. Furthermore, employing the revenues from a luxury vehicle/carbon tax to fund new healthcare facilities and hire more medical personnel garnered more widespread approval among our respondents than the other projects. These findings, however, must be interpreted with some caution as they are susceptible to changes in respondents' educational level, locality, region, and car ownership.

In terms of the impact of a carbon tax, a relatively few (less than half) of the respondents expect that a carbon tax would likely reduce their income, cause them to drive less, make them less likely to acquire a new car or make it more likely to buy a smaller car than they had anticipated. These results were independent of respondents' locality, education level, or car ownership. Also, a significant share of the respondents said a carbon tax would bring more revenue to the governments and would not increase their overall taxes because they do not drive or take airplane trips. The share of respondents who claimed a carbon tax would improve government revenues was relatively higher (lower) among low-educated (high-educated) respondents who own no car than low-educated (high-educated) individuals who own a car. However, the share of respondents was quite similar among low-educated and high-educated individuals who own a car. Respondents who own a car were significantly less likely to say that a carbon tax would increase their overall taxes because they do not drive a car or take airplanes regardless of the education level of respondents. This suggests that respondents who do not own a car, regardless of their educational level, were more likely to support the imposition of a carbon tax.

Finally, almost all the respondents agreed that vehicle emissions are a problem in Ghana and for the world and that, governments should levy taxes to control emissions. There were slight variations in responses among urban and rural dwellers on one hand and low- and highly-educated respondents on the other hand. Similarly, the responses showed little variation among low-educated (high-educated) respondents who own a car and low-educated respondents (high-educated) respondents who do not own a car. Once again, car ownership has reinforced its impact on the kind of answers provided by the respondents.

The findings from our study represent a sharp contrast to the evidence in existing literature, which is primarily from developed countries. Contrary to existing evidence, we find considerable popular support for vehicle taxes across different groups of the population and even less resistance to these taxes by car owners. One possible explanation is that people's behavior towards and support for a policy, specifically tax policy, is largely determined by their perception of whom the direct tax incidence falls on. Hence, individuals are more likely to support a tax policy when they perceive that the tax is seemingly far removed from them. In the context of

this study, because the percentage of car owners in our sample is very small – about 89 percent of respondents do not own cars – they may perceive that they would not directly pay a carbon tax or luxury vehicle tax if it was introduced, and hence the overwhelming support.

These findings have significant implications for policy-making, especially in developing countries. Our findings suggest that education is a good instrument to alter the public's perception and increase their understanding of vehicle tax policies. Hence, prior to the introduction of a luxury vehicle or carbon tax, the government needs to embark on nationwide campaigns to educate the populace on the need for the tax and explain what the proceeds from the tax will be used for. Additionally, the use of tax proceeds for specific developmental projects should be explored. Tax revenue should be linked to specific expenditure categories, particularly health care provision since this might be largely accepted by the public. Finally, our results bring into sharp focus the need for government to broadly consult with Civil Society Organizations, academia, and the business community before introducing specific tax policies.

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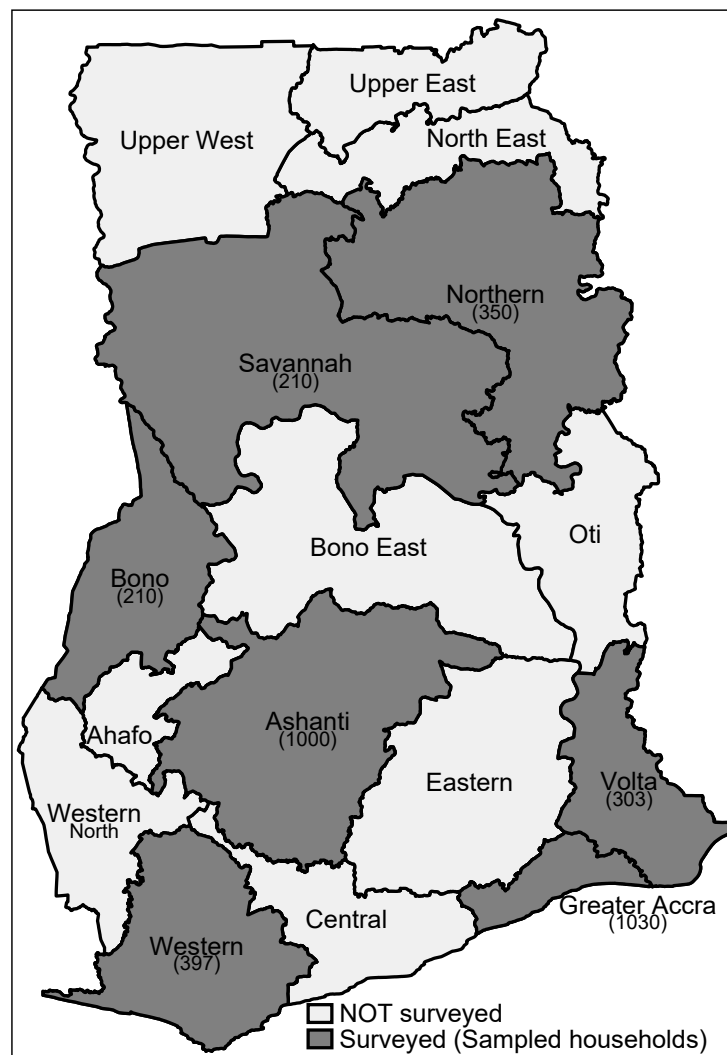
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5 Appendices

5.1 Figures

Figure A1: Sample Distribution by Region



Notes: This figure plots a map of Ghana showing the surveyed regions and households. The dark gray areas are the regions we surveyed while the light grey areas are the regions we did not survey. Also, the figures (in parentheses) in each dark grey shaded area are the number of households surveyed.

5.2 Tables

Table A1: Basic Description of Sample

	Rural			Urban		
	Freq.	Col %	Row %	Freq.	Col %	Row %
Gender						
Male	677	54.7	41.4	960	46.8	58.6
Female	560	45.3	33.9	1090	53.2	66.1
Age range						
24 years and below	90	7.3	34.0	175	8.5	66.0
25 - 34 years	259	21.0	34.4	494	24.1	65.6
35 - 44 years	373	30.3	37.4	624	30.5	62.6
45 - 55 years	257	20.9	40.3	380	18.6	59.7
55 - 64 years	155	12.6	41.8	216	10.6	58.2
65 years and above	98	8.0	38.3	158	7.7	61.7
Education level						
No formal education	343	27.7	56.8	261	12.7	43.2
Basic education	616	49.8	42.2	842	41.1	57.8
Senior High/Secondary education	213	17.2	25.7	615	30.0	74.3
Tertiary education	50	4.0	14.4	297	14.5	85.6
Other	15	1.2	30.0	35	1.7	70.0
Region						
Western	181	14.6	47.6	199	9.7	52.4
Greater Accra	99	8.0	11.4	766	37.4	88.6
Volta	193	15.6	61.7	120	5.9	38.3
Ashanti	407	32.9	40.7	593	28.9	59.3
Bono	92	7.4	43.2	121	5.9	56.8
Northern	156	12.6	44.6	194	9.5	55.4
Savannah	109	8.8	65.7	57	2.8	34.3

Notes: This table reports the basic description of respondents by type of locality.

Table A2: Car Ownership in Ghana

	Percent of respondents				
	Full sample	Locality		Education	
		Urban	Rural	Low	High
Currently owning a car	10.8	13.7	5.9	6.7	18.1
Number of cars					
... One	74.6	74.0	76.7	70.2	77.5
... Two	18.9	19.2	17.8	19.9	18.3
... More than two	6.5	6.8	5.5	9.9	4.2
Mode of Acquisition					
... Imported directly	15.8	18.9	4.1	9.2	20.2
... Bought in Ghana	79.1	75.8	91.8	87.9	73.2
... Gifted	5.1	5.3	4.1	2.8	6.6
Year acquired					
... Before 2010	5.6	5.7	5.5	7.1	4.7
... Between 2010 and 2014	14.4	14.6	13.7	16.3	13.1
... Between 2015 and 2019	35.6	35.2	37.0	35.5	35.7
... 2020 and beyond	44.4	44.5	43.8	41.1	46.5
Engine capacity					
... Less than 1.0	2.3	2.5	1.4	2.8	1.9
... Between 1.0 and 2.0	28.2	30.6	19.2	22.0	32.4
... Between 2.0 and 3.0	20.6	23.5	9.6	15.6	23.9
... More than 3.0	13.6	12.1	19.2	12.8	14.1
... Don't know	35.3	31.3	50.7	46.8	27.7
Manufacture year					
... Before 1990	4.3	3.6	6.9	5.8	3.3
... 1990's	18.7	18.9	18.1	21.7	16.7
... 2000's	26.5	26.2	27.8	30.4	23.9
... 2010's	47.6	48.4	44.4	38.4	53.6
... 2020's	2.9	2.9	2.8	3.6	2.4
Car type					
... Saloon	70.1	71.2	65.8	67.4	71.8
... SUV	13.8	15.7	6.8	6.4	18.8
... Bus	5.6	4.6	9.6	9.2	3.3
... Truck	10.2	8.5	16.4	17.0	5.6
... Don't Know	0.3	0.0	1.4	0.0	0.5

Notes: This table describes current car ownership in Ghana.

Table A3: Propective Car Ownership in Ghana

	Percent of respondents				
	Full sample	Locality		Education	
		Urban	Rural	Low	High
Planning to buy a car	12.7	14.4	9.8	10.1	17.3
Preferred engine capacity					
... Less than 1.0	1.2	1.0	1.7	1.4	1.0
... Between 1.0 and 2.0	18.0	20.7	11.6	12.7	23.6
... Between 2.0 and 3.0	16.6	19.0	10.7	11.3	22.2
... More than 3.0	8.4	7.8	9.9	8.0	8.9
... Don't know	55.8	51.5	66.1	66.7	44.3
Preferred manufacture year					
... 1990's	0.2	0.0	0.8	0.0	0.5
... 2000's	1.4	1.4	1.7	1.4	1.5
... 2010's	28.4	28.8	27.3	22.5	34.5
... 2020's	70.0	69.8	70.2	76.1	63.5
Preferred car type					
... Saloon	55.5	59.3	46.3	50.7	60.6
... SUV	15.1	18.0	8.3	7.5	23.2
... Bus	11.5	7.8	20.7	16.0	6.9
... Truck	8.7	5.1	17.4	14.1	3.0
... Don't Know	9.1	9.8	7.4	11.7	6.4

Notes: This table describes prospective car ownership in Ghana.

Table A4: Citizens View on the Imposition and the Use of Luxury Vehicle and Carbon Tax by Age

	Percent saying somewhat/strongly agreeing					
	24 years or below	25-34 years	35-44 years	45-54 years	55-64 years	65 years & above
<i>Impose a luxury vehicle tax and use it to...</i>						
... fund free secondary school	79.2	72.8	77.6	75.2	77.1	78.1
... build more roads projects	87.5	81.4	82.0	79.6	80.9	80.1
... pay for more medical facilities & staff	88.7	82.1	82.5	80.7	80.6	79.7
... plant more trees to prevent flooding	77.0	70.0	72.2	71.0	72.0	72.3
<i>Impose a carbon tax and use it to...</i>						
... fund free secondary school	87.2	78.9	81.2	77.9	76.3	79.6
... build more roads projects	91.3	83.8	84.5	81.2	80.3	83.2
... pay for more health medical & staff	90.9	84.3	85.0	81.3	80.9	83.7

Notes: This table reports the percent of respondents who think the government should impose luxury vehicle/carbon taxes and use the proceeds to help fund various developmental projects including funding free SHS, construct more roads, build more medical facilities, hire more health professionals, and plant more trees by age of respondents.

Table A5: The Impact of an Imposition of a Carbon Tax on Prospective Car Ownership, Personal Income, and Government Revenues by Age

	Percent somewhat/strongly agreeing					
	24 years or below	25-34 years	35-44 years	45-54 years	55-64 years	65 years & above
<i>A carbon tax would...</i>						
... NOT increase my overall tax	81.5	76.2	69.2	68.9	73.3	77.3
... make it less likely to buy a car	23.8	28.7	28.6	32.7	29.6	23.8
... make it more likely to buy a smaller car	29.4	35.7	38.6	38.3	35.6	32.0
... make it more likely to drive less	29.8	32.9	34.3	36.6	33.4	30.1
... likely reduce my income	27.9	36.9	35.7	35.6	39.1	29.3
... bring more revenue to the government	91.3	85.8	84.5	80.4	82.5	80.9

Notes: This table reports the percent of respondents who think the imposition of a carbon tax will affect car ownership, personal income, and government revenues by age of respondents.

Table A6: Citizens View on the Vehicle Emissions by Age

	Percent saying somewhat/strongly agreeing					
	24 years or below	25-34 years	35-44 years	45-54 years	55-64 years	65 years & above
Vehicle emissions are a problem in Ghana	92.8	90.3	90.3	90.4	92.2	92.2
Vehicle emissions are a problem for the world	86.4	83.9	86.8	88.1	87.6	88.3
Govts should impose taxes to control emissions	86.8	79.5	82.3	81.6	76.0	79.3

Notes: This table reports the percent of respondents who think vehicle emissions are a problem in Ghana and the world and that, governments should impose taxes to control vehicle emissions by age of respondents.

Table A7: Citizens View on the Imposition and the Use of Luxury Vehicle and Carbon Tax by Region

	Percent saying somewhat/strongly agreeing						
	Western	Greater Accra	Volta	Ashanti	Bono	Northern	Savannah
<i>Impose a luxury vehicle tax and use it to...</i>							
... fund free secondary school	85.3	64.0	86.3	74.2	64.3	93.1	89.8
... build more roads projects	90.3	68.8	95.5	80.7	68.5	96.6	91.6
... pay for more medical facilities & staff	90.3	68.9	96.2	82.2	68.5	96.3	92.2
... plant more trees to prevent flooding	73.9	64.6	85.9	64.7	67.1	89.4	89.2
<i>Impose a carbon tax and use it to...</i>							
... fund free secondary school	89.7	67.4	86.3	79.2	77.9	86.6	94.6
... build more roads projects	92.1	72.0	93.6	82.1	79.8	90.6	95.2
... pay for more health medical & staff	92.6	71.8	94.6	82.5	80.8	91.7	96.4

Notes: This table presents the percent of respondents who think that the government should impose a luxury vehicle/carbon tax and use it to undertake various developmental projects including funding free SHS, construct more roads, build more medical facilities, hire more health professionals, and plant more trees by age of respondents.

Table A8: Citizens View on the Vehicle Emissions by Region

	Percent saying somewhat/strongly agreeing						
	Western	Greater Accra	Volta	Ashanti	Bono	Northern	Savannah
Vehicle emissions are a problem in Ghana	95.0	83.0	99.0	97.5	93.4	81.4	84.3
Vehicle emissions are a problem for the world	95.8	78.2	97.1	87.0	91.1	79.1	97.0
Govts should impose taxes to control emissions	93.4	64.0	75.7	85.9	82.2	90.9	95.8

Notes: This table reports the percent of respondents who think vehicle emissions are a problem in Ghana and the world and that, governments should impose taxes to control vehicle emissions by region.

Table A9: The Impact of an Imposition of a Carbon Tax on Prospective Car Ownership, Personal Income, and Government Revenues by Region

	Percent somewhat/strongly agreeing						
	Western	Greater Accra	Volta	Ashanti	Bono	Northern	Savannah
<i>A carbon tax would...</i>							
... NOT increase my overall tax	53.9	82.3	93.3	72.2	82.2	45.4	78.3
... make it less likely to buy a car	40.0	36.4	2.9	26.6	14.6	34.0	32.5
... make it more likely to buy a smaller car	42.9	54.3	3.8	31.8	18.8	38.3	33.7
... make it more likely to drive less	37.4	46.7	1.9	35.8	11.3	35.1	30.1
... likely reduce my income	44.2	47.4	31.3	28.6	12.2	43.1	12.0
... bring more revenue to the government	90.8	72.0	94.9	85.7	85.0	83.4	98.2

Notes: This table reports the percent of respondents who think the imposition of a carbon tax will affect the ownership of a car, personal income, and government revenues by region.

Table A10: Citizens View on the Imposition and the Use of Luxury Vehicle and Carbon Tax – Full Breakdown of Responses

	Strongly Agree		Somewhat Agree		Somewhat Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<i>Impose a luxury vehicle tax and use it to...</i>								
... fund free secondary school	1900	57.8	602	18.3	353	10.7	432	13.1
... build more roads projects	2049	62.3	631	19.2	283	8.6	324	9.9
... pay for more medical facilities & staff	2090	63.6	608	18.5	270	8.2	319	9.7
... plant more trees to prevent flooding	1619	49.3	741	22.5	443	13.5	484	14.7
<i>Impose a carbon tax and use it to...</i>								
... fund free secondary school	1676	51.0	936	28.5	350	10.6	325	9.9
... build more roads projects	1864	56.7	868	26.4	300	9.1	255	7.8
... pay for more health medical & staff	1887	57.4	860	26.2	289	8.8	251	7.6

Notes: This table presents the full breakdown of responses of citizens' views on the imposition of a luxury vehicle/carbon tax and use it to fund various developmental projects including funding free SHS, construct more roads, build more medical facilities, hire more health professionals, and plant more trees.

Table A11: Citizens View on the Vehicle Emissions – Full Breakdown of Responses

	Strongly Agree		Somewhat Agree		Somewhat Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Vehicle emissions are a problem in Ghana	2290	69.7	698	21.2	161	4.9	138	4.2
Vehicle emissions are a problem for the world	2097	63.8	749	22.8	280	8.5	161	4.9
Govts should impose taxes to control emissions	1722	52.4	935	28.4	293	8.9	337	10.3

Notes: This table reports the full breakdown of responses on citizens' views on vehicle emissions.

Table A12: The Impact of an Imposition of a Carbon Tax on Prospective Car Ownership, Personal Income, and Government Revenues – Full Breakdown of Responses

	Strongly Agree		Somewhat Agree		Somewhat Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<i>A carbon tax would...</i>								
... NOT increase my overall tax	1678	51.0	717	21.8	528	16.1	364	11.1
... make it less likely to buy a car	424	12.9	522	15.9	1139	34.7	1202	36.6
... make it more likely to buy a smaller car	566	17.2	627	19.1	1043	31.7	1051	32.0
... make it more likely to drive less	528	16.1	579	17.6	1065	32.4	1115	33.9
... likely reduce my income	535	16.3	624	19.0	984	29.9	1144	34.8
... bring more revenue to the government	1922	58.5	836	25.4	281	8.5	248	7.5

Notes: This table reports the full breakdown of responses on the impact of the imposition of carbon taxes on prospective car ownership, personal income, and government revenues.

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