Public perceptions and financial projections by introducing a marginal fuel levy to finance healthcare in Tanzania

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Master's thesis in Global Health

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Spring 2020

Acknowledgements

First of all, I would like to express sincere gratitude to my main supervisor, Dr. Amani Thomas Mori. Since the initial stages of this project, Amani has granted me relentless support and offered me valuable guidance whenever I encountered challenges. Thank you for your patience, kindness and wisdom.

I would also like to thank my supervisor at MUHAS, Dr. Amani Anaeli, for warmly welcoming me to Tanzania, and providing me with council and direction during my stay in Dar es-Salaam.

For her pivotal role in aiding me collecting the necessary data to complete this project, I bid my genuine regards to research assistant Dorice Ndibalema.

I further owe thanks to Professor Bjarne Robberstad at CIH for introducing me to the field of health financing, which in turn inspired me to pursue a scholarship grant from NORPART to realize this study.

Last, but not least, I wish to give eternal gratitude to my partner in life, Esmeralda, for all her patience and assistance during this two-year endeavor.

Abbreviations

DALY	Disability-Adjusted Life Years
EWURA	Energy and Water Utilities Regulatory Authorities
FY	Fiscal Year
GDP	Gross Domestic Product
GNI	Gross National Income
HFS	Health Financing Strategy
HIV	Human Immunodeficiency Virus
HSSP IV	Health Sector Strategic Plan, fourth phase
LMIC	Low Middle-Income Country
MDGs	Millennium Development Goals
MBP	Minimum Benefit Package
NCD	Non-Communicable Diseases
NORPART	Norwegian Partnership Program for Global Academic Cooperation
OOP	Out-Of-Pocket
PCA	Principal Component Analysis
PFMRP	Public Financial Management Reform Program
RTI	Road Traffic Injuries
SDGs	Sustainable Development Goals
SES	Socioeconomic Status
SSB	Sugar-Sweetened Beverages
SSI	Socioeconomic Index
TRA	Tanzania Revenue Authority
TSh	Tanzania Shillings
UHC	Universal Health Coverage
USD	United States Dollars
U5MR	Under-Five Mortality Rate
VAT	Value Added Tax
WHO	World Health Organization
YLD	Years of Life Lost due to Disability
YLL	Years of Life Lost

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Abstract

Introduction

Over the last two decades, Tanzania has made a significant progress in economic growth and positive health outcomes. Poverty rates are declining, and important health indicators such as life expectancy, under-five mortality rates, skilled birth attendance and HIV and malaria prevalence are improving. However, further progress is impeded due to impaired access to essential health interventions and inadequate health financing. This study aims to assess public perceptions and the financial projections of introducing a marginal levy on fuel i.e. petrol and diesel to finance healthcare in Tanzania.

Methods

A cross-sectional survey was conducted in Dar es-Salaam region in 2019 using a structured questionnaire to collect information about acceptability and attitudes towards introduction of a fuel levy in the general population. Data collected in the survey as well as from the literature was used as input in a decision-tree model to estimate the cumulative revenue by analyzing a different range of marginal fuel levies. One-way sensitivity analysis was conducted to assess how variation in model parameters influence the results. Descriptive analysis of survey data was done in SPSS® and modelling was done in TreeAge Pro®.

Results

About 61 percent of the respondents stated 'out-of-pocket' as the primary mechanism to pay for healthcare services and 85% had experienced (themselves or family member) road traffic accident. About 98 percent of respondents agreed about the introduction of marginal levy to finance healthcare, of which about 61 percent were willing to pay less than 30 TSh per liter. A levy of 10 TSh/liter of diesel or petrol will produce a revenue of 29 billion Tsh (12.7 million USD) and 22 TSh/liter will produce 64 billion TSh (27.8 million USD).

Conclusion

Overall, the public support the introduction of marginal fuel levy on petrol and diesel to finance healthcare. This innovative financing strategy has the potential to generate significant revenues and provide financial inputs to the roll out of UHC in Tanzania.

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Chapter I: Background

1.0 Introduction

The United Republic of Tanzania (referred to as Tanzania hereinafter) is located in East Africa and boarders eight countries as shown in Figure 1. Tanzania boarders Kenya and Uganda to the North, Rwanda, Burundi, the Democratic Republic of Congo and Zambia to the West, and Malawi and Mozambique to the South. Its entire east coast boarders the Indian ocean. Tanzania is comprised of the Tanzanian mainland and the semi-autonomous islands of Zanzibar and is the largest country in the East Africa region covering 940,000 square kilometers (1).

Figure 1: *Map of Tanzania showing its neighbors (Source: www.operationworld.org)*

As of 2017, the total population of Tanzania was 57 million inhabitants (2). According to the latest Population and Housing Census of 2012 (3), 29 percent of the population resided in urban areas while 71 percent were rural dwellers with a population density of 51 persons per square kilometer. Despite a fairly dispersed population, some urban areas, like Dar es-Salaam, are densely populated and this trend has increased over time (1). Tanzania has witnessed a population growth of 2.7 percent annually between 2002-2012 (3).

Over the past three decades, Tanzania has made a lot of progress in improving its health indicators. From 1990 to 2017, life expectancy increased from 53.3 years to 64.6 for males and from 56.5 to 68.9 years for females (4). Increased birth rates combined with declining under-five mortality rates (U5MR) gives an age distribution with approximately 44 percent of the population being under the age of 15 years (5). Child mortality rates and infant mortality rates have declined significantly due to targeted efforts towards combating malaria and other childhood illnesses that were prioritized by the government in the process of meeting the Millennium Development Goals (MDGs) targets of 2015 and currently, the Sustainable Development Goals (SDG) targets by 2030. In 2018, U5MR was 53 deaths per 1000 live births (6), which is a significant improvement from the 1990 data with 158.4 deaths per 1000 live births (4). However, child mortality, vaccination coverage, nutrition status and whether child delivery is undertaken at an appropriate facility show variations by area of residence, income status and mother's education (7).

As of 2017, the burden of disease in Tanzania was predominantly caused by communicable, maternal, neonatal and nutritional diseases (4). Neonatal disorders, lower respiratory infections and HIV/AIDS were the main causes of death, while tuberculosis, malaria and diarrheal diseases were among top ten causes of death in Tanzania (Figure 2). Dietary iron deficiency has been the main cause of years lived with disability (YLD) from 2007-2017, while malnutrition is the main risk factor for disability adjusted life years (DALYs), which combines years of life lost by living with disability (YLD) and years of life lost (YLL) due to premature deaths (8). Although the burden of malaria has declined, it was the preeminent cause of morbidity and the leading cause of mortality among hospitalized patients, accounting for about 30 percent of all deaths recorded in hospitals in 2015 (9). HIV prevalence for adults aged 15-49 was 4.6 percent in 2018 (10).

Like many other low- and middle-income countries (LMICs), Tanzania is now facing an epidemiological transition towards non-communicable diseases (NCDs) (9). This shift is associated with additional health needs for the population, inducing an upsurge of cases and consequential health care costs (9). A transition from communicable diseases to NCDs is a phenomenon that can be described as a global epidemic and is causing disproportionate health impacts in LMICs due to several factors, including shortage of health care workers, lack of experience, long waiting times, and high costs related to treatment (11). Due to changing lifestyles and improved life expectancies, Tanzania recognizes that NCDs pose a major challenge for the health system (9). The main burden of NCDs is currently related to

obesity and hypertension, with ischemic heart disease, stroke and diabetes as the main cause of death (4).

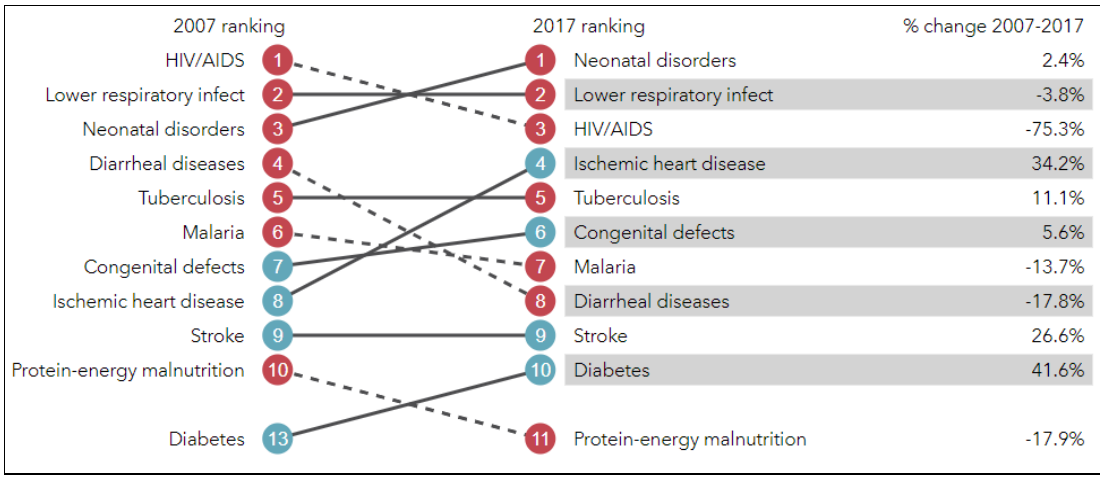

Figure 2: *Top 10 causes of death in Tanzania in 2017 and % change 2007-2017 (Source: www.healthdata.org)*

1.1 Health financing and economic growth

The Tanzanian health care system is financed main through tax-based government revenues, external assistance by donors, out-of-pocket health expenditure, health insurance schemes and voluntary payments. In a traditional low-income country like Tanzania, user fees constitute a substantial portion of healthcare cost, which is approximately 30 percent (12). In Tanzania, user fees in the health sector were introduced in 1994, to complement government financing. It was argued that such a fee would generate revenues counting for 15-20% of operating costs, increase efficiency and improve access and equity for the poor based on the notion that revenues could be cross-subsidized and distributed back to disadvantaged populations (13). More than 20 years later, evidence points to a counter-effect to this approach. Ironically, fee-for-service is associated with lack of access and equity in regard to utilizing health services in LMIC, especially on account of the poor and vulnerable (13)Those with scarce resources not only face direct costs related to health care, other economic barriers such as transport costs and lost opportunity cost of not being able to work must also be taken into consideration (13). Potentially, being treated at a government-run health care facility will lead to catastrophic costs and promotes poverty (12).

Although out-of-pocket payment still remain an important fraction of total health expenditures; however, there has been significant progress towards reduction in user fees with a decline

from 47% in 2000 to an estimated 26% in 2015 (14). Despite this reduction, the worse off are still marginalized and associated with higher out-of-pocket health costs, which promotes inequality and have negative impacts on poor households and women in particular (7).

With regard to health financing, in fiscal year (FY) 2017/18, the national budget allocated 2.22 trillion Tanzanian shillings (TSh), the equivalent of approximately 206 billion USD, to the health sector, which signifies an increase of 28 percent (when adjusting for inflation) from the previous fiscal year. Overall, it accounts for 1.8 percent of the Gross Domestic Product (GDP) and 7 percent of the national budget (7). However, in comparison to its neighbors, Tanzania is not spending as much of its GDP on healthcare as Kenya, Uganda and Rwanda (7).

Over the last decade, Tanzania has experienced an annual economic growth of 6-7%, with a GDP growth of 7 percent in 2018 (15). Historically, the economy has been closely tied to the agricultural sector and affiliated activities such as animal husbandry, comprising crop growth, hunting, fishing and forestry. In current times, however, Tanzania has a mixed economy with the service industry accounting for 52 percent of GDP (1). As of 2018, gross national income (GNI) per capita was 1,020 USD (16) and Tanzania has, according to the definition of the World Bank, achieved lower middle-income status due to a GNI per capita greater than 1,006 USD (17). However, there are still 13 million people, which is about 27 percent of the population who are living in poverty (15). Among those living in poverty, 80% are rural dwellers in areas where poverty reduction is comparatively slower than in urban areas such as Dar es-Salaam (2).

Since its independence, Tanzania has relied heavily on donor contributions to finance its health sector and is still dependent on external aid (2). In 2008, donor support accounted for 23 percent of all health care resources (18). Seven years later, in FY 2015/16, 84 percent of the development budget for the health care sector was covered by donor support (7). Such dependency on external health financing is unfortunate, due to the possible unpredictability of financial flows (19). In the aftermath of the global economic crisis in 2008, a slowdown in US and European economies led to the decline in global donor contributions (20). Since 2011, growth in foreign aid has stagnated and donors as well as recipient countries have been forced to readjust and cope with smaller budgets (20). One direct consequence of a decline in donor support is the increasing difficulty to reach the 3rd SDG of addressing good health and well-being (21).

The trend of donor deceleration has also reached Tanzania, where a steep decline in external aid has occurred over the last years. In FY 2016/17, donor support for developing health care dropped to 38 percent but increased to 57 percent of the total budget in FY 2017/18 (7). However, the Tanzanian government is aware of its vulnerable position and is currently addressing this issue through financial sustainability schemes and exit strategies (9). In light of Tanzania's recent economic growth, there exist favorable opportunities for increasing health financing domestically (22). As pointed out by Reeves et. al; a first step to reach autonomy from donor dependency is to consolidate a wider and stable tax-revenue base to increase domestic capacities (23).

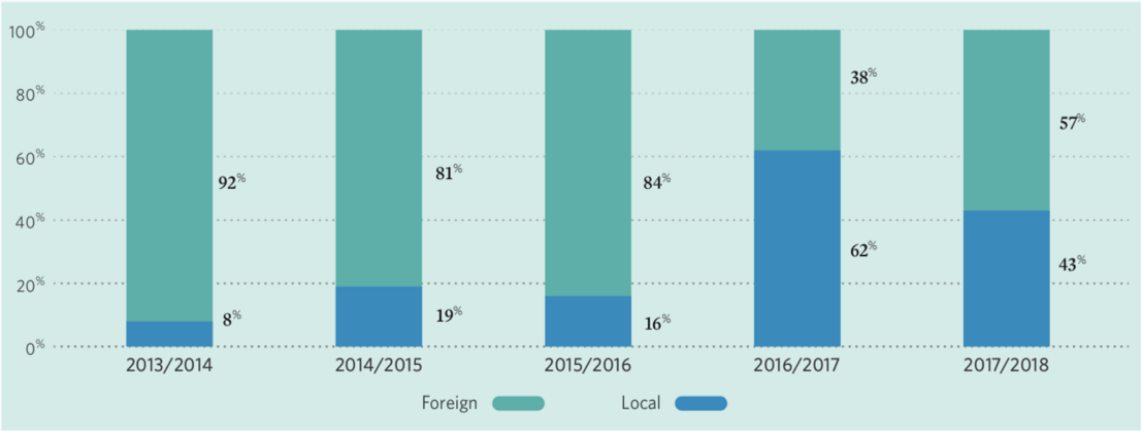

Figure 3: *Government and donor funding for The Ministry of Health, Community Development, Gender, Elderly and Children (Source: UNICEF. Health Budget Brief - Key Messages and Recommendations (Tanzania). 2018)*

1.2 Moving towards universal health coverage

Improving tax capacities is a crucial component in strengthening domestic development efforts, particularly in developing and transitional contexts, such as is the case of Tanzania (24). The Health Sector Strategic Plan (HSSP IV) is currently at the end of its fourth phase, and one of the main commitments are the introduction of universal health care (UHC) through a minimum benefit package (MBP) that will ensure essential health and social welfare services to all citizens of Tanzania (9). As stated by the program, these services should strive to meet the expectations of the population and ensure objective quality requirements by applying evidence-based, efficient service delivery standards. However, in 2018, the program was lacking necessary financing to achieve its goals (7). Overall, Tanzania has embarked on an ambitious endeavor which poses a formidable challenge: the financial aspect surrounding the commitment of introducing UHC.

By committing to UHC, Tanzania is essentially aiming for a health system that provides financial protection for its users by removing impoverishing and catastrophic costs related to out-of-pocket (OOP) expenditures by accessing health care services (25). It is widely recognized that the relationship between impoverishing health expenses and extreme poverty poses a challenge, not only with regard to health care utilization, but also for the efforts of ending global poverty, addressed in the 1st SDG (26). Providing financial protection to promote equity in healthcare financing, is a key element of moving towards UHC (27).

In the case of Tanzania, low tax efficiency and a fragmented health insurance market counter the prospects of successfully implementing UHC as envisioned by HSSP IV. Tanzania yields a lower ratio of its GDP from taxation than the average of Sub-Saharan Africa, and the health insurance market is dominated by five insurance schemes, which combined, are adopted by only one in ten Tanzanians (1). One of the consequences of inefficient and fragmented health financing is that cross-subsidization from the well-off to the poor is impeded (28). In general, this type of fragmentation is associated with inefficiency, ineffectiveness and inequality in relation to health outputs and is henceforth disharmonious with regard to UHC (29). Thus, progressive taxation is considered key to generating revenues while promoting equity with regard to health financing in developing countries pushing for UHC (13).

Tanzania is devoted to reforming its health financing strategies. Program such as the Health Financing Strategy (HFS) and the Public Financial Management Reform Program (PFMRP) share the same ambitions of streamlining financial flows to enhance service deliveries (9). While HFS is concerned with defragmentation of health financing to increase cross-subsidization and enhance equitable access to health services, PFMRP is working to strengthen macro-economic management through prudent fiscal, tax and depth policies, dedicated to increase domestic revenues as ratio of GDP from 14.8 percent in 2017 to 18 percent in 2022 (30).

Programs such as HFS and PFMRP are necessary in order to meet the financial requirements of implementing the MBP promoted by HSSP IV. The aim of the MBP is to unify the extent of covered health services to reduce inequalities and differences in coverage, a circumstance which is associated with the current sprawl of insurance schemes and lack of enrolment in Tanzania (31). As envisioned in HSSP IV, the MBP is primarily focused on providing all Tanzanians with access to fully funded primary and secondary health care services, which

includes free treatment and consultation for reproductive, maternal, neonatal and childcare, communicable diseases, NCDs, other common diseases and tropical diseases (32).

The MBP signifies a targeted effort to improve Tanzania's health care services, along with various quality improvements which serves as a prerequisite for integrating UHC in its health sector (33). However, the MBP is not complete and does not provide citizens with access to UHC at this stage. One group of patients currently excluded from the MBP, and therefore vulnerable to impoverishing and catastrophic costs, are victims of road traffic injuries (RTIs).

1.3 Road traffic injuries: burden and costs

While Tanzania has achieved progress towards curbing the mortality of infectious diseases, it shares the same challenge as many other LMICs: a rise in deaths from RTIs due to an increase in urbanization and motorization (34). Globally, injuries sustained in traffic accidents are the leading cause of death among people aged 15-29 years, and 90 percent of these victims are residing in developing countries (35).

RTIs was ranked as the 10th largest contributor to years of life lost (YLL) in Tanzania in 2010 (36). Over the following years incidence rates increased to a peak level in 2013 with 4,002 fatalities and 20,689 injuries (37). Figures show that Tanzania has experienced a fivefold increase in traffic-related casualties over the last decade, but there is a wide acceptance that these numbers are largely underestimated (38).

Traumas caused by RTIs are the most common occurrences of injury in hospitalized patients in Tanzania and can account for 44.6 percent of incidents (39). From 2013-2016 the number of registered motorcycles increased from 46 to 54 percent and within the same timeframe RTIs caused by motorcycles increased from 27 to 51 percent (40). Tanzania is expected to see a further increase in trauma caused by RTIs due to its rapid urbanization, inadequate infrastructure and high numbers of motorcycles used for individual transportation and taxi services (39).

The most common RTIs are fractures (34.1%), followed by superficial injuries (26.1%), multiple injuries (21.7%) and head injuries (15.4%) (41). Male victims are overrepresented with a ratio of 3:1 to female victims, and 70.2 percent of those injured are in the productive age of 18-45 years (41). Treatments of RTIs are associated with high economic losses and potential catastrophic costs for the victims and their families. In Tanzania, surgery due to spinal trauma

will cost on average 2,322 USD for a patient with "private" status, while a patient with "public" status will pay on average 873 USD (42). Consequently, 65.8 percent of the Tanzanian households are in danger of sustaining catastrophic costs and 85.5 percent are in danger of impoverishing expenditures if a family member has to undergo surgery (43). As payments need to be provided in advance, the accumulation of funds is a major cause of delayed treatment and is associated with worse health outcomes (42).

The Tanzanian society is estimated to ingest costs between 1.2-1.5 million USD annually due to traffic accidents (37). This includes medical costs (emergency transportation, hospitalization, rehabilitation etc.), costs of work loss or productivity losses, costs of response (police, fire, legal and victim services), costs of property damage and costs of quality of life for victims and their families (37). Fatal and serious injuries sustained in traffic accidents were estimated to inflict a GDP loss of 2,8 percent in 2015 (37). Other figures suggest that, taking into account surgery costs and rehabilitation costs, the total cost of treatment for an injury could reach a devastating financial impact of 97 percent of GDP per capita in LMICs (42).

High individual and societal costs related to RTIs illustrate some of the shortcomings that surrounds current health financing in Tanzania. Unfortunately, this is not uniquely associated with RTIs; impeded health financing may be classified as a chronic problem were funding is inadequate and has been like that over time.

1.4 Addressing the funding gap: a call for innovative financing

According to HSSP IV, there is a current funding gap, referring to the difference between *available* resources and *necessary* resources to finance the full implementation of the program, and this gap has been widening each year (9). For 2015/16, the funding gap was estimated to be TSh 1,354 billion (126 million USD), increasing to TSh 1,493 billion (138 million USD) by 2019/20, according to the most ambitious fiscal space scenario. However, without utilizing innovative strategies to generate resources, the funding gap was estimated to become TSh 2,421 billion (225 million USD) by 2019/20 (9).

Sufficient health financing is a crucial component in attaining UHC (44). As Tanzania has committed to reform its health system by moving away from the dominating approach of fee-for-services towards UHC, financing UHC will constitute a major challenge in the country's future finance planning and financial flows. In fact, achieving UHC is *particularly* a health financing challenge (45). To accommodate the estimated funding gap, innovative strategies

for pooling resources are called upon. In order to raise and pool sufficient funds while at the same time stimulating sustainable mechanisms for health financing, innovation within revenue accumulation is recommended and promoted (46). Conceived as a fund generator to enhance financial prerequisites in meeting the MDG targets, innovative financing is an increasingly valuable source of funding for global health (47).

Innovative financing is a somewhat diluted expression which holds different meanings to different recipients (48). The World Bank Group uses innovative financing as an overarching term which includes any financial approach that enables:

- Additional development funds generated by utilizing new funding sources or engaging new partners
- Improvement in efficiency of financial flows by enhancing logistics and reducing costs, especially in times of emergency or crisis
- Financial flows to be more result-oriented where funding is linked to measurable outputs

As a source to increase domestic revenues, innovative financing is often linked to duties on consumption of goods and services which were previously untaxed or prone for increased taxation. Since 1990, consumption taxes have contributed most to revenue growth in LMICs (23). Revenues extracted from consumption taxes has the potential to provide direct financial contributions for the development of health systems, while at the same time improving public health through altered consumption patterns, as experienced through the introduction of sin taxes on harmful products like tobacco, alcohol and sugar-sweetened beverages (34). In comparison to donor contributions, revenues extracted from innovative financing is still small on a global scale, but within this mechanism of pooling funds for financing healthcare lie huge untapped potentials (48).

1.5 Problem statement

Despite a rapid and steady economic growth over the last decade, Tanzania is still reliant on donor contributions and out-of-pocket expenditure to finance its health sector. Unfortunately, donor contributions are now declining (7), and out-of-pocket expenditure increases the risk of poor households to incur catastrophic health payments, which further increases their vulnerability to poverty (44). Tanzania has committed to achieve Universal Health Coverage (UHC) to its citizens, first and foremost through an MBP that will ensure fully funded health services at primary and secondary tiers of the health care system. However, it is recognized

that without innovative financing strategies, achieving UHC will be a major challenge. Road Traffic Injuries (RTIs), represent one of the major contributors on the burden of disease in Tanzania (41). The financial risk for individuals and society induced by RTIs are substantial. Victims of RTIs are at risk of impoverishing and catastrophic out-of-pocket health expenditures when engaging with the health system. Testifying to the financial stress related to health financing in Tanzania, a call for innovative financing is present and encouraged by the Tanzanian government. Therefore, this study builds on the underlying finding that Tanzania has the *potential* to use innovation within domestic taxation as a means to increase revenues to narrowing or even close the financing gap for the purpose of contributing to present and future health expenses.

In Sub-Saharan Africa, more countries are focusing on improving their tax capacities to generate revenues to finance the rollout of UHC. In Nigeria for example, an earmarked tax on mobile telephone bills contributes to financing healthcare, while Ghana has increased consumption taxes by 2-5 percent after reforming the tax system in 2003 and earmarked these revenues to co-finance its National Health Insurance Scheme (49). Similarly, Zimbabwe has introduced an earmarked tax of 3 percent on top of existing income taxes, both personal and corporate, to fund its HIV response (47). In Tanzania there is a 3 percent levy on income tax to finance the National Health Insurance Fund; however, the levy applies to employees in the formal sector only and enrollment is currently at 6,1 percent of the entire population (50). This illustrates that untapped potentials within domestic taxation to finance healthcare are present in Tanzania.

1.6 Main objective

In order to accommodate this potential, this study intend to investigate a previously untapped source of healthcare financing, namely a fuel tax earmarked for this purpose. The main objectives are to assess public perception and financial projections by introducing marginal fuel levy, i.e. on petrol and diesel, to finance healthcare.

1.6.1 Specific objectives

1. To determine public perceptions towards an introduction of a marginal fuel levy to finance healthcare

2. To determine the amount that the public is willing to pay as a fuel levy to finance healthcare

3. To estimate financial projections collected from charging a marginal fuel levy on petrol and diesel, based on willingness to pay

1.6.2 Research questions

1. Is it acceptable among the Tanzanian public to introduce a marginal levy on fuel, i.e. petrol and diesel, to finance healthcare?

2. How much is the public willing to contribute per unit (liter) of fuel?

3. How much revenues will be generated by charging a marginal levy on fuels, i.e. petrol and diesel?

1.7 Rationale

This study aims to investigate a previously unexplored mechanism of pooling funds to finance healthcare in Tanzania, generated from domestic capacities through taxation. By utilizing the idea behind innovative financing, this study will identify an appropriate measure to possibly generate significant domestic revenues to finance healthcare and contribute to UHC.

In light of the high burden of injuries and costs related to RTIs, it is assumed to be appropriate to propose a marginal fuel levy to finance healthcare, imposed on users of road vehicles. In order to promote equity by recommending a fair and reasonable tax, public perceptions towards this measure is considered to be valuable information which will determine general attitudes and willingness to pay. Public perceptions will also serve as a benchmark for estimating financial projections attached to a marginal fuel levy.

In the following chapters, methodology will be accounted for and results will be presented, followed by a discussion of the implications related to key findings unveiled in this study.

Chapter II: Methodology

2.0 Study design

This study was focused on analyzing *public perceptions* and *financial projections* with regard to the introduction of a marginal fuel levy to finance healthcare in Tanzania. In order to obtain reliable results, a mixed method study design was chosen. Information about public perceptions was obtained through a survey to collect quantifiable data, while financial projections were estimated by decision tree modelling using survey data as model inputs.

2.1 Public perceptions

The first part of the study was focused on gaining insights from public perceptions towards a fuel levy to finance healthcare and subsequently willingness to pay. Through survey participation, responders would influence and ultimately determine which fuel levies would be deemed acceptable in order to estimate financial projections based on public perceptions.

2.1.1 Study setting

The survey was conducted in Dar es-Salaam region in Tanzania between June 12 and August 3, 2019. Dar es Salaam is located on the shores of the Indian ocean and is the main business hub and hosts the largest port of imports and exports in Tanzania. With an estimated population of 6.7 million people, it is the most populated city in the country and served as the nation's capital until 1974, before the capital was transferred to Dodoma (51). Dar es Salaam is also the most densely populated region in Tanzania, with a population density of more than 3,100 people per square kilometer (52). The region is further sub-divided into five districts; Kinondoni, Ilala, Temeke, Ubungo and Kigamboni. Culturally, Dar es Salaam is sprawling with diversity as it attracts migration from other regions of Tanzania. The main means of public transport include minibuses (commonly referred to as dala dala's), motorcycles taxies (commonly referred to as boda boda's), rapid bus transport, railway and ferries.

The study was conducted at nine different purposively selected sites from seven locations around Dar es Salaam with the purpose of targeting users of road vehicles with similar *and* different attributes. Table 1 gives an oversight of the study sites, relevant characteristics for each site, and targeted populations. For the purpose of diversifying responders' income status, some locations are situated in lower wealth areas, while others are in higher wealth

areas. In specific locations, such as in hospital vicinities, it was assumed that the well-off population prefers private transportation rather than public transportation when accessing hospitals.

Location	Site characteristics	Targeted populations	Assumed income status
Buguruni	Bus station, boda boda stand, bajaj stand	Drivers and passengers	Low - middle
Kisutu	Bus stop, taxi stand, boda boda stand, bajaj stand	Drivers and passengers	Low - middle
Makumbusho	Bus station, boda boda stand, bajaj stand	Drivers and passengers	Low - middle
Mlimani	Shopping center	Car owners	Middle - high
Muhimbili Hospital	Bus station, taxi stand, boda boda stand, bajaj stand	Drivers and passengers	Low - middle
Mwananyamala Hospital	Bus stop, taxi stand, boda boda stand, bajaj stand	Drivers and passengers	Low - middle
Mwananyamala market	Bus station, boda boda stand, bajaj stand	Drivers, passengers and car owners	Low - middle - high
Victoria	Bus station, boda boda stand, bajaj stand	Drivers and passengers	Low - middle - high
Victoria	Petrol station	Car owners	Middle - high

Table 1: *Description of the study sites*

2.1.2 Sample size

A literature search was conducted to identify whether previous research had been performed on this specific topic and study settings. No evidence of such was revealed. Hence, to maximize the sample size it was assumed a prevalence of 50% for the primary outcome (53), a margin of error of 5%, which gave us a sample of 384 participants. The sample size was adjusted upward to 400 to account for non-responses. Sample calculation was done in OpenEpi version 3.01.

2.1.3 Study population

In order to obtain reliable information from a credible source, it was considered appropriate to target the populations most affected by a marginal fuel levy. Specifically, purposive sampling was determined to engage *users of road vehicles*. Purposive sampling can be defined as a non-probability sampling technique that allows to identify an available and accessible population suitable for the purpose of the study (54).

Users of road vehicles were defined as any person who carry expenses in relation to road vehicle utilization. Expenses refers to recurring costs, e.g. fuel consumption and fees for public transportation. Inclusion criteria covered study participants being 18 year or older and whether he or she was a driver or an owner of either bajaj, car, motorcycle or a passenger. Exclusion criteria included being less than 18-year-old or carrying no expenses with regard

to public transport utilization. Given the context of Dar es-Salaam, following is a list of terms that apply to the inclusion criteria and how they are referred to in this study:

- *Bajaj* refers to a three wheeled rickshaw used for taxi services
- *Bus* refers to conventional buses, regional buses and *dala dala's,* which are minibuses common in Dar Es Salaam
- *Car* refers to private vehicles and conventional taxis
- *Motorcycle* refers to private vehicles and *boda boda's* which are motorcycle taxies typical for eastern Africa
- *Passengers* refer to whoever utilizes these vehicles as a means of transportation in exchange for a fee
- *Truck* refers to commercial vehicles and lorries.

2.1.4 Data collection

A questionnaire with closed-ended questions was used for data collection. The tool consisted of 26 questions (see annex i) and was originally written in English but translated into Swahili, which is national language and universally spoken by all Tanzanians. The first part of the questionnaire contained questions about demographic, socioeconomic and health determinants information. The second part of the questionnaire had questions to evoke attitudes towards domestic taxation as a means to finance healthcare, as well as willingness to pay.

On assessing willingness-to-pay, we used the contingent valuation method with open-ended questions (87). As the method requires, we started by describing the product in the form of four related questions for each respondent. This was important to ensure we get consistent responses with regards to other products deemed to contribute to the burden of disease. The questions were:

1. Cigarettes are associated with lung cancer, heart disease and other pulmonary illnesses. Do you agree that people purchasing cigarettes should pay a small levy to finance healthcare?

2. Alcohol is associated with liver disease, colon cancer and dementia. Do you agree that people purchasing alcohol should pay a small levy to finance healthcare?

3. Soft drinks and sweets containing high levels of sugar are associated with diabetes, obesity and dental caries. Do you agree that people purchasing soft drinks and sweets should pay a small levy to finance healthcare? And finally, they were asked:

4. Cars and motorcycles are associated with traffic accidents. Do you agree that users of road vehicles (drivers and passengers) should pay a small levy to finance healthcare?

Subsequent to these questions, responders were asked how much they would be willing to pay per liter of fuel to finance health, if a small fuel levy was introduced tomorrow.

The questionnaire was first piloted among few numbers of users of road vehicles to determine time to be used for its completion and to check for inconsistencies before data collection. A local research assistant was engaged and instructed on the purpose of the study and further familiarized with the survey during this exercise. In addition, the research assistant worked in the capacity of translator and was instrumental in the process of collecting the data.

2.1.5 Statistical analysis

All data was plotted and analyzed in IBM® SPSS® Statistics version 25 and a socioeconomic status index (SSI) was created in STATA®.

For the purpose of analyzing the acquired data, a descriptive approach was implemented. Tables expressing demographic, health and socioeconomic variables was created on the basis of frequency distribution. Public perceptions on domestic taxation to finance healthcare and willingness to pay was analyzed by using univariate and bivariate analyses. This is a statistical technique that is helpful to describe single variables and more than one variable respectively and to interpret the relationships between these variables (55). Thus, it became possible to analyze how public attributes (e.g. gender, age, education, occupation etc.) influenced on the outcome.

To provide the necessary information to create an SSI, variables concerning asset ownership, housing characteristics, access to utilities and infrastructure were incorporated in the survey. This approach was based on data from The Demographic and Health Survey Program (56), a household survey on nutrition and related health outcomes applied to more than 60 countries. When creating an SSI, DHS focuses on household characteristics rather than income and/or expenditures. For this study, a similar approach was considered appropriate because wealth

based on income would be difficult to measure accurately in a population with a considerable proportion of informal employment and/or seasonal income (57).

Principal components analysis (PCA) was applied in order to create the SSI. PCA is a multivariate statistical technique that enables the analyst to reduce the number of variables within a dataset to a narrower number of dimension (57). For this study, the practical implementation was to recode socioeconomic variables that was ordinal in nature into bivariate variables. Table 2 illustrates the recoded variables. Each variable was given a weight of *0* and *1* representing *primitive* and *developed* respectively.

Variable	Primitive (0)	Developed (1)
Drinking source	River/canal/rainwater	Private well
	Public well	Piped water
	Tanker truck	Bottled water
Home sanitation	Bush/field	Flush toilet
	Pit latrine	
Home cooking	Wood/timber	Gas
	Kerosene	Electricity
	Charcoal	
Home flooring	Dirth/earth	Tiles
	Cement	Polished wooden floor
Vehicle ownership	None	Motorcycle
	Bicycle	Car

Table 2: *Ordinal socioeconomic variables recoded*

As the SSI materialized, it was recognized that truncation would be a concern. Truncation is a term that refers to an even distribution of socioeconomic status (SES) but little difference between the socioeconomic groups (57). To address this issue, the original quintiles were reduced into quartiles by collapsing the middle group and redistributing the respective data. Consequently, the SSI ended up with four socioeconomic groups: poorest, somewhat poor, somewhat rich and richest.

2.2 Modeling Financial Projection

The second part of the study was focused on modeling financial projections accumulated by a marginal fuel levy. From a business perspective, financial projections can be defined as a

forecast for future revenues and expenses (58). However, in the case of this study, the proposed measure is to implement a tax, and thus revenues will be the exclusive focus.

Tax on petroleum products are treated as an excise duty with specific rates set by the Tanzania Revenue Authority (TRA). The assumption was that a tax of the nature proposed in this study would be treated as an excise duty, levied on every liter of petrol and diesel sold on the local market through oil marketing companies in the formal sector.

As figure 4 illustrates, a decision tree was modelled in TreeAgePro version 2020.1.2® to visualize choices and calculate outcomes related to the proposed levies, as well as performing appropriate sensitivity analyses. While a conventional decision tree is typically useful when deciding on the optimal choice based on the *probability* of an outcome, this model was useful to deciding on a choice based on *public perceptions*. Implications are whether the levy was more acceptable amongst the general public rather than more rewarding in terms of financial gains.

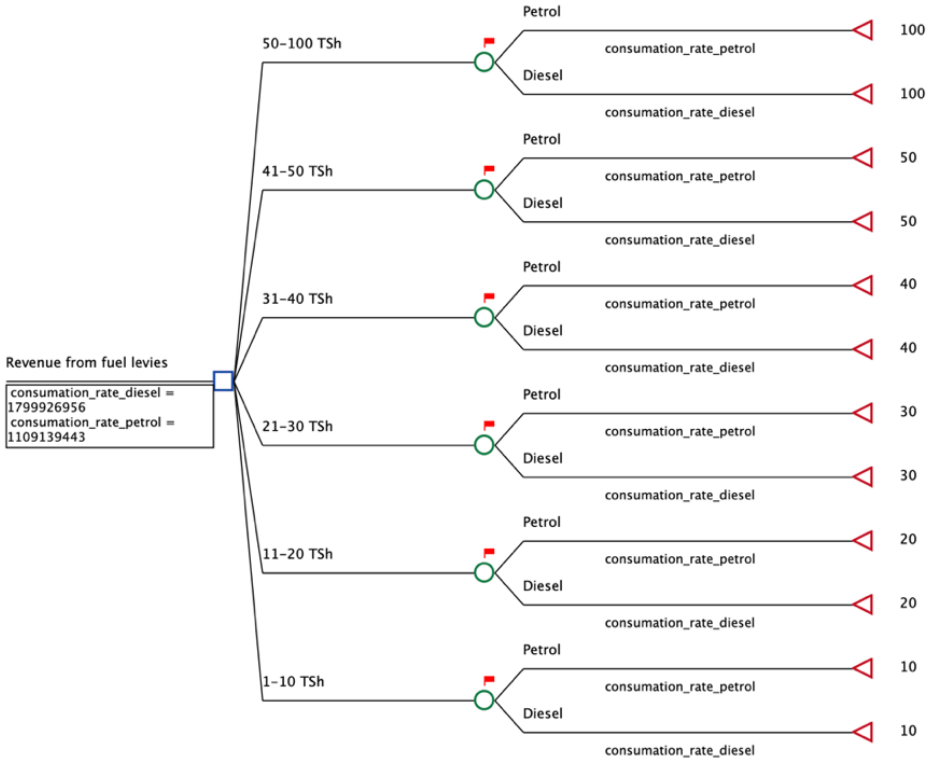

Figure 4: *Decision tree displaying proposed levies related to consumption rates of petrol and diesel on the Tanzanian mainland in FY 2017/18 (EWURA)*

The models' inputs were six distinct categories of a marginal fuel levy related to two variables; the consumption rate of *petrol* and *diesel*. It was preferable to analyze each variable

independently in order to extend the scope of information, and this way be able to analyze scenarios where either petrol or diesel or both were subject to a levy. Baseline fuel consumption rates (table 3) was extracted from Energy and Water Utilities Regulatory Authorities (EWURA) annual report from the Tanzanian mainland in FY 2017/18 (59). No other petroleum products were subject for analysis in this study, based on the assumption of not being a common mean of fuel for road vehicles in Tanzania. The models' output was gross revenues associated with each category of the proposed levy.

Fuel	Consumption/liters	Mean price/liter
Petrol	1,109,139,443	2120 TSh (0,9 USD)
Diesel	1,799,926,956	2004 TSh (0,85 USD)
TOTAL	2,909,066,399	

Table 3: *Consumption rates on the Tanzanian mainland and mean prices of fuel in Dar Es Salaam; FY 2017/18*

Modelling the decision tree provided a useful tool for initiating the analysis. Calculations of gross revenues associated with each category of levies was performed by *rolling back* the decision tree. Basically, each levy was multiplied with the consumption rate of petrol and diesel, providing the outcome when there were no *uncertainties* associated with the inputs.

2.2.1 Sensitivity analysis

For the purpose of gaining additional insights on the relationship between variables, sensitivity analysis was applied. Sensitivity analysis is an analytical technique that provides the assessment of uncertainties associated with inputs or outputs in a mathematical model or system (60).

The decision tree was a simple model and there was no uncertainty associated with the proposed fuel levies as these variables were predetermined, fixed values. However, there were uncertainties associated with fuel consumption rates. From FY 2016/17 – 2017/18 consumption of diesel increased by 7 percent while consumption of petrol decreased by 6 percent (59). In order to estimate gross revenues this uncertainty had to be accounted for. To correspond with market fluctuations, input parameters of fuel consumption was adjusted by 5 and 10 percent in both positive and negative trajectories.

By applying one-way sensitivity analysis on all categories of levies, it became possible to estimate the output for every variation associated with each variable. Specifically, this

technique provided the opportunity to analyze key findings such as mean and mode values reflecting an acceptable fuel levy grounded in public perceptions. Because one-way sensitivity analysis also has practical implications as a graphic tool, additional insights were drawn from the functionality graphs allowed for by the analysis (60).

Results concerning financial projections will be presented as TSh and USD. As the conversion rate of 1 USD were fluctuation around 2300 TSh in June 2019, it was considered appropriate to use 2300 TSh as benchmark conversion rate for the results. In the following chapter, all findings provided by this study will be outlined.

2.3 Ethical considerations

Ethical clearance was obtained from the Muhimbili University of Health and Allied Science Research and Publication Ethical Review Committee in Dar es Salaam. Ethical clearance grant from the Regional Committees for Medical and Health Research Ethics (REK) in Norway was not relevant due to the lack of sensitive information attached to this study. All participants entered the study on a voluntary basis and were asked to sign a written consent form prior to participation. No compromising information was extracted from the responders.

2.4 Funding

This research was partly funded by a scholarship grant from the Norwegian Partnership Program for Global Academic Cooperation, Project no. NORPART-2016/10480.

Chapter III: Results

3.0 Overview

As presented in the methodology chapter, the results of this study are founded on the outcome of two quantitative approaches. Both approaches were independent in nature, meaning it was possible to perform and analyze one without interfering with the other (61). However, when the two approaches are combined into corresponding outputs, a larger and more informative picture develops. Instead of merely extracting information from two exclusive dimensions, the combined interactions allow for an output providing practical implications of the results from this study, as will be illustrated in the following sections.

3.1 Public perceptions

In the initial stage of this project, some questions were identified as essential for responding to the research question. If there were to be a tax on fuel to finance healthcare, how would the public respond to this measure? Would there be positive, negative or mixed feedbacks? Regardless of attitudes, how much would the public be willing to pay, if anything at all? While these were key questions to be answered in order to accommodate the objectives of this study, other related inquiries surfaced. Specifically, it was interesting to examine whether public perceptions towards domestic taxation as a means to finance healthcare followed a consistent pattern and whether UHC was desirable for the study population. The reasoning for elaborating on these matters were based on the fact that UHC are mainly funded by domestic taxation and thus, considered relevant for the study context.

3.1.1 Baseline characteristics on demographic and health variables

Before the above questions were answered, this study ought to display various baseline characteristics that are meant to contextualize the findings. For this purpose, it was desirable to obtain an overview of the study population, specifically its demographic composition and relevant health characteristics.

Table 4 gives a description of baseline demographics associated with the study population. The male to female ratio was just shy of 3:1 and about 76 percent of the respondents were aged between 18-45 years. Without justifying a comparison, it is noteworthy to comment that the male to female ratio and predominance of productive ages mirror not only the respondents

to this study, but also the very population that is overrepresented in burden of injury related to road traffic accidents in Tanzania (62).

With regard to responders' district of residence, 85 percent resides in densely populated areas of Dar es Salaam and this finding can be easily attributed to the selection of study sites: in fact, it is here worth recalling that the survey was carried out in mass transit connections points and commercial areas of Dar es Salaam. It is also worth noticing that about 76 percent of respondents had completed ordinary level secondary school compared to 4 percent that had no formal education. Furthermore, about 46 percent of respondents were employed in the formal sector whereas about 14 percent were unemployed.

Variable	Characteristics	n (%)	Missing data
Gender	Male	239(62.2)	
	Female	145(37.8)	
TOTAL		384(100)	0(0)
Age	18-25 yrs	56(14.6)	
	26-35 yrs	97(25.3)	
	36-45 yrs	140(36.5)	
	45-55 yrs	63(16.4)	
	+ 55 yrs	23(6)	
TOTAL		378(98.4)	6(1.6)
District of residence	Kinindoni	107(27.9)	
	Ilala	91(23.7)	
	Temeke	130(33.9)	
	Other district	51(13.3)	
TOTAL		378(98.4)	6(1.6)
Education	No education	17(4.4)	
	Primary school	74(19.3)	
	Ordinary secondary	67(17.4)	
	Advanced secondary	78(20.3)	
	College/univeristy	145(37.8)	
TOTAL		380(99)	4(1)
Employment	No employment	53(13.8)	
	Informal sector	144(37.5)	
	Formal public sector	37(9.6)	
	Formal private sector	138(35.9)	
TOTAL		371(96.6)	13(3.4)

Table 4: *Baseline characteristics of the study sample*

As one of the main objectives was to determine public perceptions on the introduction of a domestic tax to finance healthcare, it was considered appropriate to obtain some information about the study populations health status and related indicators. Table 5 illustrates findings which were helpful to substantiate an understanding of the outcome related to this study.

The study participants appear to be fairly healthy, with roughly three quarters of the respondents indicating a 'good' or 'very good' health status. Healthcare consumption, referring to consultations and visits to healthcare professionals and establishments, was occurring on a monthly basis for about one in ten, i.e. 10 percent of respondents, while 60.9 percent answered, 'more than 6 times a year'. About 61 percent of the respondents stated 'out-of-pocket' as the primary mechanism to pay for healthcare services, while 33 percent said they use health insurance. Another point of consideration was to unveil any direct impacts of road traffic accidents (RTIs) on the study population. On the question of whether responders or any family members had sustained RTIs, 85 percent answered 'yes', emphasizing the magnitude of traffic accidents for them or their family members in Dar Es Salaam. Before arriving at the essential part of the survey which addressed public perceptions towards taxation and willingness to pay, responders were asked if universal health coverage was desirable. A remarkable proportion was in favor with 97.5 percent of the study population answering 'yes'.

Variable	Characteristics	n (%)	Missing data
Health status	Very poor	9(2.3)	
	Somewhat poor	60(15.6)	
	Good	261(68)	
	Very good	48(12.5)	
TOTAL		378(98.4)	6(1.6)
Healthcare consumption	Monthly	37(9.6)	
	More than 6 times/yr	234(60.9)	
	Less than 6 times/yr	107(27.9)	
TOTAL		378(98.4)	6(1.6)
Health payment	Insurance	126(32.8)	
	Out-of-pocket	233(60.7)	
	Exempted	13(3.4)	
	Other	4(1)	
TOTAL		376(97.9)	8(2.1)
Traffic accident	Yes	328(85.4)	
	No	48(12.5)	
TOTAL		376(97.9)	8(2.1)
Universal healthcare	Yes	374(97.4)	
	No	5(3.1)	
TOTAL		379(98.7)	5(3.1)

Table 5: *Health status and related factors associated with the study*

3.1.2 Taxation

After gaining insights from the analysis of demographic and health related variables, the scope of attention shifted to one of the essential sections of the survey concerning acceptance of domestic taxation as a means to finance healthcare. The results show that

public perceptions towards the introduction of a marginal levy for this purpose was overwhelmingly positive as well as for tobacco, alcohol and sweets/soft drinks. Specifically, for fuel, about 98 percent of respondents agreed about the introduction of marginal levy to finance healthcare (table 6).

Variable	Characteristics	n (%)	Missing data
Tax on fuel	Yes	375(97.7)	
	No	9(2.3)	
TOTAL		384(100)	0(0)
Tax on tobacco	Yes	367(95.6)	
	No	14(3.6)	
TOTAL		381(99.2)	3(0.8)
Tax on alcohol	Yes	368(95.8)	
	No	14(3.6)	
TOTAL		382(99.5)	2(0.5)
Tax on sweets/soft drinks	Yes	352(91.7)	
	No	28(7.3)	
TOTAL		380(99)	4(1)

Table 6: *Public perceptions towards domestic taxation as a mean to finance healthcare*

3.1.3 Willingness to pay

The final inquiry addressed how much the respondents were willing to pay if a tax on fuel was to be introduced to finance healthcare. It was considered essential to obtain this information, which was an input parameter into the modeling component of the study. Respondents were asked to select one out of seven categories of levies, ranging from '1-10 TSh' to '100+ TSh'. Whenever lacking a willingness to pay, respondents had the option to select 'nothing'. The results show that 99 percent of the study population was willing to pay *some* amount of fuel tax but about 61 percent were willing to pay less than 30 Tshs per liter. Figure 5 display the distribution of willingness to pay expressed as percentages per category of fuel levy.

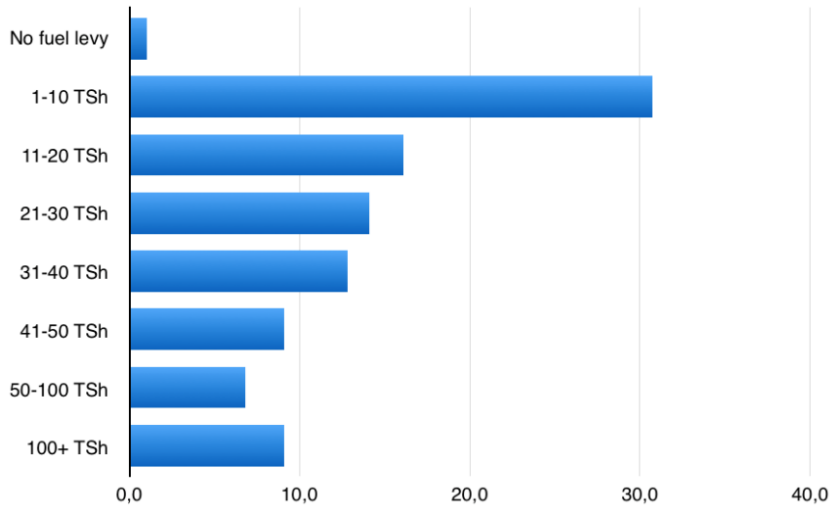

Figure 5: *Amount the respondents were willing to pay. Y-axis display the proposed levies per unit (liter) of fuel, x-axis display frequency.*

As the result portrays, there was willingness to pay across all proposed categories of levies. Further insight on which characteristics was associated with a category of levy was obtained by constructing a table that included cross tabulations of demographic variables with willingness to pay (table 7)

Table 7 allows to draw a notable observation, namely that the willingness to pay is consistent: this means that mode category of levy was 1-10 TSh per liter of fuel for the entire study population and was coherent across all variables. A synoptic pattern followed all categories of fuel levies, suggesting that willingness to pay is not necessarily grounded in demographic attributes. Interestingly, there was absolute willingness to pay *something* extra per liter of fuel among responders associated with no education, none or informal employment and belonging to the poorest socioeconomic demographic.

Variable	Characteristics	No fuel levy	1-10 TSh	11-20 TSh	21-30 TSh	31-40 TSh	41-50 TSh	51-100 TSh	100+ TSh	TOTAL	Missing data
Gender	Male	4(1.6)	73(30.6)	39(16.4)	32(13.4)	29(12.2)	26(10.9)	16(6.7)	19(8)	238(62.1)	
	Female	0(0)	45(31)	23(15.9)	22(15.2)	20(13.8)	9(6.2)	10(6.9)	16(11)	145(37.9)	
	TOTAL	4(1)	118(30.8)	62(16.2)	54(14.1)	49(12.8)	35(9.1)	26(6.8)	35(9.1)	383(99.7)	1(0.3)
Age	18-25 yrs	0(0)	32(57.1)	10(17.9)	4(7.1)	3(5.4)	0(0)	3(5.4)	4(7.1)	56(14.8)	
	26-35 yrs	0(0)	37(38.1)	21(21.6)	8(8.2)	8(8.2)	5(5.2)	8(8.2)	10(10.3)	97(25.7)	
	36-45 yrs	3(2.1)	32(23)	21(15.1)	28(20.1)	28(20.1)	9(6.5)	6(4.3)	12(8.6)	139(36.8)	
	46-55 yrs	1(1.6)	14(22.2)	8(12.7)	10(15.8)	6(9.5)	16(25.4)	3(4.8)	5(7.9)	63(16.7)	
	+ 55 yrs	0(0)	2(8.7)	0(0)	3(13)	4(17.4)	4(17.4)	6(26.1)	4(17.4)	23(6.1)	
	TOTAL	4(1.1)	118(31.2)	62(16.4)	53(14)	49(13)	34(9)	26(6.9)	35(9.2)	378(98.4)	6(1.6)
District of residence	Kinindoni	2(1.9)	45(42.5)	18(17)	9(8.5)	5(4.7)	5(4.7)	12(11.3)	10(9.4)	106(28)	
	Ilala	1(1.1)	21(23.1)	16(17.6)	20(22)	16(17.6)	8(8.8)	3(3.3)	6(6.6)	91(24.1)	
	Temeke	0(0)	35(26.9)	21(16.2)	20(15.4)	22(16.9)	11(8.5)	9(6.9)	12(9.2)	130(34.4)	
	Other district	1(1.9)	16(31.4)	6(11.8)	5(9.8)	6(11.8)	8(15.7)	2(3.9)	7(13.7)	51(13.5)	
	TOTAL	4(1.1)	117(31)	61(16.1)	54(14.3)	49(13)	32(8.5)	26(6.9)	35(9.3)	378(98.4)	6(1.6)
Education	No education	0(0)	3(17.6)	1(5.9)	2(11.8)	5(29.4)	3(17.6)	1(5.9)	2(11.8)	17(4.5)	
	Primary school	2(2.7)	33(44.6)	9(12.2)	4(5.4)	3(4.1)	5(6.8)	10(13.5)	8(10.8)	74(19.5)	
	Ordinary secondary	0(0)	28(41.8)	12(17.9)	4(6)	9(13.4)	3(4.5)	5(7.5)	6(9)	67(17.6)	
	Advanced secondary	0(0)	14(18)	17(21.8)	21(26.9)	15(19.2)	4(5.1)	1(1.3)	6(7.7)	78(20.5)	
	College/university	1(0.7)	38(26.4)	23(16)	23(16)	17(11.8)	20(13.9)	9(6.3)	13(9)	144(37.9)	
	TOTAL	3(0.8)	116(30.5)	62(16.3)	54(14.2)	49(12.9)	35(9.2)	26(6.8)	35(9.2)	380(99)	4(1)
Employment	No employment	0(0)	17(32.1)	9(17)	6(11.3)	9(17)	3(5.7)	3(5.7)	6(11.3)	53(14.3)	
	Informal sector	0(0)	43(30.1)	19(13.3)	17(11.9)	19(13.3)	15(10.5)	11(7.7)	19(13.3)	143(38.5)	
	Formal public sector	1(2.7)	8(21.6)	7(18.9)	5(13.5)	3(8.1)	8(21.6)	3(8.1)	2(5.4)	37(10)	
	Formal private sector	2(1.4)	44(31.9)	25(18.1)	25(18.1)	17(12.3)	8(5.8)	9(6.5)	8(5.8)	138(37.2)	
	TOTAL	3(0.8)	112(30.2)	60(16.2)	53(14.3)	48(12.9)	34(9.2)	26(7)	35(9.4)	371(96.6)	13(3.4)
Health status	Poor	0(0)	2(22.2)	0(0)	0(0)	0(0)	1(11.1)	2(22.2)	4(44.4)	9(2.4)	
	Somewhat poor	0(0)	18(30)	8(13.3)	11(18.3)	7(11.7)	6(10)	2(3.3)	8(13.3)	60(15.9)	
	Good	3(1.1)	89(34.2)	46(17.7)	36(13.8)	35(13.5)	18(6.9)	17(6.5)	16(6.2)	260(68.9)	
	Very good	1(2.1)	9(18.8)	5(10.4)	7(14.6)	7(14.6)	9(18.8)	3(6.3)	7(14.6)	48(12.7)	
	TOTAL	4(1.1)	118(31.3)	59(15.6)	54(14.3)	49(13)	34(9)	24(6.4)	35(9)	377(98.2)	7(1.8)
Socioeconomic status	Poorest	0(0)	36(36.7)	7(7.1)	7(7.1)	14(14.3)	12(12.2)	8(8.2)	14(14.3)	98(25.6)	
	Somewhat poor	3(3.2)	40(42.6)	15(16)	10(10.6)	11(11.7)	5(5.3)	4(4.3)	6(6.4)	94(24.5)	
	Somewhat rich	1(1.1)	25(26.3)	16(16.9)	17(17.9)	11(11.6)	10(10.5)	6(6.3)	9(9.5)	95(24.8)	
	Richest	0(0)	17(17.8)	24(25)	20(20.8)	13(13.5)	8(8.3)	8(8.3)	6(6.3)	96(25.1)	
	TOTAL	4(1)	118(30.8)	62(16.2)	54(14.1)	49(12.8)	35(9.1)	26(6.8)	35(9.1)	383(99.7)	1(0.3)

Table 7: *Crosstabulation of demographic variables and willingness to pay; n(%)*

3.2 Financial projections

The premise for estimating financial projections is grounded in the results of the survey. On the one hand, it was possible to calculate and analyze gross revenues extracted from each category of fuel levies regardless of survey outcomes. On the other hand, taking into account the nature of this study, gross revenue calculations alone would be insignificant, meaning they would amount to mere financial projections without foundation in a scenario were public perceptions was taken into account.

Key components for estimating financial projections were represented in mean and mode values derived from analyzing survey data. On average (mean), the study population was willing to pay 22 TSh (0,01 USD) extra for each liter of fuel as a means to finance healthcare. As previously established, the mode category of fuel levy was 1-10 TSh. Estimations of gross revenues associated within the mode category were extracted from intrinsic low (1 TSh), average (5 TSh) and high (10 TSh) values.

Table 8 gives an oversight of annual gross revenues associated with each acceptable fuel levy in relation to baseline fuel consumption and correlated uncertainties of fuel consumption. As outlined in the methodology it was considered appropriate to estimate gross revenues of petrol and diesel each at a time and then sum them up in order to widen the scope of information. The results show that a levy of 10 TSh/liter of diesel or petrol produce a revenue of 29 billion TSh (12.7 million USD) and 22 TSh/liter will produce 64 billion TSh (27.8 million USD). A levy on petrol is less lucrative than a levy on diesel due to a higher consumption pattern of diesel on the Tanzanian mainland in FY 2017/18. The relationship between a levy on petrol compared to a levy of diesel is illustrated in figures 6 and 7.

Fuel levy	Gross revenues from a levy on petrol (USD)				
	- 10% of baseline fuel consumption	- 5% of baseline fuel consumption	Baseline fuel consumption	+ 5% of baseline fuel consumption	+ 10% of baseline fuel consumption
1 TSh	998,225,499 (434,011)	1,053,682,471 (458,123)	1,109,139,443 (482,235)	1,164,596,415 (506,346)	1,220,053,387 (530,458)
5 TSh	4,991,127,494 (2,170,055)	5,268,412,354 (2,290,614)	5,545,697,215 (2,411,173)	5,822,982,076 (2,531,731)	6,100,266,936 (2,652,290)
10 TSh	9,982,254,987 (4,340,110)	10,536,824,708 (4,581,228)	11,091,394,430 (4,822,345)	11,645,964,152 (5,063,463)	12,200,533,873 (5,304,580)
22 TSh	21,960,960,971 (9,548,243)	23,181,014,359 (10,078,702)	24,401,067,746 (10,609,160)	25,621,121,133 (11,139,618)	26,841,174,521 (11,670,075)
	Gross revenues from a levy on diesel (USD)				
	- 10% of baseline fuel consumption	- 5% of baseline fuel consumption	Baseline fuel consumption	+ 5% of baseline fuel consumption	+ 10% of baseline fuel consumption
1 TSh	1,619,934,260 (704,319)	1,709,930,608 (743,448)	1,799,926,956 (782,577)	1,889,923,304 (821,705)	1,979,919,652 (860,835)
5 TSh	8,099,671,302 (3,521,596)	8,549,653,041 (3,717,240)	8,999,634,780 (3,912,885)	9,449,616,519 (4,108,529)	9,899,598,258 (4,304,173)
10 TSh	16,199,342,604 (7,043,192)	17,099,306,082 (7,434,481)	17,999,269,560 (7,825,769)	18,899,233,038 (8,217,058)	19,799,196,516 (8,608,346)
22 TSh	35,638,553,729 (15,495023)	37,618,473,380 (16,355,858)	39,598,393,032 (17,216,692)	41,578,312,684 (18,077,527)	43,558,232,335 (18,938,362)
	Gross revenues from a levy on petrol and diesel (USD)				
	- 10% of baseline fuel consumption	- 5% of baseline fuel consumption	Baseline fuel consumption	+ 5% of baseline fuel consumption	+ 10% of baseline fuel consumption
1 TSh	2,618,159,759 (1,138,330)	2,763,613,079 (1,201,571)	2,909,066,399 (1,264,811)	3,054,519,719 (1,328,052)	3,199,973,039 (1,391,293)
5 TSh	13,090,798,796 (5,691,652)	13,818,065,395 (6,007,855)	14,545,331,995 (6,324,057)	15,272,598,565 (6,640,260)	15,999,865,194 (6,956,463)
10 TSh	26,181,597,591 (11,383,303)	27,636,130,790 (12,015,709)	29,090,663,990 (12,648,115)	30,545,197,190 (13,280,521)	31,999,730,389 (13,912,926)
22 TSh	57,599,514,700 (25,043,267)	60,799,487,739 (26,434,560)	63,999,460,778 (27,825,853)	67,199,433,817 (29,217,145)	70,399,406,856 (30,608,438)

Table 8: *Financial projections from a marginal fuel levy based on public perceptions where petrol and diesel are analyzed separately and collectively. Baseline consumption of fuel was extracted from EWURA's annual report from 2018.*

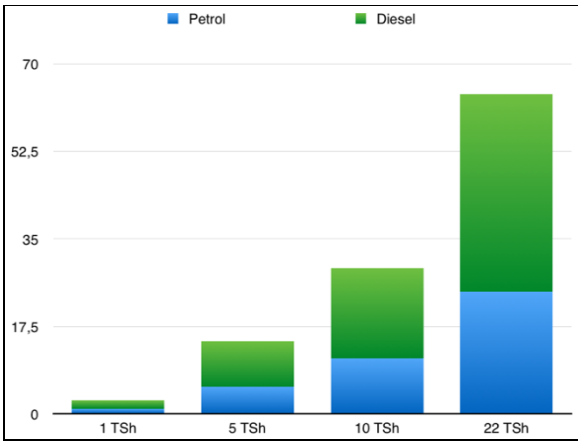

Figure 6: *Proportion of gross revenues associated with petrol and diesel in a scenario where both were subject to a levy. Y-axis display gross revenues (billion TSh), x-axis displays mode and mean levies*

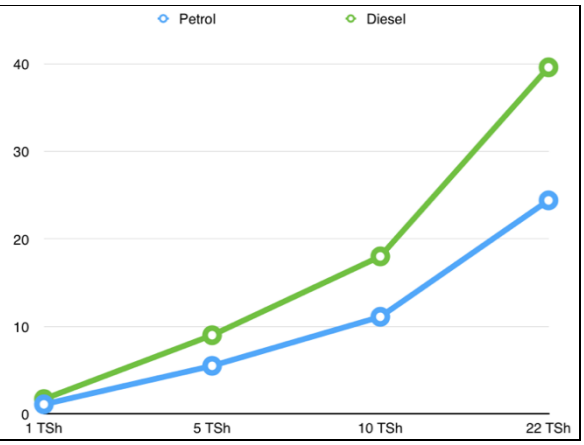

Figure 7: *Gross revenues associated with petrol and diesel when compared separately. Y-axis display gross revenues (billion TSh), x-axis display mode and mean levies*

The results have shown that public perceptions generally support the introduction of a marginal fuel levy to finance healthcare. Furthermore, as revealed by the analysis on the willingness to pay, four fuel levies have been identified as acceptable based on evidence extracted from the survey. Gross revenues associated with each of the acceptable fuel levies has been estimated and financial projections have been calculated for petrol and diesel individually and combined, showing higher gross revenues associated with diesel. The findings will be discussed and contextualized in the following chapter.

Chapter IV: Discussion

4.0 Overview

The results have provided insights on public perceptions and financial projections with regard to the introduction of a marginal fuel levy with the intent to accommodate this measure. In the following sub-chapters, the main findings will be discussed and contextualized. This chapter is organized as follows: discussions will focus, first, on the findings concerning public perceptions; second, on the findings concerning financial projections; and third, on the proposal of implementing a fuel levy to finance healthcare, both in general and with regard to the specific circumstances of Tanzania.

4.1 Public perceptions towards a marginal fuel levy to finance healthcare

As stated previously, Tanzania has committed to universal health care (UHC). In light of this commitment, it is worth to recognize that health systems with a considerable proportion of its budgets accommodated by donor contributions and out-of-pocket health payments (OOP), might be fiscally vulnerable in order to achieve this goal (23). Generally speaking, as donor contributions are declining in developing countries, it becomes increasingly important to supplement the health budgets by implementing innovative financing strategies to increase revenues from domestic resources. Such measures includes the introduction of excise duties on goods and services that are thought to contribute to the burden of disease, including tobacco, alcohol and sugar-sweetened beverages (SSB) (63). Could the same principle apply to fuel?

The first part of this study aimed to gain insight on public perceptions towards the introduction of a marginal fuel levy to finance healthcare. The results showed an overwhelmingly positive attitudes among study participants, with 97.7 percent of respondents in favor of such a measure. Moreover, the analysis reveals that almost all the people interviewed, i.e. 99 percent, were willing to pay *something* extra for each liter of fuel to contribute to the domestic pooling of health funds.

It is worth remarking that this finding is somewhat contradictory compared to findings in other studies addressing public perceptions on tax compliance. Ali, Fjeldstad and Sjursen (64), conducted a study with regard to citizens attitudes towards taxation in Kenya, Tanzania, Uganda and South Africa, and found that 47 percent of respondents in Tanzania had a tax

compliant attitude. However, as that study points out, Tanzanians' compliance to pay tax is related to the level of education, and overall satisfaction with public services, such as education and health. The divergence of results may thus have originated from the particular study group that this study has engaged, compared to the study group that the study by Ali, Fjeldstad and Sjursen identified.

There are several theories that explains the willingness to pay taxes. Notably, some of the main approaches explaining the willingness to pay taxes are the economic deterrence, social influences and fiscal exchange approaches (64).

Economic deterrence theory refers to the idea that taxpayers are more willing to comply based on rational cost-benefit calculations. Under the economic deterrence theory, taxpayers' willingness to pay taxes depends on what taxpayers perceive they can gain by paying taxes, and what the potential individual losses, or consequences, of not paying taxes will be. It should be acknowledged that some evidence supports the effect of economic deterrence. Therefore, national tax policies and administrations widely adopt the economic deterrence approach, by which the fear of being caught not paying taxes serves as an incentive to increase tax compliance (64). Nonetheless, this approach has been criticized for putting too much weight on an individual's concern of being caught for evading taxes rather than being recognized as actually compliant (65). For the difficulty of measuring deterrence, the deterrence approach was not included in the survey's design for this study. Therefore, with regard to economic deterrence, it is untenable to draw any assumptions about respondents' motives from the survey.

The second approach, hinged on social influences, is concerned with the idea that an individual's behavior and attitudes are being influenced by behaviors and social norms within its own reference group (64). As for all kinds of behavior, this social influence from one's reference group is also likely to apply to tax compliance (66). Social influences might have had an impact on the results of this study. As groups of road vehicle users were usually approached simultaneously during the data collection, it is not unreasonable to assume that common understandings and attitudes towards a marginal fuel levy could have been induced by the circumstances of the study, notably the intangible social influence from the reference group. Additionally, Tanzania has a fairly homogenous population with little ethnic tension compared to Kenya, Uganda and South Africa and social influence is therefore associated with a higher degree of compliance (64).

Also, similar demographic traits direct respondents towards similar perceptions (64). To support the outcome of this study, when respondents' demographic traits are taken into account, it is tempting to lean towards this approach. In fact, it is worth recalling that 75.5 percent of survey respondents completed ordinary level secondary school and with regard to health status, 72.5 percent of survey respondents classified themselves as being in good health or very good health. These findings support the notion that the majority of respondents share similar demographic traits including a relatively good level of education and feel comfortable about his or her personal health, both factors that are associated with tax compliance in general, and in Tanzania in particular (64).

Fiscal exchange theory holds elements from both economic deterrence and social influence. Perceived more as a behavioral problem, tax compliance is closely linked to the co-operation between tax collectors and taxpayers (24). A taxpayer's attitude is influenced by several factors, such as tax morale, tax mentality and tax tension. When the sum of these factors is positive, a taxpayer is likely to increase co-operation and willingness to pay (24). Another way of interpreting fiscal exchange theory is to emphasize the "contractual relationship" where taxpayers show compliance when governments are held accountable and providing services payed for by taxation (64).

The results from this study may indicate a potential for fiscal exchange between taxpayers and tax collectors in Tanzania. Findings show that 97.5 percent of respondents were in favor of UHC and more than 90 percent of respondents were in favor of taxation of harmful products to finance healthcare, such as tobacco, alcohol, candy and sugar-sweetened soft drinks, as well as fuel. These findings show that respondents desire UHC and are expressing compliance towards domestic taxation as a mechanism to finance healthcare. If governments strive to administer domestic taxation in an accountable and transparent fashion where taxpayers obtain perceived benefits, this might further enhance compliance (64).

However, when asking a person about compliance to pay tax there could be some degree of ambiguity attached to the answer (64). Is the person responding honestly or is the person responding what is more socially acceptable? In order to accommodate this concern, survey questions were constructed as to avoid "testing" honesty: rather, questions were constructed as impervious as possible.
Along these lines, when inquired whether harmful products should be subject to a levy, respondents were confronted with associated illnesses in the same question. As an example,

in regard to a levy on tobacco, the question stated; “Cigarettes are associated with lung cancer, heart disease and pulmonary illnesses. Do you agree that people purchasing cigarettes should pay a small levy to finance healthcare?”. In this way the respondents were providing an opinion to a tenable question rather than giving an answer to a more sensitive question about whether the respondents were compliant or non-compliant with taxation obligations, or positive or negative to levies in general. Therefore, participating anonymously in the survey, the whole exercise was presumed to be harmless and uncompromising of respondents’ integrity.

The question addressing a levy for users of road vehicles was constructed in the same fashion: “Cars and motorcycles are associated with traffic accidents. Do you agree that users of road vehicles (drivers and passengers) should pay a small levy to finance healthcare?”. Given the above argument, it is prudently assumed that the opinions of the respondents are genuine and thus, the result of this study do not seem to be “distorted” by having tested on honesty, or dishonesty.

Additionally, there were two corollary findings that stood out as interesting with regard to the outcome of this study; namely that 85.4 percent of respondents had personally or had a family member sustained an RTI, while 60.7 percent of respondents payed for health services OOP. These factors may have influenced the result to some extent by substantiating the positive attitudes towards introducing a marginal fuel levy to finance healthcare. The implication is that treatment of RTIs are associated with considerable expenses, while OOP payment for health services is associated with impoverishing and catastrophic costs, as well as promoting inequality in terms of health service utilization (ref). The questions that remains is whether the high prevalence of respondents paying for health services OOP or having sustained RTIs/having a family member involved in RTIs directly influenced the positive perceptions towards the measure proposed by this study. However, it can be prudently maintained that the result of this study suggests a positive relationship between sustained RTIs, OOP and attitudes towards a fuel levy. In fact, 97.8 percent of those involved in RTI was in favor of a levy for road vehicle users, with a similar value, 97.4 percent, for those who pay for health services OOP.

The theory of fiscal exchange might apply to explain this finding. Fiscal exchange theory addresses the relationship between those who pay taxes and the perceived benefits they obtain, provided by government (64). In the context of this study, the respondents that pay

for health services OOP might express positive attitudes towards a fuel levy based on the notion that health services funded by taxation will decrease individual expenses.

With regard to willingness to pay, this study has identified four marginal fuel levies that were deemed acceptable by the study population (1 TSH, 5 TSh, 10 TSh, 22 TSh). As pointed out by Kim and Kim (67), fair and equitable taxation acts as an enhancer of tax compliance; similarly, promoting equity is considered pivotal with regard to financing UHC (68). With this perspective in mind, in the context of this study, public perceptions towards the value of a fuel levy was considered as key information in order to promote equity and enhance acceptability for a fuel levy to finance healthcare. This approach may have contributed to the positive results attached to the outcome of this study as willingness to pay was found to be prominent.

It was previously remarked that the study group was fairly homogenous, and the question is thus whether any existing demographic differences affected respondents' willingness to pay. Presumably due to the high acceptance of a fuel levy and willingness to pay *something* extra per liter of fuel to finance healthcare, only minimal differences could be traced back to demographic variables. A consistent pattern of willingness to pay was present across all categories of fuel levies proposed by this study, leading to the conclusion that attributes such as gender, age, level of education, employment, health status and SES did not have any substantial influence on the result (table 7). Noticeably, the population with no education, none or informal employment and belonging to the poorest socioeconomic group all expressed willingness to pay *something*, while males within the age group of 36-55 expressed some unwillingness to pay. However, the latter represented only 1 percent of the study population.

In sum, in terms of public perceptions, the findings of the study can be analyzed from the perspective of the social influences and social factors approaches, whereby respondents responded positively to a fuel levy to finance healthcare in Tanzania due to the similar attitudes held with their reference group, social factors, including demographics and experience with RTIs and OOP, and study design, which did not test compliance with regard to tax obligations nor deterrence, but rather focused on identifying which levies would be acceptable by the study population.

4.2 Financial projections from a fuel levy to finance healthcare

To review, having found that, for this study, the mode category of a fuel levy was 1-10 TSh, while the mean levy was 22 TSh (0,01 USD), the study shall draw projections on the total amount of revenues the Tanzanian government can hypothetically raise through a fuel levy to finance healthcare. The outcome of financial projections was expressed as gross revenues associated with each of the proposed levies, taking into account uncertainties of fuel demand on the Tanzanian mainland. Gross revenues may introduce a somewhat inflated figure in terms of financial projections, on the ground that administrative costs, tax audit expenditures and challenges with tax compliance in Tanzania cannot be easily integrated as variables in the final analysis and were thus not integrated in this study. However, it can be argued that financial projections expressed as gross revenues provide a benchmark of the financial potential carried by a marginal fuel levy. Therefore, at the end of this analysis, it will be possible to draw a conclusion on whether a fuel levy represents an innovative source of domestic pooling to finance healthcare in Tanzania: namely, this study will offer a measure of what a fuel levy signifies as an innovative financial tool to bridge the funding gap in Tanzania's healthcare system.

It is officially recognized that Tanzania suffer from a funding gap for health services, with the health budget projecting a deficit of 1.5% of real GDP to meet the required level of health financing in 2019/20 (9). The immediate impression is that there are substantial financial gains attached to a fuel levy to finance healthcare, potentially generating annual gross revenues of 2.6 billion – 3.2 billion TSh (from a 1 TSh levy), 13.1 billion – 16 billion TSh (from a 5 TSh levy), 26.2 billion – 32 billion TSh (from a 10 TSh levy) and 59.6 billion – 70.4 billion TSh (from a 22 TSh levy). To put these numbers in perspective, one can address the estimated funding gap of full implementation of HSSP IV without utilizing innovative financing at 2.4 billion TSh by 2019/20 (ref). The result of this study shows that a 0,04 percent levy (1 TSh) on each liter of fuel sold on the local market, which is coupled with gross revenues of 2.6 billion – 3.2 billion TSh, has the potential to narrow or possibly close the current funding gap.

The analysis of financial projections yielded a higher gross revenue associated with diesel than petrol due to a higher consumption rates of diesel on the Tanzanian mainland. With regard to calculations made on the baseline consumption of fuel in FY 2017/18, a levy on diesel had the potential to generate approximately 39 percent more gross revenues compared to a levy on petrol. A levy on either petrol or diesel would alone have the potential to bridge the funding gap, but a levy on diesel would substantially exceed the funding gap. In fact, the

results of this study show that a 0.2 percent levy (5 TSh) on each liter of diesel sold on the local market would possibly suffice to accommodate the funding gap estimated by HSSP IV. The same goes for a 0.2 percent levy (5 TSh) on petrol although gross revenues would be 39 percent less than that of diesel.

According to Fell et. al (37) the Tanzanian society incurs expenditures ranging 1.2-1.5 million USD annually due to traffic accidents, which includes costs related to emergency response, damage to property, loss of productivity and medical costs. Based on the results of this study, a levy of 5 TSh on either petrol or diesel, or a levy of 1 TSh on both, as supported in public perceptions, would potentially cover the annual societal costs associated with traffic accidents in Tanzania.

4.3 A fuel levy to promote public health

To gain some understanding of exactly what kind of tax a fuel levy would represent, it is appropriate to elaborate on this matter by glimpsing some relevant theories. A fuel levy to finance health care is a type of taxation considered *indirect*, meaning it is not imposed directly on taxpayers (like income tax or property tax) but enabled at the point where an individual is paying for the goods or services to which the tax applies (69). Under indirect taxes fall import duties and excise duties, and consumption taxes such as value-added tax (VAT) and sales tax (69).

A fuel tax is a typical example of an excise duty, as is taxation of tobacco, alcohol and SSB. From a public health perspective, excise duties on products that are associated with ill health can be an effective measure to alter behaviors and increase funding for public health initiatives (70). Taxation of products such as tobacco, alcohol and SSB are commonly associated with the improvement of public health, but it can be argued that an earmarked fuel levy would contribute, not only to health financing, but also to favorable impacts on public health.

It is recognized that a fuel levy can discourage individuals from using private vehicles as a means of transport; therefore, a fuel levy can indirectly promote the utilization of public transportation (71). As pedestrians are at more risk of injury due to traffic accidents, not only in Tanzania but on the African continent in general (72), it is reasonable to assume that a reduction in motorized vehicles on the roads and higher usage of public transportation may contribute to a decrease in pedestrian fatalities. However, a positive association between a

fuel levy and the decline in pedestrian fatalities has not been discovered in current literature and is therefore yet to be considered as a strong argument in terms of public health outcomes.

On the other hand, fuel levies have the potential to catalyze fuel-efficient technologies: motor vehicle manufacturers can indeed increase their competitiveness by catering their vehicles to individuals that aim to save on fuel, due to the increased fuel prices. Fuel-efficient technologies would admittedly have a positive impact on air pollution (71), a serious contemporary concern with regard to public health. While cigarettes were the cause of 7 million deaths worldwide in 2015, air pollution was responsible for 6,4 million deaths in the same year (73). Among these casualties, non-communicable diseases accounted for 70 percent of air pollution deaths, which shows that air pollution is a mechanism for non-communicable diseases (73). Cardiovascular diseases, including heart attacks and strokes as well as respiratory illnesses such as chronic obstructive pulmonary diseases and asthma exacerbations are all related to air pollution generated by fossil fuels, as is absenteeism from school and work (74). While air pollution is comprised of several components, its determinants are undoubtedly related to urbanization, megacities and the growing use of road vehicles (73). Over the last decade, air pollution has been ranked as the third biggest contributor to disability-adjusted life years in Tanzania (4). So, since tobacco, alcohol and SSB are subject to taxation based on public health concerns, why should this perspective not apply to fossil fuels? Moreover, emerging Covid19-related studies show how particulate matter, found in emissions from combustion engines, are correlated to the faster spread of Covid19 in Northern Italy, the so-called “boost” effect of particulate matter (75). In light of this development it is only reasonable to argue for a fuel levy to promote public health, also in a developing context.

However, there are arguments which disfavor the idea of introducing a fuel levy as a means to promote public health in a developing context. As pointed out by Ngare and Derek (76), poor households in developing countries, both urban and rural, are particularly vulnerable to an increase in food prices which can be directly affected by a rise in fuel prices. In Kenya, an increase in diesel prices resulted in a significant rise in perishable food prices, such as cabbage and potatoes, and such events can lead to negative effects on food consumption and food investments (76). Increased food prices may also lead to considerable social unrest, as was the case in North-Africa and the Middle East during 2011 (77). In order to address and accommodate these concerns, policymakers are urged to readjust tax rates on certain foods and goods if fuel prices reach a certain level (76). As the introduction of a fuel levy to finance

healthcare are likely to directly increase fuel prices, responsible governance and equity considerations with regard to food security and the availability of essential goods must be acknowledged and accentuated by policymakers. A methodology based on public perceptions, as shown by this study, would help achieve the goals of responsible governance, including societal participation, and equity.

4.4 Why a fuel levy to finance healthcare can be appropriate in Tanzania

From a global health perspective, and in light of Tanzania's ambitious efforts of achieving UHC, there exists growing recognition that health funding from *domestic* sources is becoming increasingly important (78). The issue of raising sufficient revenues to finance UHC is one of the most fundamental factors to succeed with an appropriate financing of the healthcare system (78). Taxation of products or goods that are deemed harmful to individuals and costly to society is increasingly important in developing countries, not only to discourage unhealthy consumption and behavior, but also to increase domestic revenues to finance healthcare. In the case of Thailand, which introduced UHC in 2002, a 2 percent levy on cigarettes has contributed to the accumulation of 50 – 60 million USD annually for health financing (79).

In the case of Tanzania, enhancing domestic taxation by broadening the tax base and by imposing innovative duties is particularly salient. Compared to other developing countries, Tanzania is performing poorly with regard to domestic revenue collection, yielding a lower domestic tax ratio of GDP than other non-oil producing countries in Sub-Saharan Africa (80). In 2012/13, the cumulative value of tax collection reached the equivalent of 11,3 percent of GDP. This number improved slightly to 13,2 percent of GDP in 2016/17 but was still below the average of 16,4 percent for Sub-Saharan Africa (81). Despite a continuous trend where external funding is declining, and private funding remains limited, Tanzania has increasing needs, which are significant and expanding. In order to enable its own development, Tanzania has no other choice than to rely on its own revenues (80).

The introduction of a marginal fuel levy to finance healthcare represents an opportunity to increase domestic revenues for improving health services. A tax performance analysis conducted in 2006, showed that motor fuel exhibited a price-inelastic demand in Tanzania, meaning that motor fuel was prone for increased taxation without interfering with the overall demand for fuel (Osoro). Accordingly, the TRA has increased revenues from a fuel levy, with the equivalent of 4.4 percent annual growth between 2016/17 – 2017/18 (82).

As shown by the results of this study, potential revenues can be substantial even though the levy in question yields a modest 0.04-0.1 percent tax increase, as supported by public perceptions. The excise duty on fuel was 313 TSh on each liter of petrol or diesel sold in FY 2018/19 (83), and with the additional levy, earmarked for financing healthcare, the total duty would be levied at 314-335 TSh per liter of petrol and/or diesel (approximately 0.14 USD) with the tax increase regarded as acceptable by the public. It is here impossible to reckon the total amount of taxpayers' money that would be directed to the public finances, as calculating excise duties on fuel is difficult due to fluctuating oil prices on the global market, as well as uncertainties related to changes in excises and prevalence of subsidies (84). It should nonetheless be remarked that understanding what current excise duties on fuel are financing would be important in the future. A focus towards healthcare would thus be a responsible and responsive policy to lay down, and an extenuating one to justify before Tanzanian taxpayers.

As in most countries, tax compliance in Tanzania is connected to the perception among taxpayers on whether their contributions are distributed in an equitable, fair and reasonable fashion, and applied efficiently by the government to improve public services or to cross-subsidize the poor (80). Younger, Myamba and Mdadila (85), argues that redistribution is following a positive trajectory in Tanzania, and that indirect taxes are more progressive than in other countries. In 2016, excise duties on petrol and diesel were considered progressive due to the relatively small levy it imposed, while the only indirect taxes that were deemed regressive were those imposed on kerosene and tobacco (85).

Whether a tax is considered progressive or regressive is reflected in the economic burden it poses onto individuals and whether this is disfavoring the poor, meaning that those with the lowest economic security pay disproportionally higher amounts of their income due to taxes compared to the well-off (68). This concern is at the core of this study and is the reason why public perceptions are emphasized; the need for progressive taxation is also the reason why the proposed levies for this study are marginal. However, as pointed out by Mills et al (68), indirect taxes have the ability to become regressive. As a country enjoys economic growth, as for Tanzania, a higher proportion of its citizens become able to purchase certain goods and services that were previously unattainable. When these commodities are subject to excise duties, this occurrence can cause indirect taxation to eventually become regressive.

Over the last two decades, Tanzania has seen extensive tax reforms with the aim of enhancing institution building, improving service delivery and deepening the tax authorities' specialization (84). Such factors as transparency, accountability and efficiency are considered key in order to succeed in utilizing domestic potentials through taxation (86). And here lies the essence of introducing a marginal fuel levy to finance healthcare in Tanzania: to create a fiscal space through the domestic funding of health at a time when donor and private contributions simply are insufficient for reaching the fiscal requirements of operating Tanzania's health system, with regard to the targets set by HSSP IV.

4.5 Strengths and limitations

With regard to this study, current literature produces vast results when it comes to *related* fields of research, but none *directly related* to the core of the research in question. Public perceptions towards taxation has been examined through survey participation in different studies. However, these other studies focus on tax compliance in general rather than attitudes and willingness to pay towards a specific tax to finance healthcare, as the marginal fuel levy proposed by this study. Research addressing taxation on harmful goods and products, like tobacco, alcohol and SSB, with the intent to promote public health and increase domestic taxation in a developing country, is wide. Still, literature regarding a tax on fuel to finance the health system in the most progressive way as possible is lacking. Evidence-based research on climate change and carbon taxes is to some extent linking pollution from fossil fuels to public health; however, recommendations implicating a fuel tax to promote public health were not retrieved.

In light of the above, the following sub-sections will briefly outline the strengths and limitations of this study, considering that this research is pioneering in the field of innovative finance for public health and that further research is necessarily to possibly comprehend the most important implications of this study.

4.5.1 Strengths

Due to the lack of literature on a fuel tax to finance healthcare, this study provides a valuable addition to the current knowledge gap. The results of this study implicate that public perception towards taxation can be positive under the condition that taxpayers have a say with regard to the *relevance* of the tax in question (e.g., a tax relevant for financing healthcare), and the *amount* of the levy to which it applies. It also provides financial projections based on

public perceptions which start from marginal levies but reveal estimates of potentially considerable revenues.

This study supports the encouragement of promoting equity in healthcare financing, hence, the structure of the study. The first part included survey participation and was dedicated to gaining insight on public perceptions towards a fuel levy to finance healthcare and willingness to pay. Based on these outcomes, financial projections could be estimated by modelling a decision tree where the proposed fuel levies had acceptance founded in public perceptions.

4.5.2 Limitations

The survey was distributed to study participants in cites, which functions as connection points for public and private transport in Dar Es Salaam. This circumstance led to the engagement with groups of drivers and passengers who completed the survey with close proximity to each other, which introduced an information bias to some extent. To which degree participants was genuinely sincere in their responses is therefore uncertain. The structure of the survey questions did neither allow for analyzing tax compliance in general.

The study setting was exclusively urban and given that approximately 70 percent of Tanzanians are rural dwellers, this study does not encapsulate public perceptions from a rural prospective. Therefore, the results regarding public perceptions may not be generalizable for the whole country.

With regard to financial projections, calculations in this study must be regarded as parametrical values, rather than evidential values. Estimates did not consider fluctuations in market prices of petrol and diesel, nor the interaction of other duties and subsidies which will affect fuel prices on the Tanzanian mainland. Kerosene was also excluded from the analysis, due to the circumstance of not being mean of fuel for road vehicles, which may have underestimated the projections attached to a fuel levy. Revenues are expressed as gross revenues, which is a diluted term and does not take into account costs related to implementing and administering a fuel levy to finance healthcare.

Chapter V: Conclusion

This study has investigated an innovative health financing mechanism intended to increase domestic revenues in Tanzania. As the country has committed to UHC, it is recognized that financial capacitates are insufficient in order to successfully implement the targets set by HSSP IV. In general, UHC is promoting financial protection for all citizens with regard to accessing health services. However, health systems run in this fashion is mainly financed through domestic taxation, which is lacking in Tanzania.

Attitudes towards domestic taxation is influenced by taxpayers' beliefs of whether a tax is fair, equitable and beneficial. Governments are encouraged to introduce progressive taxes that harmonize with the tax base by promoting accountability through enhanced service delivery, cross-subsidization and transparent tax audit processes. With these perspectives as a backdrop, this study aimed to determine public perceptions and estimate financial projections associated with a marginal fuel levy to finance healthcare in Tanzania.

The findings of this study suggest that public perceptions are positive towards domestic taxation as a means to finance healthcare. There was strong support in favor of a marginal fuel levy, as was the support towards taxation of harmful goods and products in general, such as tobacco, alcohol, candy and sugar-sweetened beverages. Demographic traits, e.g. education, employment and SES, appeared to be insignificant for the outcome due to respondent's high willingness to pay *something* extra for a liter of fuel.

Founded in public perceptions, this study identified four marginal fuel levies deemed acceptable by respondents based on their willingness to pay. Levies were extracted from mode values (1 TSh, 5 TSh, 10 TSh) and the mean value (22 TSh) and signifies an additional levy of 0.04 – 0.1 percent to current fuel prices.

Financial projections were estimated as gross revenues based on willingness to pay and consumption of petrol and diesel in Tanzania in fiscal year 2017/18 (adjusted for uncertainties in fuel consumption). Estimates show that there are potentially substantial revenues to be gained from a marginal fuel levy to finance healthcare. The least ambitious fiscal scenario has the potential to generate gross revenues of 2.6 billion – 3.2 billion TSh annually, while the most ambitious fiscal scenario has the potential to generate gross reveues of 59.6 billion – 70.4 billion TSh annually. As financial projections are expressed as gross revenues, net

revenues are not projected. Estimates did not encompass uncertainties in global oil market prices, additional excises and subsidies attached to a fuel levy in Tanzania, nor administrative costs associated with implementing an additional tax on fuel.

Overall, this study found a positive relationship between public perceptions and a marginal fuel levy to finance healthcare. However, the lack of literature on this topic call for further research. In particular, an upscale of a similar study is necessary to obtain public perceptions from different regions and districts, with the inclusion of rural populations, to establish attitudes towards a marginal fuel levy to finance healthcare on a national scale.

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ANNEX 1: Survey in English

No	Question	Answer
1.	Identity number	----------
2.	Gender	❑ Male ❑ Female
3.	Age	❑ 18-25 yrs. ❑ 26-35 yrs. ❑ 36-45 yrs. ❑ 46-55 yrs. ❑ 55+ yrs.
4.	District of residence	❑ Kinondoni ❑ Ilala ❑ Temeke ❑ Other
5.	Highest level of education completed	❑ Primary school ❑ Ordinary Secondary ❑ Advanced level secondary ❑ College/University ❑ No formal education
6.	Type of employment	❑ Formal public sector ❑ Formal private sector ❑ Informal sector ❑ Unemployed
7.	Do you own a mobile phone?	❑ Yes ❑ No
8.	Do you own a radio?	❑ Yes ❑ no
9.	Do you own a Television?	❑ Yes ❑ No
10.	Do you own a refrigerator?	❑ Yes ❑ No
11.	Do you own any of the following means of transport?	❑ Car ❑ Motorcycle/Bajaj ❑ Bicycle ❑ None of the above
12.	Do you own a house/dwelling?	❑ Yes ❑ No
13.	Do you have electricity in your household?	❑ Yes ❑ No

14.	What is your source of drinking water in the household?	❑ Bottled water ❑ Piped water in the house ❑ Own deep well ❑ Tanker truck water ❑ Water from public well ❑ River/canal or rain
15.	Type of toilet you use in your household	❑ Modern flush toilet ❑ Pit latrine ❑ Bush/field
16.	Source of energy for cooking	❑ Electricity ❑ Gas ❑ Charcoal ❑ Kerosene ❑ Woods
17.	Flooring material of your dwelling	❑ Polished wood ❑ Tiles ❑ Cement ❑ Dirt earth
18.	How often do you visit a medical clinic, a doctor or a dispensary?	❑ Monthly ❑ 6< times a year ❑ 6> times a year
19.	How would you describe your overall health status?	❑ Very good ❑ Good ❑ Somewhat poor ❑ Very poor
20.	How do you pay for health care if you or a family member falls ill?	❑ Health insurance ❑ I pay myself ❑ I am exempted ❑ Other
21.	Do you believe health care should be universal?	❑ Yes ❑ No
22.	Have you or any of your family members or friends been involved in a traffic accident?	❑ Yes ❑ No
23.	Cigarettes are associated with lung cancer, heart disease and other pulmonary illnesses. Do you agree that people purchasing cigarettes should pay a small levy to finance healthcare?	❑ Yes ❑ No
24.	Alcohol is associated with liver disease, colon cancer and dementia. Do you agree that people	❑ Yes ❑ No

	purchasing alcohol should pay a small levy to finance healthcare?	
25.	Soft drinks and sweets containing high levels of sugar are associated with diabetes, obesity and dental caries. Do you agree that people purchasing soft drinks and sweets should pay a small levy to finance healthcare?	❑ Yes ❑ NO
26.	Cars and motorcycles are associated with traffic accidents. Do you agree that users of road vehicles (drivers and passengers) should pay a small levy to finance healthcare?	❑ Yes ❑ No
27.	Imagine that a fuel levy was introduced tomorrow, how much would you be willing to pay per liter to finance health?	❑ Between 1-10 TZS ❑ Between 11-20 TZS ❑ Between 21-30 TZS ❑ Between 31-40 TZS ❑ Between 41-50 TZS ❑ Between 51-100 TZS ❑ Above 100 ❑ Nothing

ANNEX 2: Survey in Swahili

No	Swali	Jibu
1.	Namba ya utambulisho	----------
2.	Jinsia	❑ Me ❑ Ke
3.	Umri	❑ Miaka 18-25 ❑ Miaka 26-35 ❑ Miaka 36-45 ❑ Miaka 46-55 ❑ Miaka 55 na kuendelea
4.	Wilaya unayoishi	❑ Kinondoni ❑ Ilala ❑ Temeke ❑ Nyingine
5.	Kiwango cha elimu ulichofikia	❑ Elimu ya msingi ❑ Elimu ya sekondari O levo ❑ Elimu ya sekondari A levo ❑ Diploma/Chuo kikuu ❑ Sina elimu
6.	Aina ya ajira	❑ Nimeajiriwa serikalini ❑ Nimeajiriwa sekta binafsi ❑ Sekta isiyo rasmi ❑ Sina ajira
7.	Unamiliki simu ya mkononi?	❑ Ndio ❑ Hapana
8.	Unamiliki redio?	❑ Ndio ❑ Hapana
9.	Unamiliki TV?	❑ Ndio ❑ Hapana
10.	Unamiliki jokofu/Friji?	❑ Ndio ❑ Hapana
11.	Unamiliki kimojawapo ya vyombo hivi vya usafiri?	❑ Gari ❑ Pikipiki/Bajaji ❑ Baiskeli
12.	Unamiliki nyumba?	❑ Ndio ❑ Hapana
13.	Nyumbani kwako unaishi kuna umeme?	❑ Ndio ❑ Hapana

14.	Nini chanzo chako cha maji ya kunywa nyumbani?	❑ Maji ya chupa ❑ Maji ya bomba ndani ❑ Kisima kirefu nyumbani ❑ Maji ya kwenye magari ❑ Bomba ya mtaa ❑ Mto/mfereji/mvua
15.	Aina ya choo unachotumia nyumbani	❑ Cha kisasa cha kuflashi ❑ Choo cha shimo ❑ Vichakani
16.	Chanzo cha nishati ya kupikia	❑ Umeme ❑ Gesi ❑ Mkaa ❑ Mafuta ya taa ❑ Kuni
17.	Aina ya sakafu	❑ Mbao zilizongarishwa ❑ Tiles ❑ Sementi ❑ Udongo
18.	How often do you visit a medical clinic, a doctor or a dispensary?	❑ Monthly ❑ 6< times a year ❑ 6> times a year
19.	How would you describe your overall health status?	❑ Very good ❑ Good ❑ Somewhat poor ❑ Very poor
20.	Wewe au ndugu akiugua unalipaje gharama za matibabu?	❑ Bima ya afya ❑ Nalipa mwenyewe ❑ Msamaha ❑ Nyingine
21.	Unaamini huduma za afya zinatakiwa kuwa kwa wote	❑ Ndio ❑ Hapana
22.	Wewe au ndugu yako amewahi kupata jail ya barabarani?	❑ Ndio ❑ Hapana
23.	Uvutaji sigara unasababisha kansa ya mapafu, magonjwa ya moyo na magonjwa mengine ya mfumo wa hewa. Unakubali kuwa watu wanaovuta sigara walipe kiasi kidogo cha pesa kugharamia huduma za matibabu?	❑ Ndio ❑ Hapana
24.	Unywaji pombe unasababisha maradhi ya ini, na kansa. Unakubali kuwa wanywaji pombe	❑ Ndio ❑ Hapana

	walipe hela kidogo kugharamia matibabu wanaponunua pombe?	
25.	Utumiaji wa vinywaji laini vyenye sukari na vitu vingine vyenye kiwango kikubwa cha sukari vinasababisha kisukari, utapiamlo na kuoza meno. Unakubali kuwa watu wanaponunua vinjwaji na vyakula hivi vye wingi wa sukari wachangie kiasi kidogo kulgharamia huduma za matibabu?	❑ Ndio ❑ Hapana
26.	Magari, pikipiki na vyo bo vingine vya moto vya usafiri vinasababisha jail za barabarani. Je unakubali watumiai wa vyombo vya moto (madereva na wasafiri) walipigie gharama kidogo kugharamia huduma za afya?	❑ Ndio ❑ Hapana
27.	Fikria kama watu wanaotumia vyombo vya moto kwa usafiri wataambiwa wachangie kidogo gharama za afya, je utakuwa tayari kuchangia kiasi gani kwa kila lita ya mafuta ya gari itakayonunuliwa?	❑ Kati ya 1-10 TZS ❑ Kati ya 11-20 TZS ❑ Kati ya 21-30 TZS ❑ Kati ya 31-40 TZS ❑ Kati ya 41-50 TZS ❑ Kati ya 51-100 TZS ❑ Zaidi ya 100 TSH ❑ Sipo tayari kuchangia

ANNEX 3: Informed consent form – English version

INFORMED CONSENT FORM-ENGLISH VERSION

ID-NO | | | | | | | | | | |

Consent to Participate in Research

Greetings! My name is …….....

Purpose of the Study

We are enrolling ……using a questionnaire **to assess the financial projections and feasibility of introducing a marginal levy on fuels to finance health care in Tanzania.** The study will inform the government about percentage of levy to introduce and the revenues to be collected through this mechanism, which will add more resources to finance its ambitious target of Universal Health Care

Confidentiality

All information we collect will be confidential.

Risks

We do not expect that any harm will happen to you because of joining this study

Rights to Withdraw and Alternatives

Taking part in this study is completely your choice. If you choose not to participate in the study or if you decide to stop participating in the study, we will respect your decision. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdraw from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

If you agree to take part in this study, you will help us to understand how much should be charged, the amount to be collected and the acceptability of charging levy on fuel to finance healthcare. We hope that the information we learn from this study will benefit the policy makers and the nation in general.

We do not expect that any additional costs to you will result from participation in this study.

Who to Contact

If you ever have questions about this study, you should contact the Principal Investigator, Mr. Pål Sebastian Vognstølen via Dr. Amani Thomas Mori, P.O. Box 65013, Dar es Salaam, Email:

pax_amani@yahoo.com Cell phone: +255 715 585133 and the Director for Research and Publication of Muhimbili University of Health and Allied Sciences, Dr. Bruno Sunguya, P.O. Box 65001 Dar es Salaam, Phone +255-022-2150302/6 Ext: 1016

Signature:

Do you agree?

Participant agrees …….

Participant does NOT agree ……..

I, _____ have read the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant _____

Signature of researcher _____

Date of signing consent _____

ANNEX 4: Informed consent form – Swahili version

INFORMED CONSENT FORM-SWAHILI VERSION

ID-NO | | | | | | | | | | |

Ridhaa ya kushiriki katika utafiti

Salaam! Jina langu ni …….....

Lengo la utafiti

Tunamuhusisha ndugu ……katika utafiti kwa kumuhoji maswali kwa kutumia dodoso ili "**Kujua kiasi cha pesa kitakachopatikana na uwezekano wa kutoza kiwango kidogo cha asilimia kutoka kwenye bei za mafuta ya magari kuchangia gharama za matibabu".** Utafiti huu utaisaidia serikali kujua ni asilimia ngapi itozwe and jumla ya pesa itakayopatikana kwa njia hii ili kuongeza kiwango na wigo wa mapato kwa ajili ya kufikia lengo la kila mtu kuweza kupata huduma za afya.

Usiri

Taarifa zote zitakazokusanywa zitakuwa ni siri.

Uwezekano wa hatari

Hatutarajii utapata matatizo yoyote kwa kushiriki katika utafiti huu.

Haki ya kujitoa

Kushiriki katika utafiti huu ni maamuzi yako binafsi. Ikiwa hutapenda kushiriki au ukiamua kujitoa katika utafiti tutaheshimu maamuzi yako. Unaweza kuacha kuendelea kushiriki katika utafiti huu wakati wowote ule au katika hatua yoyote ile hata kama utakuwa umeshatoa ridhaa ya kushiriki. Kukataa kushiriki au kujitoa katika utafiti huu hautakufanya upigwe faini au upoteze stahiki zako ambazo unastahili kuzipata.

Faida

Kama ukiamua kushiriki katika utafiti huu utatusaidia kufahamu ni kiasi gani kikatwe kwenye bei za mafuta, ni pesa kiasi gani kitapatikana kwa jumla na maoni ya wananchi juu ya kukata asilimia Fulani ya pesa kutoka kwenye mafuta ya gari kugharamia huduma za afya. Tunatarajia kuwa kuwa taarifa tutakazopata kutoka kwenye utafiti huu zitasaidia watunga sera na taifa kwa ujumla.

Hatutarajii utaingia gharama yoyote ya ziada kwa kushiriki katika utafiti huu.

Mtu wa kuwasiliana naye

Kama utakuwa na swali lolote kuhusu utafiti huu wasiliana na mtafiti mkuu, Bwana Pål Sebastian Vognstølen kupitia kwa Dr. Amani Thomas Mori, S.L.P 65013, Dar es Salaam, Barua pepe: pax_amani@yahoo.com, Simu ya kiganjani: +255 715 585133 au Mkurugenzi wa Tafiti na Machapisho wa Chuo Kikuu Kikuu cha Sayansi za Afya Muhimbili Dr. Bruno Sunguya S.L.P 65001 Dar es Salaam, Simu: +255-022-2150302/6 Ext: 1016

Sahihi:

Umekubali kushiriki katika utafiti?

Amekubali ……

Amekataa ……..……..

Mimi_____ nimesoma maudhuri yaliyopo kwenye fmu hii. Maswali yangu yamejibiwa na ninakubali kushiriki katika utafiti.

Sahihi ya mshiriki _____

Sahihi ya mtafiti _____

Tarehe ya kusaini fomu hii _____