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Taxi operator's perception on environmental levy to curb carbon emissions. A case of motor vehicles in Kampala (Uganda)

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Declaration

I Beatrice Namanya hereby declare that this work is my own research carried out under the supervision of Prof. Shai André Divon at the Department of Environment and Development Studies, Norwegian University of Life Sciences. All articles, journals, books, and related articles have been duly acknowledged and referenced.

Student Signature _____ Date: __15th May 2023_____

Abstract

Climate change and other environmental problems are frequently attributed to social problems and a lack of collective action. The national environmental law was amended in Uganda, and a new environmental tax clause was added to cut down on emissions from old cars and other sources. Studies show that every day, some 50,000 vehicles enter the city, most of them are taxis. These vehicles, which are largely reconditioned or used, have poor fuel efficiency, and emit a lot of exhaust fumes into the air, contributing significantly to the poor air quality in different cities of the country. Effective policy implementation requires a detailed understanding of the operators' perception of pollution and environmental concerns to reduce emissions. This is essential for the efficient implementation of the tax policy and the enactment of new policies in the future to safeguard the environment and reduce pollution. In this sense, this study aims to contribute to the understanding of taxi operators' perceptions of the environmental levies on reconditioned vehicles as a measure to curb emissions in Uganda, using Kampala as a case study. First, the review of academic literature was conducted to comprehend the relationship between environmental levy and taxi operators. Secondly, one focus group discussion (FGD), Ten (10) key informants, and one hundred (100) interview questionnaires were distributed to taxi operators in Kampala city, to gather field data for the analysis of their perception. And in this case, 69% of the taxi operators surveyed felt that reconditioned vehicles pollute the environment; and 76% of respondents (Taxi operators) attribute vehicle pollution to the release of dangerous gasses. In fact, most taxi operators (95%) are aware of the damage of pollution from reconditioned vehicles or automobiles. However, 62% of the taxi operators oppose a fee on the environmental levy, and other 59% respondents oppose a ban on reconditioned vehicles as emission-controlling measures. They also highlighted two main reasons why the Kampala taxi operators (sector) do not consider purchasing new vehicles; one was the high prices and two was poor roads/high maintenance. Reducing taxes on new vehicles for it will give a choice to those who can afford to pay willingly, and renovating road in the city to enhance mass transit systems like BRT and light rail are necessary if the city is to reduce emissions from the use of reconditioned taxis.

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List of Abbreviations

BRT- Bus rapid transport

CNG -Compressed Natural Gas

CO2-carbon dioxide

EFVs- Electric Freight Vehicles

EVs - Electric vehicles

FGD- Focus group discussions

GHG- Greenhouse gas emissions

IPCC- Intergovernmental Panel on Climate Change

KCCA – Kampala Capital City Authority

KPDP- Kampala Physical development plan

MOFPED-Ministry of Finance, Planning and Economic Development

NMBU- Norwegian University of Life Sciences

NSD- Norwegian Centre for Research Data

NYC – New York City

OECD- Organization for Economic Co-operation and Development

SPSS- Special package for Statistical Students

SSA – Sub Saharan Africa

UBOS – Uganda Bureau of Statistics

UN – United Nations

UNFCCC- United Nations Framework Convention on climate change.

URA – Uganda Revenue Authority

V2G- Vehicle-to-grid

CHAPTER ONE

1.0 Introduction

The environment is everything that surrounds humans and has a mutual relationship with them. The reciprocal relationship between living things and natural elements forms a unit that can determine the carrying capacity of the environment for development (Febrianti, 2022). In the modern era, it is common for humans to exploit the environment consciously and blindly according to their desires, with little regard for the negative consequences of their actions. Environmental issues and their management necessitate the participation of the government, legislators, law enforcement, and citizens (Febrianti, 2022).

Power plants that use fossil fuels are a major source of emissions that contribute to climate change. They also emit high levels of nitrogen dioxide and sulfur dioxide, which contribute to the formation of ozone and particulate matter (Larr, 2016). Pollutants in the atmosphere, such as ozone and particulate matter, are harmful to human health, according to Allison Larr and Matthew Neidell (2016). They cause respiratory symptoms and worsen asthma, but they can also cause heart attacks and irregular heartbeats, among other things (Anderson et al., 2012).

Considering the emission issues, the world agreed to a set policy, which include the Kyoto Protocol (1994) and the Paris Agreement (2015), both international policies that commit state parties to reducing greenhouse gas emissions, based on scientific consensus that global warming is occurring and that man-made CO_2 emissions are to blame (UNFCCC, 1994; Agreement, 2015).

Policies to reduce climate change and pollution are assumed to be useful in reducing carbon emissions from fossil fuel combustion. Larr and Neidell (2016) project that policies to reduce the emissions that cause climate change would significantly reduce atmospheric ozone and particulate matter, after examining various methods for modeling future air quality.

Countries must implement stringent policies to reduce carbon emissions. However, public support for such policies is insufficient (Anderson et al., 2017, Klenert et al., 2018). In fact, the more rigorous the measures, the less support from the community (Lachapelle and Paterson, 2013; Carattini et al., 2017, Beiser-McGrath and Bernauer, 2019).

Only if public support for a policy project exceeds a critical threshold for instance majority buy-in, it can be implemented without significant resistance. Public opinion influences the feasibility

of effective climate policy in a variety of ways, including general elections, as demonstrated by the repeal of carbon pricing in Australia (Crowley, 2017); direct referenda, as demonstrated by rejections of carbon taxes in Washington State (USA) (Reed et al., 2019); and social movements, as demonstrated by the 2018 Yellow Vest protests in France against a fuel tax with a carbon component (Doyenne and Fabre, 2020). On the other hand, experiences such as the carbon tax in British Columbia, Canada, demonstrate that favorable public opinion and increased policy ambition can coexist (Murray and Rivers, 2015).

Carbon taxation is a type of environmental taxation that specifies a number of fiscal "instruments that can raise revenue while simultaneously advancing environmental goals" (World Bank, 2005). Carbon taxes may comprise fees, charges, and duties having a basis that "is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment" (OECD, 2018a). Examples given by Heine and Black (2018) include CO_2 and other pollution emissions from energy generation and consumption, cars (road taxes, vehicle registration taxes, and congestion charges). According to OECD data (2018a), revenue from environmental taxation increased between 1994 and 2014 from US$420.7 billion to US$785.2 billion. With environmental deterioration growing more severe and directly related to human life, countries are striving to prevent global warming caused by emissions through taxing activities that contribute to emissions (Heine & Black, 2018). According to research, the carbon tax has been enacted in a number of nations, including Canada (Murray and Rivers, 2015), France (Doyenne and Fabre, 2020), Washington state (Reed et al., 2019), and Australia (Crowley, 2017). However, all have encountered widespread opposition. Uganda passed a law to reduce emissions under section 42 (1b) of the National Environment Act (2020), by inserting a tax and economic disincentives to discourage activities that pollute the environment. Furthermore, Section 171 subsection 1 of the act authorizes the imposition of fines and taxes, as well as (2d) pollutant emission costs (NEA, 2020).

Every year, low-income countries import thousands of used vehicles from international markets, with at least 85 percent of Africa's vehicle fleet being used cars, some of which are obsolete with outdated technology (Ayetor, 2021). These used vehicles provide affordable mobility in areas where only a small percentage of the population owns a car, but they also emit more pollution than newer vehicles (IGC, 2020). Outdoor pollution has increased by 57% in Africa over the last three decades, with motor vehicles being a major contributor (Ayetor, 2021). Most countries in Sub-Saharan African (SSA) rely on age-based import restrictions to reduce the inflow of old, polluting

used vehicles. These policies are especially important because they are one of the few approaches that aim to reduce local vehicle traffic emissions.

Air quality in cities in SSA has deteriorated, owing to factors such as rapid population growth and increased vehicle ownership, as well as industrial expansion (Ko, 2016), representing a major threat to human health.

Uganda imposed a ban on imported older cars in 2018, with many people skeptical of the dire consequences for the 11,000 direct beneficiaries (Brief, 2020). According to the Uganda Bureau of Statistics (UBOS), these beneficiaries included 11,139 car importers and forwarders. The government raised the environmental levy for buyers of used motor vehicles 5–10 years old from 20% to 30% (National budget, FY 2015/2016). In the national budget, a 50% environmental levy was also imposed on vehicles older than ten years (Brief, 2020; Parliament of Uganda, 2018).

The environmental tax is calculated based on the cost of insurance and freight on used vehicles, raising the cost of transportation, thus weaning the population off used vehicles as a result of high value-added tax and import duty for the same vehicle. As end users face higher prices across a wide range of age groups, evidence of substitution towards older vehicles has increased (Brief, 2020).

In Kampala, Uganda taxi business is one of the most important branches of the public transportation sector. This business is among the biggest employers of the sector in the city. It is considered to be a fast, flexible and cheap means of transportation for the general public. The taxi operators rely mainly on reconditioned vehicles (known as Matatus) for their business; only a few acquire new vehicles (drones). Even though environmental taxes critically affect taxi operators, their view of levy is not completely understood. In this sense, this study aims to explore taxi operator's perception of environmental levy on motor vehicles as a measure to curb carbon emissions. To achieve this, the awareness of taxi operators about dangers of environmental pollution in the central division of Kampala, Uganda, is assessed. Furthermore, the opinions of the taxi operators of this region on an environmental levy for reconditioned vehicles is studied.

1.2 Problem statement

Environmental issues such as pollution, climate change, and resource depletion are commonly attributed to social dilemmas and a lack of collective action (Muhammad, 2021). International organizations, such as the Organization for Economic Co-operation and Development (OECD), the United Nations (UN), and the World Bank recommend that policymakers should implement

environmental taxes to achieve several goals, including reducing the impact of climate change, protecting the environment, and generating additional revenue for governments. According to the UBOS, about 50,000 vehicles enter the city each day, most being taxis. These vehicles, which are mostly used, burn fuel poorly and emit a lot of exhaust fumes into the atmosphere (Mutenyo, 2015), and thus contributing to the country's poor air quality in Kampala and other cities. Uganda amended its national environmental act in 2020 (Uganda National Environment Act, 2020), which included an environmental levy to reduce carbon emissions from old vehicles, and other emitters. The effectiveness of a policy is dependent on a carefully designed framework that incorporates a country's social and economic context as well as stakeholder support such as the taxi operators (Zhou 2020). In spite of the fact that taxis are important contributors to the emissions of roadside pollutants and greenhouse gasses (Zhou 2020; Li, 2019), taxi operator's perception on environmental levy is understudied with little to no information locally. Muhammad (2021) recommends the need for studies on stakeholder acceptability of environmental tax policy before implementation, and to inform the design of future environmental policies. Accordingly, this study aims to understand the perception of taxi operators in regard to the environmental pollution and tax imposed on reconditioned cars to reduce carbon emissions, using Kampala, Uganda as a case study.

CHAPTER TWO

2.1 Objectives

2.1.1 General objective

To contribute to the understanding of taxi operator's perceptions of the environmental levies as a measure to curb emissions in Uganda.

2 .2.2 Specific objective

- To assess the taxi operator's awareness of the dangers of environmental pollution in the central division of Kampala-Uganda.
- To assess taxi operator's opinion on the environmental levy imposed on reconditioned vehicles in Central division, Kampala.

2.2 Research Questions

- Are taxi operators aware of the of environmental pollution and Levy in central division Kampala-Uganda?
- Are taxi operator's supportive or not of environmental levy on reconditioned vehicles in Kampala?

3.0 Literature Review

3.1 Taxi operator's awareness of the dangers of environmental pollution and levy

In recent years, transportation network companies have developed various services, such as express, ride-pooling, premium service, and app-based taxi hailing service, to satisfy the diversified travel demands of residents (Li, 2022). According to this author, Premium service has a positive effect on reducing the use of private cars among users with house vehicles, though relatively weak i.e., 14.1% of the valid 1206 valid samples.

Electric Freight Vehicles (EFVs) have a strong potential for urban freight transport and city logistics. The deployment of EFVs could significantly reduce exhaust emissions and noise pollution in cities (Şükrü, 2021). According to a study in New York, most taxi drivers believe they are more exposed to particulate matter than non-drivers. Besides, most believe air pollution causes health problems (Francesca, 2016). Exposure to both Black Carbon and $PM_{2.5}$ have been linked to negative health risks, including cardiovascular disease and lung cancer (Koton, 2013).

The transport sector has long been recognized as a major contributor to CO_2 emissions and consequently to climate change, but efforts at reducing emissions in this sector have not been very successful (Marsden and Rye, 2010). Within these efforts, public transport companies have been trying to improve management practices by implementing cleaner products to increase social, environmental and ecological benefits (Govindan et al., 2014). The practices are geared toward reducing transport emissions of CO_2, promoting greater equality of transport opportunity, and improving well-being and quality of life for consumers (Marsden and Rye, 2010)

According to Xei (2019) taxi industry in China adoption of natural gas is a typical reflection of the use of low-carbon energy, however, the application of Compressed Natural Gas (CNG) taxis in practice is difficult because of the unawareness of other consumer behaviors, choices, and the lack of consideration of the reforming and maintenance costs of CNG taxis in practical use during policy implementation.

One of the most important transactions between government and citizens is taxation (Marianthi ,2009). Governments determine the subsidy coefficient per unit of carbon tax and optimal reduction rate of carbon emissions confirmed by taxi operators. For instance, government increasing subsidy for CNG taxi, the competitive advantages of the CNG taxis are strengthened while the revenues of oil-fired taxis decrease constantly, which forces oil-fired taxis out of the

market (Xei, 2019). At the same time, the service prices of both kinds of taxis are proportional to the money paid by consumers and the positive impacts of service prices on CNG taxis are greater than that on oil-fired taxis. The carbon tax standard set by the government can play a proper role only if it considers the interests of both consumers and CNG taxis.

3.2 Taxi Operators Opinion on the environmental levy imposed on reconditioned vehicles.

Applying a green tax is one such legislative tool applied through a 'carrot and stick' routine by way of deterrence or incentives which is essentially an either/or approach (Christiansen and Smith, 2012). Environmental taxation, and the carbon tax in particular, trace their genesis to the Pigouvian (Gregory, 2008) basis, which comes from the proper and equitable allocation of costs between entities engaging in pollution and victims of the pollution in society at large.

The misperception of the economic effects of taxation is a major barrier to support carbon taxation. People consistently overestimate net monetary loss and wrongly think that the policy is regressive, while underestimating its efficacy on the environment with thought of not being effective (Douenne and Fabre, 2022). According to a study in India, the Shimla Municipal Corporation imposed a 'green tax' on vehicles bearing registration numbers of other states. This met with fierce resistance from hotels and taxi operators. Over 40,000 taxi operators went on strike in 2015 against the National Green Tribunal's decision to tax tourist vehicles (Chaturvedi, 2017). Besides, indicates the excise duty imposed on petrol and diesel i.e., implicit carbon tax is fragmented as for environmental tax policy has certain dysfunctionalities in way carbon tax is levied as well as coverage (Chaturvedi, 2017).

A New York study on taxi operators indicates that without government intervention the 5-year future NYC taxi fleet would comprise 9.35% high electric vehicles, which will lead to a 2.29% decrease in carbon dioxide emission over the current fleet (Gao, 2008). However, 0.03% particulate matter is possible from a high proportion of sport-utility hybrid taxis, government intervention (e.g., mandates or incentive programs) is necessary to further improve the environmental effects of the taxi fleet (Gao, 2008).

Evidence of differential preferences for older vehicles and their characteristics (Grubel, 1980; Pelletiere and Reinert, 2006, 2010) suggest that the elasticity estimates from advanced economies do not accurately reflect the responsiveness of demand to tax based interventions in low-income countries (LIC) settings. Over 90% of vehicles imported into Uganda are already second-hand, most coming from Japan (Forster, 2020). The environmental levy does not apply to goods vehicles;

however, it has a negative impact on imports and mixed impact first-time registrations, raising transactions especially among recondition vehicles.

The inventory of passenger vehicles available for resale in Uganda built-up throughout 2013, rising more slowly from then until the beginning of 2015, and peaking in June 2015 sharply due to the spike in imports. With imports depressed after the levy change, the level of registrations appears to be sustained from this previously accumulated stock (Forster, 2020).

3.3 Theoretical Framework

Environmental taxation has been used in industrialized countries for several decades to internalize environmental externalities. With social and economic progress, many developing countries have reached the stage of implementing environmental taxation reform in order to achieve cleaner production and long-term development (Zhe, 2022).Through environmental levy, governments are able to regulate social costs such as the importation of reconditioned vehicles that are one of the biggest emitters of pollutants such as Sulphur-dioxide, nitrous oxide, and ozone among others and are dangerous to both human health and the environment (Zhe, 2022). The government of Uganda, through the Ministry of Water and Environment and Uganda revenue authority, introduced an environmental tax clause in the National environment act, 2020, to curb the emission from old vehicles and reduce the dumping of these reconditioned vehicles in the local market (National environment act, 2020). The policy is aimed at promoting more modern and fuel-efficient cars and deterring the importation and use of reconditioned vehicles locally. However, for those who still need to import old cars, the policy requires a tax based on the year of manufacture applied, and cars older than 8 years face a ban. This study is based on the Pigouvian tax theory (Baiardi & Menegatti., 2011; Jacobs &; de Mooij., 2015; Banzhaf., 2020), which is premised on the idea that environmental problems arise when the social cost of pollution exceeds the private cost. Thus, the government applies the theory to correct market failure by imposing a tax on reconditioned vehicles that cause pollution so as to internalize the environmental cost of pollution from reconditioned vehicles on the market hence reducing emission level for instance adding a tax at the level of marginal damages increases welfare (Baiardi & Menegatti., 2011).

3.4 Justification

The information is useful for policymakers in developing a feasible and acceptable carbon tax policy that will look at increasing welfare by reducing emissions from reconditioned vehicles. The outcome will inform policymakers on the public awareness and perception of the environmental

policies, specifically the levy imposed on imported reconditioned cars in Uganda. This will help the government in designing measures to improve the public's compliance with environmental policies. This will aid in ensuring the effective curbing of carbon emissions from the transport sector.

4.0 MATERIALS AND METHODS

4.1 STUDY AREA

4.1.1 Location and Topography

Kampala is Uganda's political capital, greatest urban hub, and only city until 2020. (Local government act,1997) constituting 5 divisions of Central, Nakawa, Kawempe, Makindye and Rubaga, located at coordinates 0.3476° N, 32.5825°E (KCCA, 2014). Kampala has a total area of 189 square kilometers, which includes 169 square kilometers of land and 19 square kilometers of water. The highest point of the topography is 1,311 m (4302 ft), with numerous low flat-topped hills and valley.

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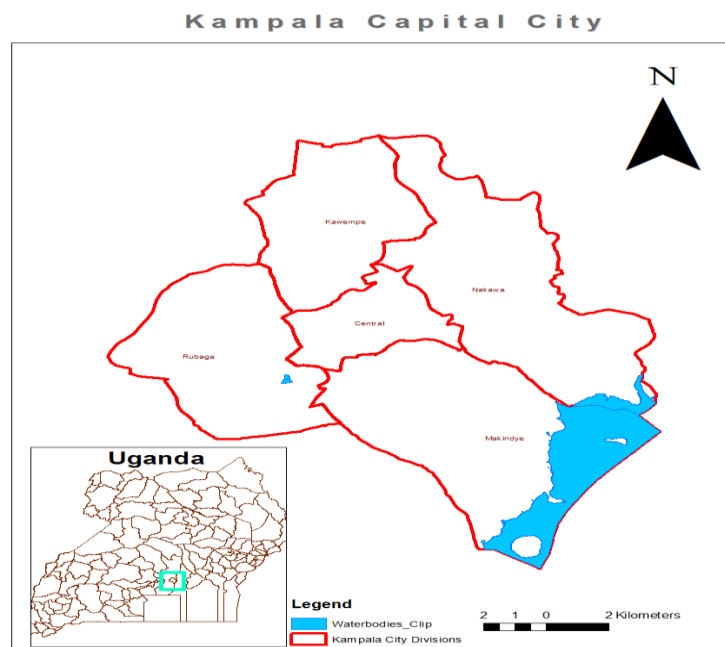
Figure 1: Map of Kampala showing the five divisions of the city. **Source:** *Kampala Capital City Authority (KCCA)*

4.1.3 Environmental aspects

Kampala experience a tropical climate impacted by the city's closeness to Victoria (KCCA, 2014). The vegetation comprises of huge papyrus swamps and perennial streams. (Hickman and Dickens, 1981) and wetlands such as such as Lubigi, Kinawataka, Nakivubo, and Banda, among others. (KPDP, 2012; MNR, 1992).

The city of Kampala's air quality has substantially declined over the previous few decades (Schwander et al., 2014). According to the World health organization (WHO), "Kampala's mean PM$_{2.5}$ concentration (138.6 μg/m3) is 5.3 times the World Health Organization (WHO) cut-off limit" (Bruce, 2015). A rapidly growing number of older, unrestricted exhaust-emitting vehicles imported second-hand and rebuilt automobiles, lorries, buses, and motorcyclists make up Kampala's automotive traffic. (Schwander et al., 2014). Besides, many wetlands have been encroached on due to the increasing population with an annual growth percentage of 3.9% (UBOS, 2014).

4.1.2 Socio-economic aspects

Kampala has a residence population estimated at 1,650,800, with a 3.9% annual growth rate and the daytime population estimated to be 4 million people. The male is estimated at 47% and the female estimated at 53% (UBOS, 2019). 25% of the population is below 10years and only 2% are 60+ years of age. Majority, 43% are averagely 25-year-old and so have an average life expectancy of 63 years (UBOS, 2014; J. B. Nyakaana et al., 2007).

Economically, it is home to 80% of the country's industrial and commercial operations, accounting for more than 65% of national GDP, with 60% being informal. With this industrial and commercial operations, and the national economic strategy on industrial and manufacturing sectors, has promoted and realized a rise in cottage and other larger industries within the city. In addition to the ever-growing road traffic and unregulated industrial emissions, waste burning by individuals to manage uncollected waste, also contributes to the deterioration of air quality in Kampala (Schwander, 2014).

4.2 METHODOLOGY

4.2.1 Assess the taxi operator's awareness of the dangers of environmental pollution in Kampala

Qualitative and quantitative research methods were used: a mixed method approach. Qualitative data gives a high platform for exploring the problem being researched as it offers rich and in-depth knowledge about the phenomena under study (Thomas et al., 2010, Bryman, 2016), and also it allows the researcher to investigate people's experiences and examine their stories. For primary data collection, a quantitative technique was used (Bryman & Bell, 2011; Creswell and Poth, 2016).

According to Bryman (2016), he highlighted "survey researchers are invariably concerned to be able to generalize their findings to large populations and frequently use random sampling to enhance the representativeness of their samples and therefore the external validity of their findings". In that case, Purposive and random sampling was used to administer 100 interview questionnaires (Appendix 1) targeting taxi owners, conductors, and drivers. Furthermore, a group was assembled to gather additional information from the public. This focus group discussion (FGD) included 12 people: one taxi owner and four drivers, one car bond manager, one car broker, three taxi clients, and two city representatives (policymakers) (Creswell, 2014). The FGD reduces the power relationship that exists between a researcher and a respondent (Bryman, 2016) because the investigator simply acted as the facilitator for the discussions, where different questions and probing was employed to get different views of people. FGD was conducted from an agreed-upon place like a community center or facility area depending on the distance and arrangements with the field coordinators.

4.2.2 Assess taxi operator's opinion on the environmental levy imposed on reconditioned vehicles in Kampala.

The responses from the focused group discussion were supplemented into a structured questionnaire, which was distributed to taxi operators individually via interviews. It was divided into sections based on the study's objectives, such as individual socioeconomic information, compliance performance, and challenges, among others. And in that case, a survey questionnaire was administered to 100 taxi operators using purposive and random sampling, (Bryman, 2016) guided by the research questions. Questionnaires were distributed by research assistants who are fluent in both English and the local language (Luganda). In addition, the research questions (Key informant checklist – Appendix 2) were used to guide the selection of key informants. According to Bryman (2016), Key informants are important people or participants assumed to be knowledgeable about the subject under study. And in this case, the key informants were; the chairperson of the taxi operators' association who is responsible for the welfare of taxi drivers, the KCCA technical officer at the directorate of engineering and technical services who is in charge of motor vehicles and transport regulation in Kampala, the environmental officer at KCCA directorate of public health and is in charge of environment protection, the commissioner traffic at the ministry of works and transport, the commissioner at the ministry of finance, Planning and Development (MOFPED) who is the charge of environment and climate change, and other 3 policymakers in charge of environmental levy issues. Interaction with each key informant did not

last more than 20 minutes. Secondary data collection from published literature was undertaken to gather additional taxi operator's opinions on the environmental levy imposed on reconditioned vehicles.

4.3 Field entry procedure

I and the research assistant used a letter of introduction from NMBU University confirming my research (attached letter in appendix 3). Therefore, a research permit from Kampala capital city authority to the various key informants. I and my research assistant then met with the various key informants the Policymakers in (KCCA, Ministry of Finance, taxi leaders, traffic commissioners, and others) to explain the research and obtain their consent to participate; as emphasized by Bryman, "these are the gatekeepers" (Bryman, 2016). They were able to provide easy access to other participants in Kampala's central division, such as taxi drivers, owners, and conductors, for primary data. Several communication channels, such as physical (face-to-face), phone calls, WhatsApp messaging, and emails, were used to support data collection in the field (cite). In addition, A promise to maintain the confidentiality of the gathered information was made (communicated) to the participants at large and added an agreement signed as a consent letter with the Norwegian Centre for Research Data (NSD) is in the appendix.

4.4 Data Analysis

As Bryman (2016) describes, "When researchers conduct initial coding, they compare data with data; stay close to and remain open to exploring what they interpret is happening in the data; construct and keep their codes short, simple, precise and active; and move quickly but carefully through the data". In that case, the interviews were transcribed, and thematic analysis was performed, which entails using reiterative techniques of reorganizing data from interviews, grouped into themes, to make sense of and answer the research questions (Bryman, 2016).

Furthermore, Content analysis was used to group themes in relation to the objectives and research questions using classification and coding (Berg and Lune, 2012) to analyze the diverse perspectives of the participants. In addition, Statistical Package for the Social Sciences (SPSS) and Excel analysis applications was used to analyze descriptive statistics such as the frequency of answers in the questionnaires and draw conclusions about awareness of the dangers of environmental pollution and the levy, as well as support or opposition to the levy.

4.5 Ethical considerations

As mentioned by Bryman (2016), Research ethics are rules that tell us how to treat the people who participate in our studies and what interactions with them are appropriate or inappropriate

(Bryman, 2016). Therefore, Before the participants were included in the study, the (NSD) process was in conformity with the research, and the research assistant obtains informed consent. I also made sure that The KCCA process of conducting research was adhered to by obtaining a letter of permission from KCCA (Appendix 5). During the interview, I ensured that I followed the research processes and guidelines as Bryman (2016) advised and as I was taught in class by asking the participants for permission to record the interviews rather than doing so secretly and if they were okay with it. I and my research assistant also ensured that the information provided, and data gathered are kept secure, confidential, and private. Furthermore, it protected the study participants' anonymity (Bryman, 2016). With the recent news of the COVID-19 increment in Uganda, I and my research assistant were required to observe and adhere to standard operating procedures such as masking, sanitizing, and social distancing.

CHAPTER FIVE

5.0 RESULTS

5.1 Taxi Operators level of awareness of the dangers of environmental pollution

5.1.1 Dangers of environmental pollution from reconditioned vehicles in Kampala

In this research, the taxi operators are drivers, conductors, and owners. Drivers and conductors are indirectly affected by environmental levy through high-income return needed by the owners as a result of tax hence long working hours to meet income target. While the owners are directly impacted by the tax they are required to pay, which in turn affects the period of income return and start earning profit. The quantitative computations indicated that 69% of the taxi operators agreed that reconditioned vehicles pollute the environment, 45% being drivers, 5% conductors, and 19% owners (Table 1). Opinions of the different operators are important for targeted interventions in curbing environmental pollution. Of the operators who agreed, 38% stated that, despite the known dangers of environmental pollution, the unaffordability of new vehicles forces these taxi operators to use reconditioned vehicles. For example, 64% of drivers, 52% of owners, and 50% of conductors stated the unaffordability of new vehicles. Furthermore, 8% of drivers, 32% of owners, and 25% of conductors reported excessive maintenance and servicing costs. Also, least but not last, 15% of the drivers, 3% of the proprietors, and 13% of the conductors indicated the vehicles to emit dangerous emissions, including. (Table 1)

Table 1. Reconditioned Vehicles cause pollution to the environment in Kampala Capital City

Operator's Role	Yes	No	Total

Driver	45%	16%	61%
Conductor	5%	3%	8%
Owner	19%	12%	31%
	69%	31%	

The taxi operators who disagreed with the fact that reconditioned vehicles pollute the environment were 31%, and those that stated that new vehicles were unaffordable were 21%. The taxi operators supported their notion by stating that "if new vehicles were affordable, they would not be buying reconditioned cars". Additionally, 2% of the operators indicated that poor roads are the reason why they do not invest in new cars. Finally, other operators (3%) were not concerned about any environmental problems, and therefore did not consider the option of buying a new vehicle as

a   b
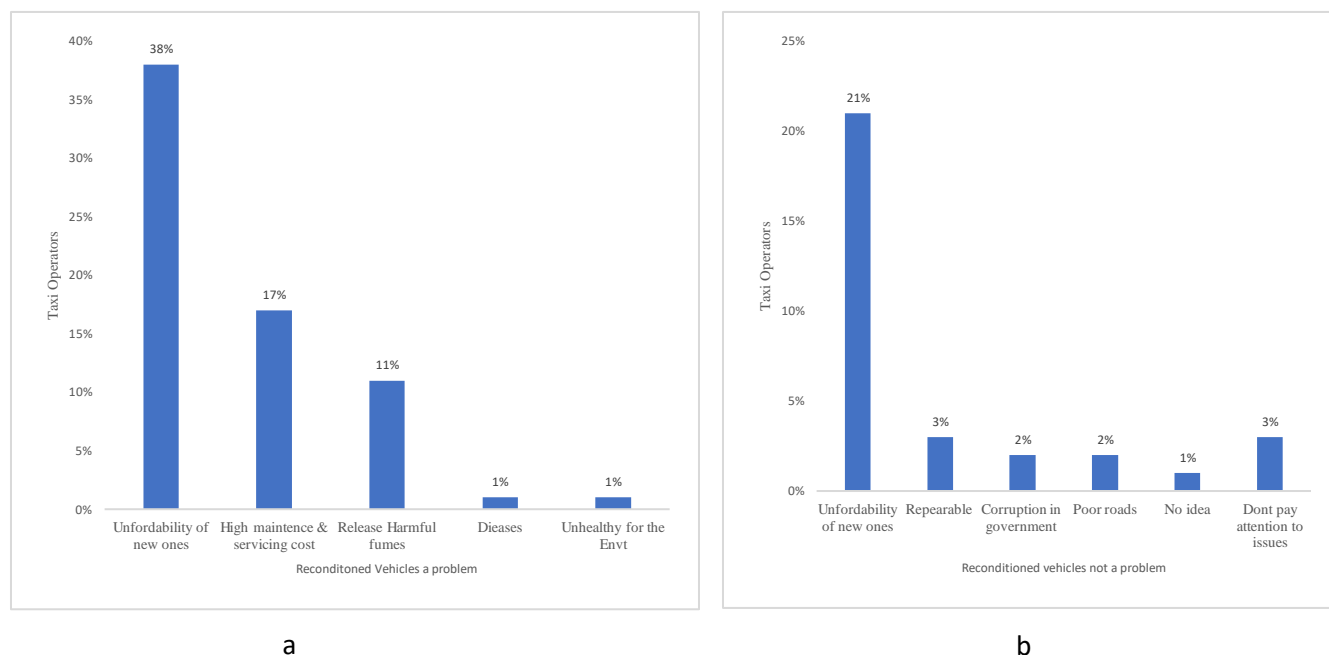
Figure 1. Taxi operators' awareness of reconditioned vehicles as a pollution problem, (a) agreed and (b) disagreed.

5.1.2 Taxi operators' Awareness on Vehicle Pollution and Impact

According to the results, 96% of taxi operators acknowledge vehicle pollution. And 76% attributed it to the release of harmful gasses from vehicles, and 4% of these operator's had no idea of vehicle pollution (Figure 2a). When taxi operators were asked about the impacts of vehicle pollution, 26% related it to health problems, 12% mentioned the release of harmful gasses that destroy the environment, 53% related it to diseases, 4% said crops take long to mature and 5% had no idea of the impacts of vehicle pollution see (Figure 2b).
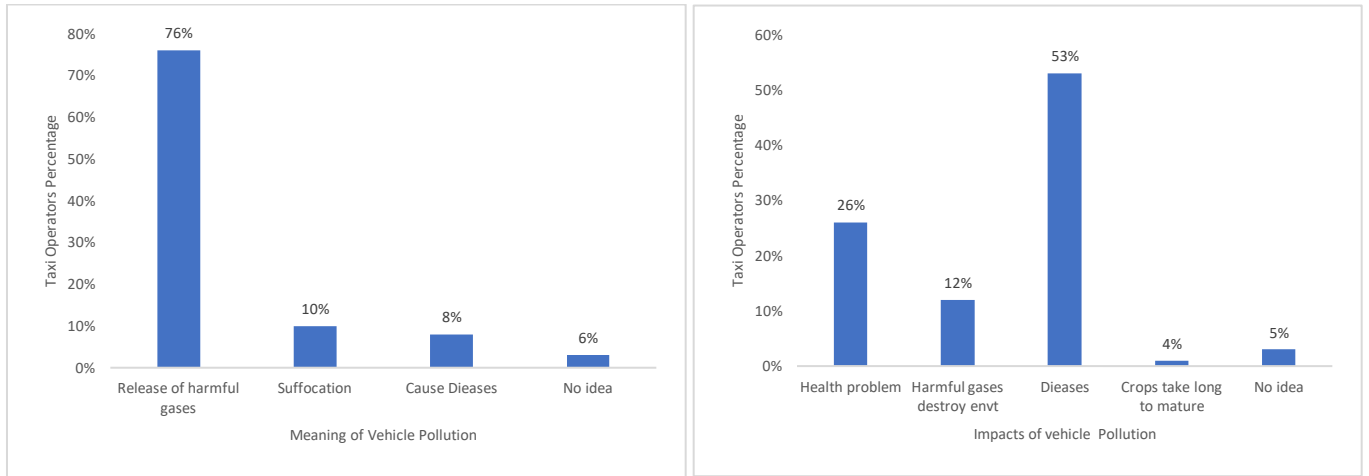
Figure 2. Awareness on vehicle pollution (a) and impact (b).

5.1.3 Awareness of the relationship of Climate change and Vehicles gasses

On the above case, 95% of the taxi operators know about Climate Change according to the results, and 65% of these participants related vehicle gasses to climate change. Furthermore, the operators attributed climate change to changes in seasons (48%), increase in temperature (6%), prolonged drought (5%), irregular weather events (22%), and increased flooding (3%) (Figure 3a, 3b). The operators attributed this relationship to the depletion of ozone layer in the atmosphere which is degraded due to harmful gasses released by the vehicles. Also, they affirmed that acidic rains are the result of heavy metals present in the vehicles' gasses. Additionally, these participants claimed that the delay in the maturing of crops was due to the blackening of leaves which in turn affect photosynthesis. Finally, with seasonal changes for instance the city is experiencing a long dry spell coupled with higher temperatures than before.

Furthermore, 35% of the operators indicated there was no relationship between climate change and gas emissions. And 33% maintained they had no idea about the relationship. An analysis of the socio-economic status of those that said no relationship of vehicle pollution to climate change had a strong positive correlation coefficient (r=94.9%, df= 60, p>5%), 56% of the operators had only completed their primary level of education. And 28.5% had completed the Ordinary level of education and 11% had only completed the Advanced level of education. While those that agreed (65%) to a relationship, 26% of operators completed primary education, 49% completed ordinary level of education and 9.2% completed Advanced level of education, and 4.6 % Tertiary level of education.
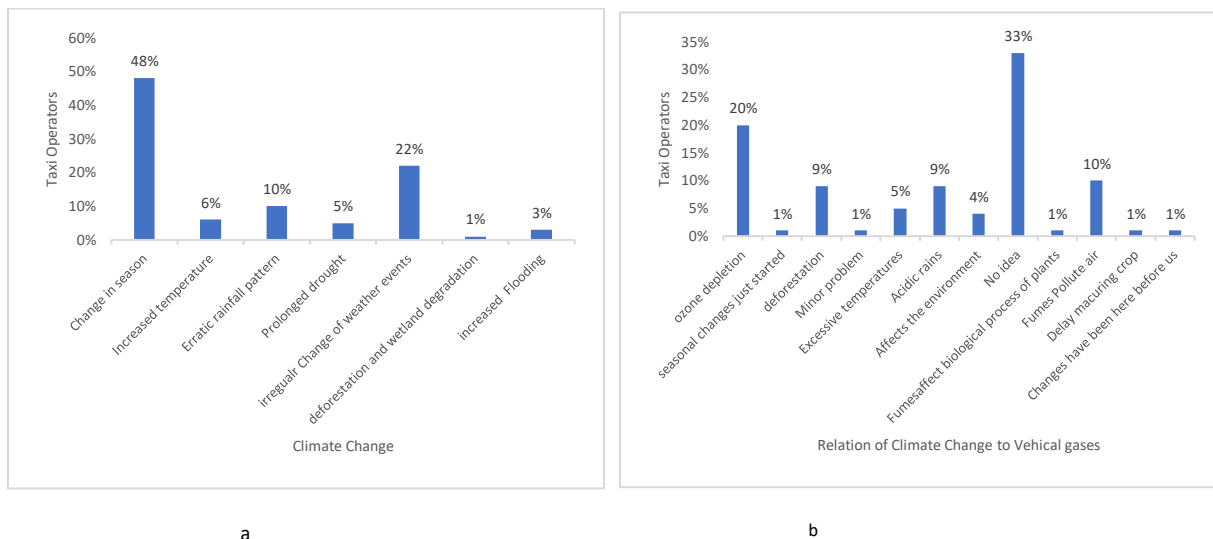
Figure 3. Comments of taxi operators on climate change (a) and (b) Relationship of climate change with vehicle gasses according to taxi operators.

According to the results, 81% of the operators indicated the need to reduce emissions in Kampala: 30% of the operators urged the need to reduce diseases, reduce air pollution (21%), avert climate change (2%), and stop the destruction of the ozone layer (2%) (Table 2).

Table. 2 Answers of taxi operators on the need of reducing emissions in Kampala City

Reasons	Yes
Reduce diseases	30%
Reduce air pollution	21%
Not change anything	7%
Health Problems	6%
Small portion of the big problem	6%
Age of vehicle cause pollution	2%
Avert climate change	2%
Destroy ozone layer	2%
Less of govt concern	2%
lack of alternatives	1%
Promote electric vehicles	1%
Save on fuel consumption	1%
Total	**81%**

	No
Small portion of the big problem	6%
Not change anything	5%
Personally, not affected	3%
All of Kampala like the drainage channels	1%
lack of alternatives	1%
No idea	1%
No proof that taxis release emission	1%
Promote electric vehicles	1%
Total	**19%**

5.2 Taxi Operator's Opinion on the environmental levy

5.2.1 Opinion on a government policy to curb emissions.

Analysis shows that 83% of the taxi operators indicated that there's a need for policy to curb emissions (Table 3). Notably, 20% attributed this to the safety of citizens and a need to reduce government expenditure on health services, and 12% indicated a need to prevent environmental damage from vehicle oils and fumes. Furthermore, 4% of the taxi operators indicated a need to tax substandard and imported fuel to reduce the number of vehicle users. Also, 2% of operators stated that it is the government's responsibility to put all the necessary measures for the safety of the environment from reconditioned vehicles through the use of tools like tax.

Table 3. Government policy on reconditioned vehicles emissions and Opinion on tax

Government Policy on emissions	Yes	83%
	No	17%
Reasons for the government policy on emission	Safety of citizens and reduce government expenditure on health services	20%
	Government reduces taxes on new vehicles	2%
	It is political in Uganda	1%
	Tax Substandard fuel and fuel imported	4%
	Main cause of pollution	2%

Government responsibility	2%
Prevent environmental damage	12%
Government officials cause Environmental damage	3%

On the other hand, 17% of the operators disagree with a policy due to corruption from government officials (4%), the inability of the government to implement policies (3%), and government officials causing environmental damage (Figure. 4). This may be attributed to the unbothered government enforcing agencies to curb environment degradation offenders with impartiality. The operators stated, "There are many policies and yet less progress has been achieved with it". 3% stated that government officials are responsible for environmental damage as well. 2% indicated the tax is not feasible for low-income people who can't afford brand new vehicles to do taxi business.
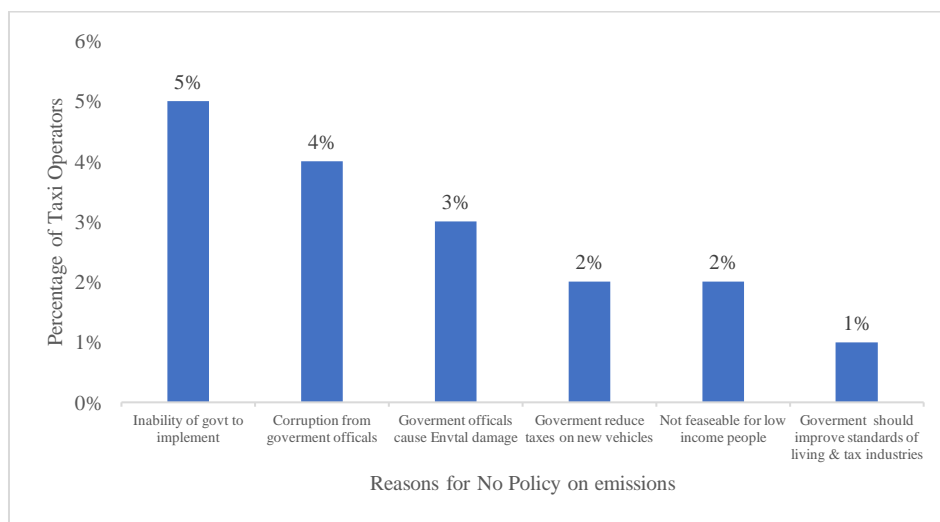
Figure 4. No need for government policy to curb emissions. *Source:* own

In the analysis on tax opinion, 54% of the taxi operators indicated there are no alternatives to the reconditioned vehicles for they are a major public transport means, thus taxing wouldn't be a good idea, "the government should first provide alternatives to the people before imposing any tax". 4% of the operators indicated corruption in government does not necessitate tax. Some operators indicated it will deter investors from investing in certain sectors which will in turn affect the economy because of the tax (Table 4).

However, the operators who agree (83%) with a need for a policy to curb emissions, indicated that it is a source of revenue, and it can be used as a financial source to invest in environmental compensation for instance., the tax levied can be used to offset the damage on the environment (Table 4).

Table 4. Taxi Operators' Opinion on Environmental Levy

Positive Opinion	Taxi operators (%)
Good initiative	10%
Prevent environment damage	8%
Impose at source	3%
Impartial implementation	1%
Increase revenue	1%
Compensate environment damage	1%
Negative Opinion	**Taxi operators (%)**
No alternatives	54%
Govt officials damage the environment	8%
Not necessary	7%
Corruption	4%
Deter investors from coming	2%
Does not make economic sense	1%

5.2. 2 Opinions on Environmental Tax as a Strategy for emission reduction

Taxi Operators' Opinions on Tax a strategy

Analysis shows that 62% of the taxi operators indicated no to a tax strategy for the reduction of emissions. 11% of these operators mentioned a need to ensure the affordability of new vehicles to lower the use of reconditioned vehicles other than taxing them. 7% state that factories and deforestation also emit and thus taxing reconditioned vehicles won't give the ultimate solution to emissions in Kampala. Given that taxis are the primary mode of public transportation, 7% believe taxation makes little economic sense (Table 5).

Furthermore, 38% of the operators agree to tax as a strategy to curb emissions from reconditioned vehicles. While 11 % mentioned a need to reduce tax on brand-new vehicles, and 2% stated the

tax will compensate for the damage to the environment. 4% of these operators attributed it to the influence of the purchase of new vehicles. 2% stated tax strategy will contribute to a lasting solution of emissions from taxi operations (Table 5).

Table 5. Tax as a strategy for reduction of emissions from reconditioned vehicles

Reason	Yes
Reduce tax on brand new	11%
compensate for the environmental damage	2%
Govt provide alternatives	1%
Contribute to a lasting solution	2%
Influence the purchase of new ones	4%
Ban old vehicles	3%
Ensure the Affordability of new ones	7%
Factories and deforestation have more pollution	4%
No alternatives	2%
Impose at source	2%
Sub-total	**38%**
Reason	**No**
No economic sense	7%
Wouldn't change anything	3%
Government should improve standards of living	1%
Reduce tax on brand new	4%
Corruption	3%
Bad fuel used	3%
Stop the import of fuel-powered vehicles	3%
Not lasting solution	3%
Ban old vehicles	3%
Different sources of emission in the city	3%
Ensure the Affordability of new ones	11%
Factories and deforestation have more pollution	7%
No alternatives	2%
if reconditioned are imported	3%

Poor roads	5%
Poor behavior of people & government	1%
Total	**62%**

Expert (Policymaker's) opinion on tax a strategy

A thematic analysis from the key informants informs on the environmental tax. 1 key informant indicated "Tax measures will cause the poor to suffer". (….) "Ensure taxis are serviced & maintained". 7 Key informants indicated "Develop well-built transport systems like bus rapid transport (BRT), and light metro train". 1 key informant indicated "introduce and gazette well-maintained stages for instance., only 2000 taxis should be packed in Kampala". (….) "Private sector needs to provide a sensitization platform on the effects of taxis on emission". 7 key informants indicated "tax cars other than fuel, for the effective curbing of emission".

5.2. 3 Opinion on a ban of reconditioned vehicles for emission reduction.

Taxi operators on a ban of reconditioned vehicles

59% of the taxi operators indicated there is no need to ban reconditioned taxis (Table 6). 24% affirmed a prohibition is not possible due to the high price of new cars. Also, 11% mentioned that factories and deforestation are more important sources of pollution. Finally, 10% declared that the ban would not make sense considering the income cost-benefit ratio (Table 6). Most drivers (37%) and owners (18%) are against the ban (Table 7).

Table 6. Ban reconditioned vehicles as a government policy.

Reasons to Ban reconditioned vehicles	Taxi Operators (%)
Market removal	9%
Solve problem at source	6%
Reduce tax on brand new	11%
No economic sense	4%
Laxity in gov't	3%
Gradual implementation	2%

Factories and deforestation source of pollution	1%
Reduce emissions	1%
Poor roads	1%
Already in place	2%
Bad fuel consumed	1%
Total	**41**
No Ban of reconditioned vehicles	**Taxi Operators (%)**
High price of new cars	16%
Factories and deforestation source of pollution	11%
No economic sense	10%
Laxity in gov't	7%
Poor roads	6%
Bad fuel consumed	3%
Impartial implementation	3%
Reduce tax on brand new cars	2%
Other pollutant sources	1%
Total	**59**

Expert opinion on a ban of reconditioned vehicles

The opinions of the taxi operators are collaborated with key informants who are mainly policy makers and implementors of any tax regime in the city inclusive of an emission levy, these included tax and environment officers of Kampala capital city authority, ministry of finance, Ministry of works and transport, traffic police officers, Uganda revenue authority. From the thematic analysis, 7 of the key informants indicated a no need to ban reconditioned vehicles i.e., "it may affect the public transport system in the city, given the major transport system for the city are taxis that use reconditioned vehicles". (…) "Level of importation only reduces 30% or less, it can mitigate but not meet objectives significantly". (…..) "The poor road infrastructure makes vehicles wear off very fast". (…..) "Reduce the years of manufacture to 5yrs from 8 years to curb very old vehicles".

Table 7. Socio-economic of taxi operators and opinion to ban reconditioned vehicles.

Age	Yes	No
18-36	9%	11%
37-54	31%	45%
>54	1%	3%
Taxi Stage	Yes	No
Kisenyi Park	14%	23%
Old Park	7%	11%
New Park	3%	8%
Namayiba Park	6%	9%
Usafi Park	40%	59%
Role	**Yes**	**No**
Driver	24%	37%
Conductors	4%	4%
Owner	13%	18%

5.2. 4 Taxi operators' opinion on Often willingness and amount to pay an environmental levy

The majority (85%) of taxi operators are not willing to pay a levy. 9% state it makes no economic sense, and the other 9% because it only benefits the government. 7% attribute they're not willing to pay corruption in government and so feel no need to pay tax. For those willing to pay, 5% indicated once a year, and 3% say twice a year of the total amount would be fine for giving time to gather the money from the taxi business. Another 3% indicated that the government decides the amount and so has no choice but to pay the tax. It is also worth noting that 2% indicated their willingness to if the tax is incorporated as a fraction into the passenger service vehicle tax so as to pay at once (Table 8).

Table 8. Taxi operators often willing-ness to pay carbon levy

Often willingness to pay	Taxi operators (%)
Not willing	85%

Once a year	5%
Twice a year of the total annual	3%
Government decides the amount	3%
Willing if incorporated in Passenger Service Vehicle (PSV) tax	2%
Government responsible for the damage	2%

Reason	Taxi operators (%)
No Economic sense	9%
Only govt benefits	9%
Government Responsibility	8%
Corruption	7%
Per year	4%
No willing coz its double taxing	4%
No value for tax	4%
Old vehicle still imported	2%
End consumers take the burden	2%
Economy is powered by fuel	1%
Should be levied on fuel sold	1%
I don't participate in spoiling	1%
incorporated in PSV	1%
Impose on fuel	1%
if incorporated in PSV	1%

5.2.5 Taxi Operators' amount willing to pay.

On the other hand, 80% of the taxi operators were not willing to pay any amount of carbon levies. However, 12% indicated that it is determined by the government. 4% mentioned that the amount to pay depends on the vehicle capacity, for instance, small vehicles should pay less a mount than heavy-duty vehicles. 2% stated they are willing to pay one (1) million shilling annually. 1% are willing to pay only 150,000 Uganda shillings annually and 1% are willing 2,000 Uganda shillings which are less than a dollar monthly (Figure 5). The reason for this statistic, according to key informants (8), taxi operators see tax as a burden to the already overburdened taxpayer.
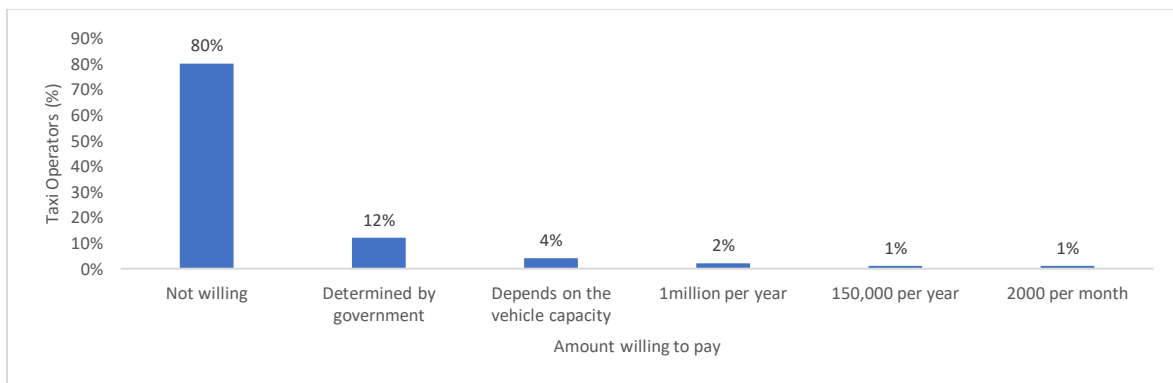

Figure 5. Taxi operators amount willing to pay

CHAPTER SIX

6.0 DISCUSSION

6.1 Taxi Operators level of awareness of the dangers of environmental pollution

Largely taxi operators in Kampala understand the dangers of environmental pollution. This may be attributed to the fact that many of them are actually drivers to who interact with vehicles they drive as opposed to the other categories of operators. The finding is similar to a study on New York taxi drivers, most taxi drivers believe they are more exposed to particulate matter than non-drivers (Francesca, 2016). Transportation is recognized as the major source of air pollution in many cities, especially in developing countries. Contribution of automobiles is reported in the range of 40 to 80% of the total air pollution (Goyal. et al. 2006). The operators who disagreed due to unaffordability of new vehicles and being informed of the dangers maybe due to limited engagement. According to Kelly et al. (2012), society would benefit from being better engaged and educated about the complex relationship between air quality and ill health.

However, a significant number of operators understand one of the causes of environmental pollution is vehicle pollution. The level of knowledge may be attributed to level of awareness for operators by the local authorities such as Kampala Capital City Authority (KCCA) through media talk shows during events like the annual air quality awareness week. According to the IPCC AR6 WGII the literacy of Ugandans is of 60-69% in relation to climate and its drivers, under scoring the level of engagement of public to emissions and sources (IPCC, 2019b; Simpson et al., 2021a). The finding is similar to that of Govindan et al., (2014), where public transport companies tried to implement clear products to increase social and environmental benefits.
 The attribution to release of harmful gases is due to the unregulated number of taxis that make their way into the city on a daily from the metropolis for instance, the high city day time population (KPDP, 2012), who use taxi most of which are in very bad mechanical condition due to inadequate serving of the engine system that has seen some of them release a lot of exhaust fume.

The level of awareness of vehicle gases relation to climate change may be attributed to the operators' socioeconomic status for instance a high number had only completed primary level of education. The analysis showed a very strong correlation coefficient (r=94.9%) of education level and taxi operators' responses to relationship of vehicle gases and climate change. Majority that saw a link analysis indicate higher attainment of education. This finding is similar to study in New

York, most operators believed exposure to both black carbon and $PM_{2.5}$ is linked to negative health risks, cardiovascular disease, and lung cancer (Koton, 2013). Despite the high literacy rate on climate change in Uganda as reported in the IPCC working group II report, the level of awareness of the dangers of vehicle gases to the climate may be inadequate among the taxi operators. Nonetheless, there is strong public support for a policy to curb vehicle emissions in the city.

6.2 Taxi Operator's opinions on the environmental levy

The majority of taxi operators agree on policy interventions to curb emissions. According to the operators, this will increase the safety of citizens and reduce environmental damage from taxi emissions. Besides, 2% indicated it to government's responsibility to put all necessary measures for the safety of the environment. This finding is similar to a study in NYC that found that without government intervention 9.35% of the overall future (5-year) NYC taxi fleet will be comprised of HEVs (Oliver and Vincent., 2008). As such, public perceptions are central to decarbonizing transportation and help capture the co-benefits of reduced local pollution, noise emissions, and oil dependency (Johannes,2019).

In line with the policy to tax reconditioned vehicles, 62% disagreed with the tax policy and attributed it to the unaffordability of new vehicles. This may be a misconception of economic returns against the cost of the environment which can be anchored on the current local economic situations of the locals. According to Douenne and Fabre (2022), misperception of the economic effects of taxation is a major barrier to carbon taxation. People consistently overestimate its costs while underestimating its efficacy. A study by Ruben (2019), suggests that the highest demand for cleaner vehicles would be achieved in two ways: firstly, by penalizing conventional vehicles in terms of costs/km; secondly, by providing incentives directed at lowering the purchasing price of hybrid and electric vehicles. Although the need for more environmentally friendly vehicles was recognized some decades ago, this new market has not yet established itself (Ruben, 2019).

Public perceptions are central to decarbonizing transportation and help capture the co-benefits of reduced local pollution, noise emissions, and oil dependency (Johannes,2019). 59% disapproved of the need to ban reconditioned vehicles. These affirm a prohibition is impossible due to the high price of new vehicles, 6% indicated poor roads, for even when new ones are purchased the bad roads cause fast wear and tear to vehicles. Furthermore, a ban on reconditioned vehicles leaves no option for public transportation. According to Bruun (2015), the majority of people who live in cities do not have the resources to own private motor vehicles, and consequently, public transport services assume great importance in sustaining livelihoods. A combination of limited road capacity

and weak traffic management and law enforcement resources often results in congestion levels that are considerably worse than in cities in other parts of the world, exacerbated by weak institutional and planning frameworks, and limited fiscal and household financial resources (Bruun., 2015). Public awareness and acceptance of electric vehicles (EVs) are essential components to catalyze a faster uptake of more sustainable passenger transport as well as vehicle-to-grid (V2G) mobility (Johannes,2019).

Besides, many of the taxi operators (85%) are not willing to pay at any moment, and any amount (80%) of the environmental levy. This may be attributed to the fact that operators perceive it as the responsibility of the government. This is similar to a New York study on taxi operators which indicated that without government intervention the 5-year future NYC taxi fleet would comprise highly electric vehicles, which will lead to a decrease in carbon dioxide emission over the current fleet (Gao, 2008). Taxi Operators also indicated no economic sense and thus Pelletiere and Reinert (2010) reflect the elasticity estimates and responsiveness of demand to tax-based interventions in low-income countries settings as operators preferred older vehicles. According to Chaturvedi (2017), a study in India on green tax, meet fierce resistance from taxi operators, with going on strike against the national green tribunal decision.

CHAPTER SEVEN

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The majority of taxi operators, who largely consist of drivers, are aware of the dangers of pollution from reconditioned vehicles and are also able to link reconditioned vehicle pollution to climate change, according to research on taxi operators' perceptions of environmental levies to reduce emissions. New vehicles are prohibitively expensive and have been found to hinder the transition to and adoption of new fuel-efficient vehicles. Of the different categories of taxi operators, the drivers were the majority and more concerned about the unaffordability of new vehicles whereas owners were more concerned about their(vehicles) high maintenance costs. It is to be noted that diseases are highly linked to vehicle pollution impact in the city.

There is a strong sentiment for the policy need to curb emissions. However, this is curtailed by limited alternatives to public transport due to the high prices of new vehicles. Reducing taxes on new vehicles and enhancing mass transit systems like BRT and light rail is necessary if the city is to reduce emissions from the use of reconditioned taxis. Public transport is underdeveloped and a ban on reconditioned vehicles will largely disrupt the public transport system. Despite imposing a tax is good intuitive to curb emissions, this will not fully address the emission problems of the city, but rather disrupt the social and economic fabric of the city dwellers due to limited alternatives. It is worth noting the non-willingness of the people to pay the environmental tax due to the perception like the poor implementation of policies that protect the environment by agencies of government hence the fear of some evading tax.

7.2 Recommendations

The high cost of new vehicles has contributed to the employment of refurbished vehicles in the city, which is important to know when analyzing taxi operators' perceptions of the environmental levy. As a result, the government and Kampala Capital City Authority (KCCA) need to develop a method to make brand-new cars less expensive in order to encourage the purchase and use of superior, fuel-efficient cars for taxi operations in the city.

The KCCA will need to upgrade the road infrastructure, including the installation of bus lanes to accommodate the growth of the city's bus rapid transit system and the introduction of light trains for mass transit to provide the general public with transportation options. In order to improve the

quality of fuel sold in the nation, the KCCA and government, through the National Bureau of Standards and Uganda Revenue Authority (URA), would need to monitor the fuel and oil quality imported into the nation.

To prevent environmental tax evasion and promote sustainable development, KCCA and URA must educate operators and other stakeholders, such as vehicle importers, about the advantages of utilizing new vehicles and the necessity of paying an environmental fee if one is to import reconditioned vehicles. There is need for research into level of consultation policy makers during legislation of tax policies. Future research may need to investigate the uptake of electric vehicles in the taxi operations in the city.

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Appendices

Appendix 1. **INDIVIDUAL INTERVIEW QUESTIONER**

Taxi Operator's Perception on Environmental Levy to curb carbon dioxide emission - December 2022

Dear Respondent, I'm a student of the International Environmental Studies program at NMBU, conducting a research project on "Taxi Operator's Perception on Environmental Levy". More specifically, the academic study is to determine the perception of taxi operators on dangers of emission and subsequent levy in Kampala, Uganda with focus on Central division. In your position as a community member, you have useful information to contribute to the success of the study.

Please do **NOT** write your name on this questionnaire. Your responses will be anonymous and will never be linked to you personally. Your participation is entirely voluntary. If there are items you do not feel comfortable answering, please skip them. The questionnaire will take you 5-7 minutes to fill. Thank you for accepting to take part in this study.

Section 1: Biodata

Please tick the most appropriate response

1. **Gender:** Male……………….... Female………………

2. Please write your;

   Age: ……………………………………………

   Education level………………………………….

   Taxi stage: ……………………………………....

1	What is you role a) Driver…….; b) Cashier ('conductor') ……… c) Owner…………
2	If, driver or Cashier, who is the owner? …………………………………………………………………………………
3	What is the age of your taxi? a) Brand new b) Reconditioned
4	Do you think the import of old reconditioned cars is a problem? Why or why not? ……………………………………………………………………………….
5	Do you know about vehicle pollution? If yes, what do you think is vehicle pollution and what sort of impacts vehicle pollution has according to your knowledge? ………………………………………………………………………………...
6	Is air pollution an important problem to you? If yes, why?...
7	Do you know what climate change is? If yes, What is climate change according to your understanding? ………………………………………………………………………………...

|	
8	Are vehicle gases related to climate change? If yes, how?...
9	Do you think it is necessary to reduce taxi emissions in our city? If yes or not why?..
10	Do you think the government should have a policy to reduce emissions, and why? Yes………………… No………………… If yes or no why?...
12	Do you think imposing taxes on reconditioned vehicles could be a strategy to reduce emissions? Yes or no and why?...
13	Do you think banning the import of reconditioned vehicles could be a solution to reduce emissions? Yes,no and why?...
14	If a levy was imposed, how often would you be willing to pay?
15	If a levy was imposed, how much would you be willing to pay?

Thank you!

End of Questionnaire

Appendix 2 - KEY INFORMANT QUESTION CHECKLIST

1. What is your take on taxi operations and emissions in the city?

2. What is your take on the need to reduce taxi emission in our city?

3. What means could be used to reduce emissions from taxi operations

4. What is your take on a policy to reduce emissions?

5. Would you shade light on environmental taxes?

6. If it were imposed would people be willing to pay and how much?

7. What is your take on imposing and banning of reconditioned vehicles as a solution?

Appendix 3-5 Consent Letters (NMBU,NSD and KCCA)
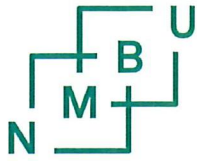
**Norwegian University
of Life Sciences**

0104
2005

To whom it may concern

Confirmation of Student Status

We hereby confirm that Beatrice Namanya, born 18. September 1989 is currently enrolled as a full-time student in the English taught master programme: Master's in International Environments Studies, at the Norwegian University of Life Sciences (NMBU). Beatrice Namanya was admitted 02. August 2021 and is expected to complete the degree Spring 2023.

She is planning to join a research team in Uganda starting in December 2022, collecting data for her master thesis with the topic:
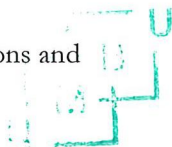
"TAXI OPERATOR'S PERCEPTION ON ENVIRONMENTAL LEVY TO CURB CARBON EMISSIONS": A CASE OF MOTOR VEHICLES, KAMPALA-UGANDA.
She will join the team in Uganda starting this December.

Yours sincerely,

Iben N. Andersen

Head of International Relations and
Student Services
Student Information Centre

Norwegian University
of Life Sciences

Are you interested in taking part in the research project?

TAXI OPERATOR'S PERCEPTION ON ENVIRONMENTAL LEVY TO CURB CARBON EMISSIONS: A CASE OF MOTOR VEHICLES, KAMPALA-UGANDA.

This is an inquiry about participation in a research project where the main purpose is to evaluate Taxi operator's perception on environmental levy to curb emission on old vehicles in Kampala-Uganda. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

-The purpose of this study *is* To contribute to the understanding of taxi operator's perceptions of the environmental levies as a measure for policy formulation to curb emissions in Uganda. Additionally, it is to contribute to the understanding of what could be done to ensure the reduction of carbon emissions from the transport sectors. And maybe to help the government of Uganda in designing measures to improve the public's compliance to environmental policies since it's a new levy.

Research questions:

Are taxi operators aware of the environmental pollution and Levy in central division Kampala-Uganda?

Are taxi operator's supportive or not of environmental levy on old reconditioned vehicles in Kampala?

Your personal data is not for this research project.

Who is responsible for the research project?

Norwegian University of Life Sciences is the institution responsible for the project. The master's thesis is under the supervision of Prof.Shai André Divon.

Why are you being asked to participate?

I'm a student of the International Environmental Studies programme at NMBU, conducting a research project on ``Taxi Operator's Perception on Environmental Levy". More specifically, the academic study is to determine the perception of taxi operators on dangers of emission and subsequent levy in Kampala, Uganda with focus on Central division. In your position as a community member, you have been purposely sighted to have useful information to contribute to the success of the study.

What does participation involve for you?

If you chose to take part in the project, this will involve you filling in a paper-based survey and interviews. It will take approximately 15 minutes. The research questions shall be used to guide the

selection of key informants. Key informants are important persons assumed to be knowledgeable about the subject under study. These may include:

 (1) chairperson of taxi operators' association who are responsible for welfare of taxi drivers, conductors among others, (1) KCCA technical officer at the directorate of engineering and technical services who is the in charge of motor vehicles and transport regulation in the city of Kampala, (1) Environmental officer at KCCA directorate of public health who is in charge of environment protection, (1) commissioner traffic at the ministry of works and transport, (3) taxi stage leaders who are in charge of day to operations at gazetted stages within in the City for researcher. Interaction with each key informant shall not last more than 20 minutes.

Your answers will be recorded electronically and in written form.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you choose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will not need your personal data as specified in this information letter.

The supervisors Shai André Divon in connection with Norwegian University of Life Sciences will not have access to the personal data.

● I and my research assistant Daniel Padde will use codes as your details. This will ensure that no persons get your personal data.

● The participants will not be recognizable in the publication.

What will happen to your personal data at the end of the research project?

The project is scheduled to end May 2023. All personal data will be anonymized.

Your rights

So long as you can be identified in the collected data, you have the right to:

● access the personal data that is being processed about you

● request that your personal data is deleted

● request that incorrect personal data about you is corrected/rectified

● receive a copy of your personal data (data portability), and

- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with Norwegian University of Life Sciences (NMBU). Data Protection Services has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- Norwegian University of Life Sciences (NMBU) via beatrice.namanya@nmbu.no (student) and shai.divon@nmbu.no (Thesis supervisor)
- Our Data Protection Officer: Hanne Pernille Gulbrandsen (email;personvernombud@nmbu.no)
- Data Protection Services, by email:(personverntjenester@sikt.no) or by telephone: +47 53 21 15 00.

Yours sincerely,

Project Leader   Student (Beatrice Namanya)
(shai.divon@nmbu.no)

Consent form

I have received and understood information about the project *Taxi Operator's perception on environmental levy to curb emissions: A Case of motor vehicles, Kampala-Uganda* and have been given the opportunity to ask questions. I give consent:

☐ to participate in paper-based questionnaire

☐ to participate in personal interviews

I give consent for my personal data to be processed until the end date of the project, approx. May, 2023

(Signed by participant, date)

KCCA
KAMPALA CAPITAL CITY AUTHORITY
For a better City

**DIRECTORATE OF PUBLIC HEALTH
AND ENVIRONMENT**

REF: DPHE/KCCA/1301

2nd January, 2023
Miss. Beatrice Namanya
0759361867
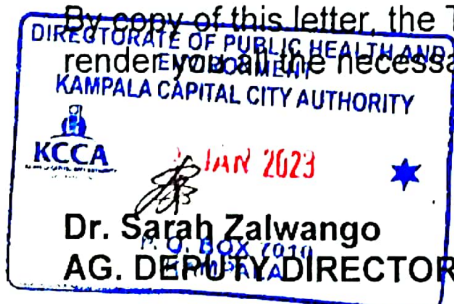**Kampala, Uganda**

RE: PERMISSION TO CONDUCT RESEARCH

Reference is made to your letter dated 19th December 2022 on the above subject matter.

This is to inform you that permission has been granted to carry out a study titled **"Taxi Operator's Perception on Environmental Levy to Curb Carbon Emissions- A case of Motor Vehicles."** has been extended to you for a period of two months from 4th January 2023.

The permission is granted to you on the following conditions:

1. Participation in your study is voluntary and the informed consent process should be observed at all times.

2. You will provide a report to the office of the Director Public Health and Environment of your findings.

3. You will access information from Central Division.

By copy of this letter, the Town Clerk of the above Division is requested to render you all the necessary support.

DIRECTORATE OF PUBLIC HEALTH AND
ENVIRONMENT
KAMPALA CAPITAL CITY AUTHORITY
KCCA   JAN 2023   ★

Dr. Sarah Zalwango
AG. DEPUTY DIRECTOR, MEDICAL SERVICES