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Navigating Taxpayers Attitude: Exploring Support for Urban Sanitation Surcharge in Kumasi

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ABSTRACT

BACKGROUND: Urban sanitation challenges persist in Ghana, prompting Metropolitan, Municipal, and District Assemblies (MMDAs) to explore innovative funding mechanisms such as surcharges to fund sanitation services. This study assesses property owners' attitudes toward the imposition of sanitation surcharge for pro-poor sanitation improvement in the Kumasi Metropolis.

METHOD: An analytical cross-sectional study was conducted among 424 property owners in the Kumasi metropolis. Structured questionnaires were utilized to solicit information from respondents using multi-stage sampling techniques.

RESULTS: Findings indicated that 36.1% of respondents were willing to pay the sanitation surcharge, while 63.9% opposed its implementation in the Metropolis. Property ownership and support for a sanitation surcharge were associated with higher odds of willingness to pay. Participants paying property rates had decreased odds of supporting the sanitation surcharge. Factors associated with pro-poor spending support included age (61-80 years) [AOR = 1.81, 95%CI = 1.60-3.82] and willingness to pay sanitation surcharge [AOR = 11.07, 95%CI = 6.63-18.49]. Protective factors against supporting pro-poor spending included residing in medium-class communities [AOR = 0.25, 95%CI = 0.08-0.81], perceiving improvement in sanitation status [AOR = 0.41, 95%CI = 0.21-0.81) and having a home toilet facility (OR = 0.65, 95%CI = 0.36-0.95).

CONCLUSION: The study revealed a nuanced landscape where concerns about fund utilization, perceived tax burdens, and trust in local institutions significantly shape public sentiment. To enhance public acceptance and participation, policymakers should prioritize transparent communication to build trust and convey the effective utilization of funds from the sanitation surcharge.

KEYWORDS: Sanitation surcharge, pro-poor policy, levy, residents, urban Ghana, Kumasi Metropolis

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Introduction

Background

Increasing domestic revenue is a pivotal objective for many developing countries.[1] Tax mobilization stands as a means for governments to create fiscal space, provide essential public services, and reduce reliance on foreign aid and single-resource dependence.[2] Within this fiscal framework, taxation represents the citizen's end of the "social contract," signifying a reciprocal arrangement where individuals contribute financially for the goods and services dispensed by their government.[3,4] Failure on the part of the government to support fundamental services undermines this social contract.

Among the plethora of services governments provide, improved sanitation holds a paramount position due to its profound impact on individuals' daily lives.[5] Inadequate sanitation infrastructure compromises public health and economic development, particularly among poor households. By contrast, investments in improved sanitation yield substantial returns by improving health and welfare while averting millions of annual deaths attributed to diarrheal diseases.[6,7] Moreover, such investments generate positive externalities, improving overall quality of life and signaling government responsiveness to citizen welfare.[8]

Yet, ensuring safe and effective sanitation services in rapidly urbanizing areas remains a persistent challenge, especially in developing countries. Many cities grapple with the conundrum of providing efficient and equitable sanitation services amid resource constraints and bureaucratic inefficiencies.[5,9] This challenge has spurred interest in innovative financing mechanisms, particularly those that empower local governments and involve citizens in shaping and administering sanitation solutions.[10,11] Among these approaches, the sanitation surcharge has emerged as a potentially promising tool. A sanitation surcharge is an additional fee levied on specific taxes,

such as property rates or water bills, earmarked explicitly for sanitation improvements within the jurisdiction.[12] By decentralizing sanitation governance and linking financial resources directly to local needs, this approach enables local governments to address sanitation challenges more effectively, especially in reaching marginalized communities underserved by centralized systems.[13-15]

Although urban sanitation surcharges have been implemented across various African cities, their outcomes have been mixed. While some policies have successfully provided improved sanitation facilities for low-income communities,[8,12,16,17] others have struggled to generate sufficient revenue for local development.[9] Despite existing studies on taxpayers' attitudes and customers' willingness to pay,[8,9,17] there remains limited evidence regarding taxpayers' support for such policies prior to their implementation—a gap that holds crucial implications for policymakers.

In the context of Kumasi, where the Metropolitan Assembly seeks to implement a sanitation surcharge model to enhance sanitation in low-income communities, understanding taxpayers' perceptions and reactions to such surcharges is paramount. This study aims to explore taxpayers' attitudes toward the implementation of a sanitation surcharge in Kumasi, shedding light on the nuances of public support for this innovative financing mechanism.

Insights from the implementation of pro-poor sanitation surcharges in Africa

The effectiveness of local government services is contingent upon the policies guiding urban local governments and the extent of autonomy granted by national governments in political, administrative, and fiscal domains.[15,18] Unfortunately, in many developing countries, the role of local governments in urban service provision has diminished, leading national governments to frequently bypass them in addressing local challenges.[14] Consequently, local governments struggle to establish the capacity for autonomous service delivery. Even when formally designated for sanitation provision, their efficiency is compromised by limited financial resources and fiscal discretion.[14] Inadequate local government revenues often fail to meet capital infrastructure needs, making central governments and international donors the primary funding sources for pro-poor infrastructure. This notwithstanding, central government funding and grants from development partners and philanthropic and charity organizations have been insufficient to address the sanitation gap in many developing countries. As a result, innovative financing approaches are gaining attention for sanitation improvement.[10,11,19]

Sanitation surcharges, involving an additional charge in existing user fees for sanitation, have emerged as an innovative mechanism to bridge the financing gap, particularly in low-income urban areas of sub-Saharan Africa. Several African cities, including Ouagadougou, Lusaka, Dakar, Antananarivo, Beira, and Maputo, have implemented sanitation levies in the form of surcharges, often integrated into water bills.[8,12,17] In Ghana, the inclusion of sanitation surcharges in water bills initially occurred when sanitation was under the purview of the Ghana Water and Sewerage Corporation (GWSC). Presently, Metropolitan Municipal Assemblies have included surcharges to landed property tax.[7,9]

However, it's important to note that not all sanitation surcharges are pro-poor. A pro-poor sanitation surcharge policy entails allocating funds from the surcharge in a manner that ensures low-income communities receive sanitation services that exceed their contribution to the funds. Thus, it refers to redistributing financial resources to ensure affordable access to sanitation services for all, particularly for disadvantaged and low-income populations. The rationale behind pro-poor spending of sanitation surcharge lies in recognizing that cost recovery through user fees alone may not be sufficient to finance infrastructure development, operations, and maintenance while ensuring affordability for all segments of society.[13] Examples from African cities like Lusaka, Bobo-Dioulasso, and Ouagadougou showcase successful implementation, where surcharges were levied on higher-income citizens to finance sanitation services in low-income areas[8,12,20,21] Lusaka, for instance, exclusively allocated funds from the sanitation surcharge to improve sanitation in low-income areas, resulting in the installation of 200 sanitation facilities and condominial sewerage systems in peri-urban areas.[12] Burkina Faso has achieved notable success by levying a sanitation services surcharge on water bills, leading to improved sanitation access for nearly 1 million people without relying on external donor funding.[19,20]

However, contrasting outcomes were observed in the Ga West Municipality after the implementation in 2016. The revenue from the sanitation surcharge was merely GHS 15 096.87 (USD 3774.22) in 2016 and GHS 15 268.20 (USD 3392.93) in 2017. This was attributed lack of commitment to policy implementation, evidenced by the absence of measures to track revenue collection, disbursement, and utilization by the Municipal Assembly.[9]

Conceptual foundation: Dimensions of taxpayer compliance

Governments worldwide rely on taxation as a crucial revenue source to achieve developmental objectives outlined in their fiscal plans. Taxpayer compliance, however, presents a complex challenge, encompassing issues from avoidance to evasion, and poses a significant threat to governments' revenue generation capacity. This paper explores 5 interconnected theories that provide a conceptual foundation for understanding the dimensions of taxpayer compliance: Economic Deterrence, Fiscal Exchange, Social Influences, Comparative Treatment, and Political Legitimacy.

Economic deterrence. The Economic Deterrence Theory, a fundamental concept in the study of taxpayer compliance, posits that individuals are motivated to comply with tax laws primarily due to the perceived economic consequences associated with non-compliance. Originating from Becker's[22] seminal work in 1968, this theory, rooted in rational choice, asserts that individuals make decisions based on a cost-benefit analysis, where the potential legal and financial ramifications of tax evasion act as significant deterrents. Allingham and Sandmo's[23] paper further contributed to the theory by incorporating risk aversion, tax rates, and detection probabilities into a formal model, highlighting the crucial role of the perceived risk of detection and punishment in shaping taxpayer behavior. Empirical studies have supported the theory, with research often utilizing econometric models to analyze the impact of enforcement measures on tax compliance. Terkper[24] advanced the reason that taxpayers demonstrate various degrees of compliance owing to factors such as a lack of understanding of the tax laws and apathy toward the government. While economic deterrence is a useful tool, it has its limitations. Critics contend that the assumption of rational decision-making only partially captures the complexity of taxpayer behavior. Therefore, a more comprehensive understanding of tax compliance requires a holistic approach that considers alternative theories and factors, including psychological and social influences. Ultimately, such an approach will help build a fair and equitable tax system in response to new tax measures.

Fiscal exchange. The Fiscal Exchange Theory, a prominent framework in the study of taxpayer compliance, posits that individuals are more inclined to adhere to tax obligations when they perceive a fair exchange between their tax contributions and the public goods and services they receive in return. Central to this theory is the concept of reciprocity, suggesting that taxpayers view their tax payments as a transaction with the government, expecting a proportional reciprocation in the form of essential services. Torgler's[25] 2007 work on tax morale and Feld and Frey's[26] study on the psychological contract further illuminate the theory, emphasizing that when taxpayers believe in the equitable link between their taxes and societal benefits, their compliance is heightened. Torgler's investigation demonstrated that individuals are more likely to comply when they perceive their tax payments contribute to societal well-being. Levi,[27] highlights how transparency and accountability in tax administration foster trust and willingness to contribute. When taxpayers see their contributions translating into tangible improvements in public services, they are more likely to view compliance as a worthwhile investment.

Social influences. The Social Influences Theory is a crucial framework in the study of taxpayer compliance, positing that individual adherence to tax laws is intricately shaped by social factors, including peer pressure, societal norms, and cultural values. This theory, rooted in social psychology, challenges traditional economic deterrence models by emphasizing the significant influence of the social environment on individual decision-making in the realm of taxation. Studies such as Alm and Torgler's examination of ethics in tax compliance demonstrate that societal norms and ethical considerations play a substantial role, moving beyond mere economic incentives in influencing taxpayer behavior.[28] That is, individuals are not solely motivated by economic incentives but are swayed by ethical and moral considerations shaped by societal norms. Additionally, Feld and Tyran's experimental analysis reveals that individuals may adjust their compliance behavior based on the perceived societal acceptance or rejection of tax evasion, underscoring the substantial impact of social influences on tax-related decisions.[29] Taxpayers are more likely to comply if they perceive adherence to the tax system as the expected and accepted behavior within their social circles. Studies by Cialdini and Goldstein[30] demonstrate that individuals tend to conform to established social norms, even when facing personal costs. If people around them comply with tax rules, it creates social pressure to do the same. Conversely, exposure to non-compliant behavior can normalize tax evasion and erode compliance motivations.

Comparative treatment. The Comparative Treatment Theory emerges as a pivotal lens in the study of taxpayer compliance, asserting that individuals assess their tax burden and treatment in relation to others, influencing their compliance decisions. This theoretical framework, anchored in the concept of fairness, posits that taxpayers' perceptions of the equity and fairness of the tax system play a crucial role in shaping their willingness to comply. Sausgruber and Tyran's[31] study substantiates the Comparative Treatment Theory by empirically investigating the impact of tax policies on individuals' perceived fairness, revealing that attitudes toward compliance are significantly influenced by the relative treatment of others within the tax system. Taxpayers are more likely to comply when they perceive the system as treating everyone fairly and consistently, regardless of their social or economic status. This belief engenders a sense of trust and fosters a willingness to comply, as demonstrated by Tyler.[32] This includes consistent application of tax rules, transparent decision-making processes, and impartial enforcement practices. Studies by Tyler[32] highlight how procedural justice, characterized by fairness, respect, and a chance to be heard, fosters trust and increases compliance. Perceived unfairness or inconsistencies, on the other hand, can breed resentment and undermine compliance motivations.

Political legitimacy. The Political Legitimacy Theory is a foundational framework in the study of taxpayer compliance, asserting that individuals are more likely to comply with tax laws when they perceive the tax system and governing authorities as legitimate and fair. Grounded in political science and

governance theories, this framework goes beyond traditional economic deterrence models, emphasizing the importance of the broader political context and the perceived legitimacy of governing institutions in influencing taxpayer behavior. Feld and Frey's[33] study explores the relationship between trust in government and taxpayer compliance, revealing that trust and perceived fairness foster compliance, thus underlining the psychological dimensions of taxpayer behavior within the Political Legitimacy Theory. Levi[27] emphasizes that trust in a government's competence, fairness, and commitment to the public good fosters a sense of obligation to contribute. Transparency, accountability, and evidence-based decision-making can all contribute to building this trust, ultimately leading to increased compliance. Conversely, corruption, perceived misuse of tax revenue, and lack of public participation can erode trust and undermine compliance motivations.

This study mobilizes the diverse theories on taxation and compliance behavior to analyze the data collected regarding taxpayers' attitudes toward the implementation of a sanitation surcharge in Kumasi. By synthesizing insights from these theories, the study provides a comprehensive understanding of the factors influencing taxpayers' support or opposition toward the proposed sanitation surcharge.

Methods

Study setting

The data for this study was collected as part of a sanitation surcharge research targeting property owners in 3 Assemblies in Ghana, including KMA. The Kumasi Metropolis (or the City of Kumasi) is one of Ghana's oldest administrative districts. The original township of Kumasi, which forms the nucleus of the Metropolis, was founded in the 1680s by Nana Osei Tutu I to serve as the capital of the then-Ashanti State.[34] When Ghana's current decentralization policy was introduced in 1988, Kumasi, Accra and Sekondi-Takoradi were assigned the status of a "metropolis" and have since been administered by the Kumasi Metropolitan Assembly. However, the boundaries of the city have undergone drastic changes in recent years. In 2012, Asawase Sub-metro, which was 1 of the 10 sub-metropolitan districts that made up the Metropolis at the time, was hived off to create the Asokore Mampong Municipality. Again in 2018, 5 of the remaining 9 sub-metropolitan districts—Kwadaso, Suame, Tafo, Oforikrom, and Asokwa—became municipalities on their own. The new Kumasi Metropolis occupies an area of about 79.6 km^2, representing 0.33% of the regional land area. Some principal settlements that make up the Metropolis include Bantama, Adum, Manhyia, Asante Newtown, Bompata, Fanti Newtown, Asafo, and Amakom. For effective administration, Kumasi Metropolis is divided into 4 Sub-Metropolitan District Councils: Bantama, Manhyia, Nhyiaeso, and Subin. The now Kumasi Metropolitan Assembly population is estimated at 815 962 people.[35] In Kumasi, the working group consists of those aged 15 and up. Approximately 66.5% of this population is economically engaged, and 91.4% of the economically active population is employed. These people work in various economic sectors, including wholesale and retail, manufacturing, automobile and motorcycle maintenance, accommodation and food service, financial and insurance services, transportation and storage services, agriculture, forestry, and fishing. The city's geographic centrality has enabled it to function as a major transport and commercial hub, with its influence reaching beyond the country's land borders.[36] Less than 10% of Kumasi's households are connected to a sewer network. Sewerage networks connected to simple treatment plants are available in 3 communities. The remaining portion of the population relies on onsite sanitation facilities such as septic tanks and ventilated improved pits (VIP), biodigester toilets and container-based sanitation solutions.[36-38]

Figure 1 Present the map of KMA.

Study design and sample size

This study utilized a cross-sectional design where owners or caretakers (in the event the owner is absent) of selected properties (buildings) within the metropolis were selected as the study population. The data collection exercise spanned half a year (6 months), commencing in January 2019 and ending in July 2019. The sample size for each of the study areas was calculated based on the estimated number of buildings using data from the 2010 Population and Housing Census. An error margin of 5% was applied in calculating the sample sizes.

Sampling procedures and techniques

A multi-stage stratified sampling technique was used to select communities and property owners for the study. The justification for employing the multi-stage sampling technique was to obtain a more representative sample from the geographically dispersed population. The 4 Sub-Metropolitan Districts in Kumasi, namely Bantama, Manhyia, Nhyiaeso, and Subin, served as distinct strata. At least 2 communities were selected from each stratum, depending on the number of communities in that stratum. The list of localities in each stratum then served as a sampling frame from which a number of localities were randomly selected. The sample size (number of sampled buildings) was then distributed proportionally among the selected communities based on their sizes (in terms of population and housing stock) (see Table 1). Within the communities, buildings were randomly selected with the help of satellite images and ground-truthing.

To gather information from property owners or their designated representatives (spouses, caretakers, etc), survey

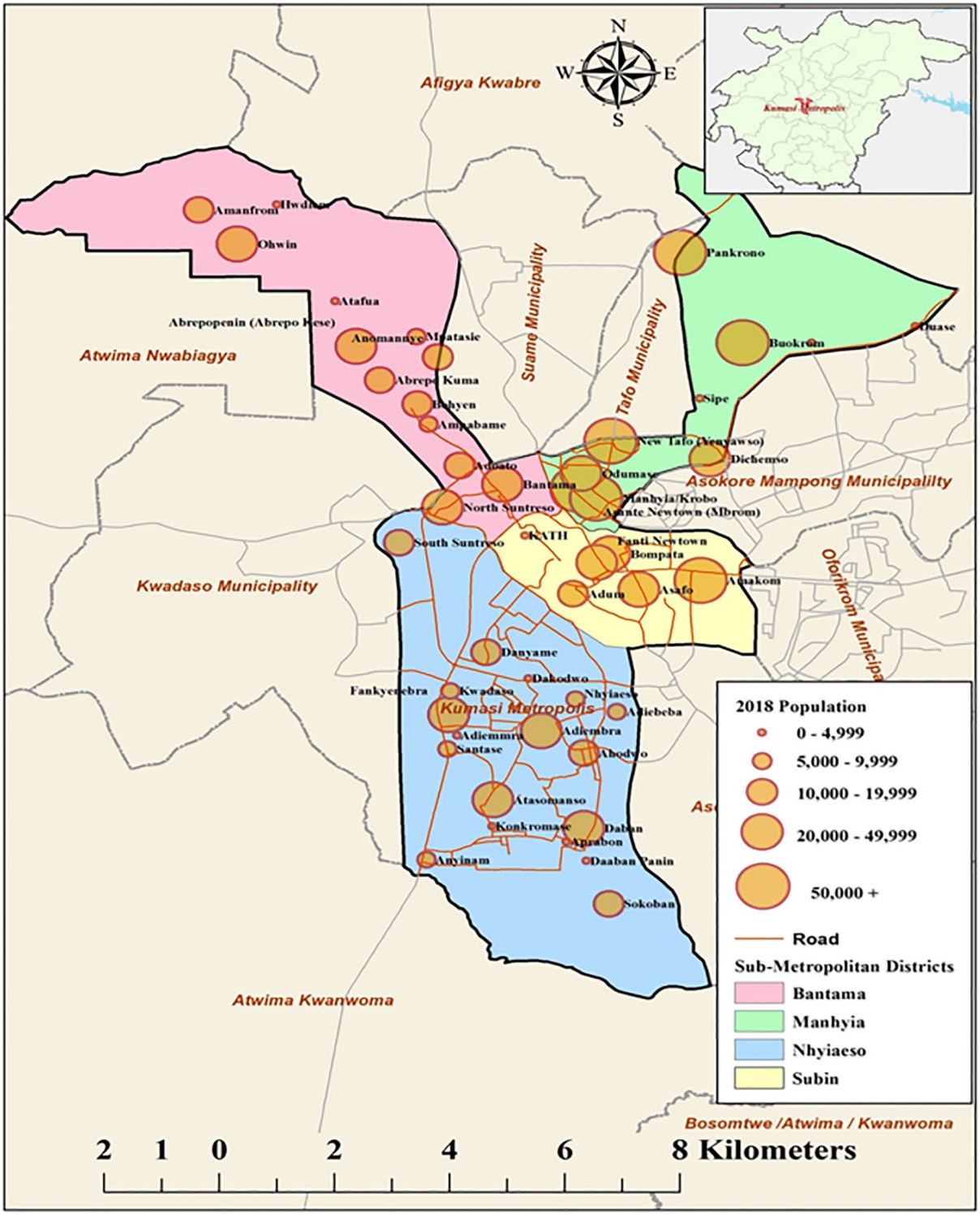

Figure 1. Map of Kumasi.

instruments and questionnaires were developed and integrated into the Kobo Collect software for streamlined data collection. The administration of questionnaires employed this computer-assisted technique, utilizing Android-based devices or tablets equipped with the Kobo Collect software. Responses and data were entered directly into the devices, stored locally, and routinely synchronized with a dedicated virtual server. The data management process involved the oversight of a dedicated data manager, who ensured the accuracy and integrity of the synchronized data. Subsequently, the collected data were extracted into Microsoft Excel for data management and subsequent analysis.

Table 1. Distribution of sample size.

SUB -METROPOLITAN DISTRICTS	KUMASI	
	COMMUNITY	SAMPLE SIZE
Bantama	Abrepokese	39
	Bantama	47
	Bohyen	45
Subin	Amakom	47
	Asafo	43
	Bompata	26
Manhyia	Dichemso	41
	Ash Town	47
Nyhiaeso	Ahodwo	20
	Nhyiaeso	18
	Santase	27
	South Suntreso	24
	Total	424

Data management and analysis

Data was cleaned, checked for consistency and validated using self-written commands before analysis. Data management, as well as statistical analysis, were performed using STATA statistical software version 16.0.[39]

First, descriptive computations were conducted to describe the general sampled characteristics. At the 5% alpha threshold, a chi-square test of independence was conducted to ascertain the association between dependent and independent variables. As such, any independent variable that could not meet the cut-off point of 5% was not entered into the regression model.

Subsequently, at 95% confidence level and 5% alpha threshold, two-level binary logistic regression models were built. Model I (unadjusted model) examined the relationship between the independent variables and willingness to pay sanitation surcharge, whilst Model II (adjusted model) accounted for the effect of other covariates. Our findings were reported in Odds Ratio (OR), and odds above 1 were explained as having a likelihood to pay sanitation surcharge, whilst odds below 1 meant otherwise. The Hosmer-Lemeshow post-estimation test was used to assess the model fitness, and the results indicated no evidence of poor fit.

Ethical consideration

This study was approved by the Committee for Human Research, Publication, and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology. Written informed consent was obtained from all study participants and the study was conducted following all ethical procedures and methods that ensured that the rights of participants were not violated.

Results and Discussions

Results

Table 2 presents the socio-demographic characteristics of 424 respondents who participated in the study. Nearly half of the participants (49.3%) were in the age category of 41 to 60, and nearly one-third (30.4%) were between 61 and 80 years. More than half of the participants (54.3%) were females, more than a quarter (28.8%) had no formal education, nearly half (45.5%) had 6 to 10 household size, and the majority of the participants (85.4%) were employed. Among those employed, over half (53.6%) were into trading/business, and a little over one-fifth (23.5%) were pensioners. Almost all the participants (92.5%) live in a medium-class area, a little over three-fourths (75.7%) live in a compound house, and nearly three-fourths (72.9%) were landlords/owners. Almost all the participants were not living in gated/estate communities, and nearly half (47.9%) earn between GHS 1001 to 2000 (USD 209-417) every month.

Figure 2 is a graphical presentation of participants' willingness to pay the sanitation surcharge if implemented by the Kumasi Metropolitan Assembly. Nearly two-thirds (63.9%) were unwilling to pay the sanitation surcharge, whilst a little over one-third (36.1%) were willing to pay the surcharge.

Figure 3 presents the conditions under which respondents will be willing to pay the sanitation surcharge—those who were willing to pay. Nearly half (45.1%) were willing to pay provided the money will be put to good and proper use, a little over a quarter (27.5%) were willing to pay provided the amount is not too high or is affordable, and the least (5.8%) said others such as when the residents will be educated on the money and when the amount will be monitored and accounted for to residents.

Figure 4 is a pictorial presentation of whether participants would support the sanitation surcharge if it were in place. A little over a quarter (27.8%) would strongly oppose it, nearly a quarter (23.4%) would support it somehow, nearly one-fifth (19.8%) would strongly support it, and a little over a tenth (10.1%) would oppose it somehow.

Table 3 presents the determinant of the willingness to pay sanitation surcharge among the 424 participants. More than one-third (68.9%) were living in buildings aged 31 and above years, nearly three-fourths (70.3%) lived in residential buildings, and nearly three-fourths (72.6%) had toilets in their building. Nearly three-fourths (74.8%) pay between GHS 1 to 10 for waste disposal, more than half (55.4%) are satisfied with the sanitation status in their communities, and almost all participants (95.1%) pay property rate to the Assembly. Close to half of the participants (43.1%) claimed would support a sanitation surcharge if it were in place, and close to half (43.4%) claimed the sanitation situation has improved.

Table 4 presents the logistic regression results of the willingness to pay sanitation surcharge. Respondents aged 41 to 60, compared to 20 to 40 years, had higher odds of paying the sanitation surcharge [OR = 1.12, 95%CI = 1.12-4.10]. Landlords/owners had increased odds of paying sanitation surcharge compared to caretakers [OR = 1.77, 95%CI = 1.10-2.83] and respondents

Table 2. Socio-demographic characteristics of respondents.

SOCIO-DEMOGRAPHIC VARIABLE	FREQUENCY (N=424)	PERCENTAGE (%)
Age group (in years)		
20-40	71	16.8
41-60	209	49.3
61-80	129	30.4
⩾81	15	3.5
Gender		
Female	230	54.3
Male	194	45.7
Level of education		
No formal education	122	28.8
Basic	119	28.1
Secondary	105	24.7
Tertiary	78	18.4
Household size		
2	25	5.9
3-5	119	28.1
6-10	193	45.5
⩾11	87	20.5
Employment status		
Employed	362	85.4
Unemployed	62	14.6
Occupation, if employed (n=362)		
Artisan	32	8.8
Private sector	27	7.5
Civil servant	19	5.2
Pensioner	85	23.5
Business/trading	194	53.6
Agriculture/farming	5	1.4
Community classification		
Not classified	6	1.4
High class area	6	1.4
Medium class area	392	92.5
Low class area	20	4.7
Household type		
Compound house	321	75.7
Single family semi-detached	66	15.6
Multi-family semi-detached	37	8.7
You are the landlord		
No	115	27.1
Yes	309	72.9
Building located in gated/estate community		
No	409	96.5
Yes	15	3.5
Monthly income (GHS)		
⩽1000	173	40.8
1001-2000	203	47.9
2001-3000	29	6.8
⩾3001	19	4.5

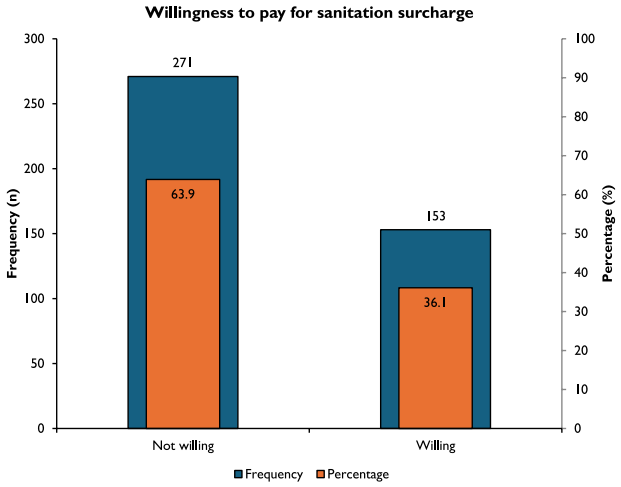

Figure 2. Willingness to pay sanitation surcharge.

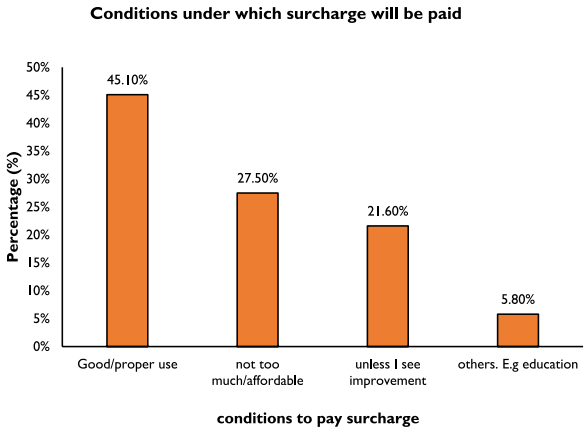

Figure 3. Conditions under which surcharge will be paid.

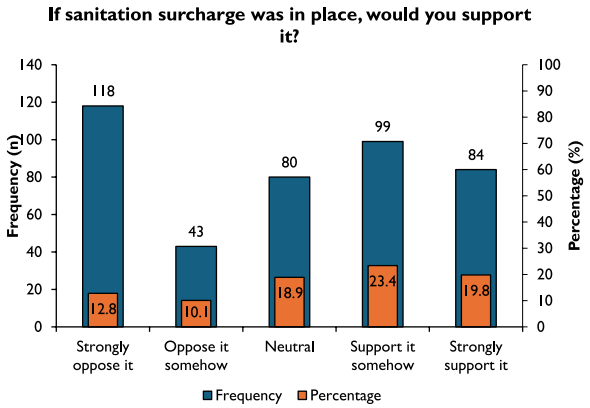

Figure 4. Support for sanitation surcharge if in place.

Table 3. Key independent variables of willingness to pay sanitation surcharge.

VARIABLE	FREQUENCY (N = 424)	PERCENTAGE (%)
Age of building		
1-10	9	2.1
11-20	47	11.1
21-30	76	17.9
⩾31	292	68.9
Function of the building		
Commercial	12	2.8
Mixed-use	114	26.9
Residential	298	70.3
Have toilet in the building		
No	116	27.4
Yes	308	72.6
Amount paid for waste disposal (GHC)		
0	31	7.3
1-10	317	74.8
11-20	76	17.9
Sanitation status		
Dissatisfied	148	34.9
Neutral	41	9.7
Satisfied	235	55.4
Pay property rate to assembly		
No	21	4.9
Yes	403	95.1
Support sanitation surcharge		
Oppose	161	38.0
Neutral	80	18.9
Support	183	43.1
Improvement or deterioration of sanitation		
Deterioration	95	22.4
No change	145	34.2
Improvement	184	43.4

(Continued)

who claimed would support sanitation surcharge if in place had increased of paying the surcharge compared to those who claimed would oppose it [OR = 20.67, 95%CI = 10.86-39.30]. Respondents who own a toilet facility compared to those without [OR = 0.57, 95%CI = 0.37-0.88] and respondents who pay for property rate compared to their counterparts [OR = 0.40, 95%CI = 0.17-0.98] had decreased odds of paying for the sanitation surcharge.

After controlling for the effect of other variables, landlords/owners had higher odds of paying the sanitation surcharge than caretakers [AOR = 2.36, 95%CI = 1.21-4.57]. Respondents who claimed would support the sanitation surcharge if it were in place had a higher likelihood of paying for the sanitation surcharge compared to those who claimed would oppose the surcharge if it were in place [AOR = 23.05, 95%CI = 11.69-45.44]. Participants who paid for the property rate had decreased odds of paying for sanitation surcharge compared to those not paying for the property rate [AOR = 0.27, 95%CI = 0.09-0.80].

Table 5 presents the logistic regression results of the willingness of participants to support pro-poor spending of sanitation surcharge provided they pay the surcharge. In the unadjusted model, respondents aged 61 to 80 years were more likely to support pro-poor spending compared to 20 to 40 years [OR = 2.40, 95%CI = 1.31-4.40], and residents in medium-class communities had lower odds of supporting pro-poor spending compared to lower class communities [OR = 0.23, 95%CI = 0.08-0.63]. Respondents who were willing to pay sanitation surcharge had higher odds of supporting pro-poor spending compared to those unwilling [OR = 10.69, 95%CI = 6.68-17.08], respondents who claimed the sanitation status of their community have improved had lower odds of supporting pro-poor spending [OR = 0.43, 95%CI = 0.25-0.75] and respondents who have toilet facility in their homes had decreased odds of supporting pro-poor spending compared to their counterparts [OR = 0.49, 95%CI = 0.32-0.75].

Table 4. Logistic regression results of willingness to pay sanitation surcharge.

VARIABLE	UNADJUSTED MODEL		ADJUSTED MODEL	
	OR	95%CI	AOR	95%CI
Age group (in years)				
20-40 (ref)	1	1	1	1
41-60	2.01*	[1.09-3.71]	1.36	[0.62-2.98]
61-80	2.15*	[1.12-4.10]	0.89	[0.36-2.19]
⩾81	0.79	[0.20-3.15]	0.70	[0.13-3.75]
Employment status				
Unemployed (ref)	1	1	-	-
Employed	0.69	[0.38-1.24]	-	-
You are the landlord				
No (ref)	1	1	1	1
Yes	1.77*	[1.10-2.83]	2.36*	[1.21-4.57]
Average monthly income				
⩽1000 (ref)	1	1	-	-
1001-2000	0.79	[0.52-1.20]	-	-
2001-3000	0.56	[0.24-1.34]	-	-
⩾3001	0.39	[0.12-1.23]	-	-
Function of building				
Commercial (ref)	1	1	-	-
Mixed-use	1.02	[0.26-4.04]	-	-
Residential	2.05	[0.54-7.73]	-	-
Have toilet in the building				
No (ref)	1	1	1	1
Yes	0.57**	[0.37-0.88]	0.79	[0.46-1.33]
Pay for property rate				
No (ref)	1	1	1	1
Yes	0.40*	[0.17-0.98]	0.27*	[0.09-0.80]
Would support sanitation surcharge if in place				
Oppose (ref)	1	1	1	1
Neutral	4.32***	[2.04-9.14]	4.67***	[2.16-10.09]
Support	20.67***	[10.86-39.30]	23.05***	[11.69-45.44]
Goodness of fit test				
Hosmer-Lemeshow		$X^2 = 6.44$		$P = .598$

*$P < .05$, **$P < .01$, ***$P < .001$.

Table 5. Logistic regression results of willingness to support pro-poor spending.

VARIABLE	UNADJUSTED MODEL		ADJUSTED MODEL	
	OR	95%CI	AOR	95%CI
Age group				
20-40 (ref)	1	1	1	1
41-60	1.52	[0.86-2.68]	1.04	[0.52-2.11]
61-80	2.40**	[1.31-4.40]	1.81*	[1.60-3.82]
⩾81	0.52	[0.13-2.03]	0.65	[0.13-3.17]
Household size				
1-2 (ref)	1	1	-	-
3-5	1.20	[0.50-2.90]	-	-
6-10	1.08	[0.46-2.54]	-	-
⩾11	1.22	[0.49-3.01]	-	-
Educational level				
No formal education (ref)			-	-
Basic	1.28	[0.80-2.13]	-	-
Secondary	0.93	[0.55-1.58]	-	-
Tertiary	1.02	[0.57-1.82]	-	-
Community classification				
Low class (ref)	1	1	1	1
Medium class	0.23**	[0.08-0.63]	0.25*	[0.08-0.81]
High class	2.00	[0.19-10.89]	1.99	[0.15-16.33]
Located in gated community				
No (ref)	1	1	-	-
Yes	0.46	[0.14-1.48]	-	-
Willing to pay surcharge				
No (ref)	1	1	1	1
Yes	10.69***	[6.68-17.08]	11.07***	[6.63-18.49]
Satisfied with general sanitation				
Dissatisfied (ref)	1	1	-	-
Satisfied	0.72	[0.49-1.07]	-	-
Sanitation status of community				
Deteriorated (ref)	1	1	1	1
Improved	0.43**	[0.25-0.75]	0.41*	[0.21-0.81]
No change	0.60	[0.34-1.06]	0.64	[0.32-1.24]
Have toilet facility				
No (ref)	1	1	1	1
Yes	0.49**	[0.32-0.75]	0.65*	[0.36-0.95]

*$P < .05$, **$P < .01$, ***$P < .001$.

After accounting for the effect of other covariates (adjusted model), respondents aged 61 to 80 had higher odds of supporting pro-poor spending than 20 to 40 years [AOR = 1.81, 95%CI = 1.60-3.82]. Respondents who dwell in medium-class communities compared to low-class had lower odds of supporting pro-poor spending [AOR = 0.25, 95%CI = 0.08-0.81]. Respondents who were willing to pay sanitation surcharge had higher odds of supporting pro-poor spending compared to those unwilling [AOR = 11.07, 95%CI = 6.63-18.49], respondents who claimed the sanitation status of their community has improved had lower odds of supporting pro-poor spending [AOR = 0.41, 95%CI = 0.21-0.81] and respondents who have toilet facility in their homes had decreased odds of supporting pro-poor spending compared to their counterparts [OR = 0.65, 95%CI = 0.36-0.95].

Discussions

Taxpayers' attitude toward a public policy, such as the sanitation surcharge, is crucial in its successful implementation. This study focuses on understanding how property owners in Kumasi felt about the potential imposition of a sanitation surcharge policy by KMA. The identified limited support among property owners for the potential imposition of a sanitation surcharge in Kumasi, as evidenced by the study's findings, aligns with broader trends and insights present in the extant literature. The disparity between the relatively low percentage (36.1%) of property owners willing to pay the surcharge and the majority (63.9%) expressing unwillingness highlights a noteworthy difference in public sentiment. Literature on tax compliance and willingness to pay for public goods provides relevant insights. Torgler[25] and Feld and Frey[26] have argued that taxpayers' willingness to comply with tax policies is influenced by perceptions of fairness, trust in governmental institutions, and the perceived benefits derived from the imposed taxes. Conversely, other studies suggest that resistance to tax policies may arise from apprehensions about an inequitable tax system, perceived high and unaffordable tax rates, and dissatisfaction with the quality of public services.[2,40] In the context of a sanitation surcharge, if taxpayers perceive the policy as unfair or lack confidence in the municipality's ability to utilize the funds effectively, it may lead to increased resistance and reluctance to comply.[9]

Although comparisons of similar studies in Ghana by Oduro et al[9] and Kenya by Acey et al[8] and Kisiangani et al[17] reveal notable divergences in public attitudes toward sanitation surcharges, the reasons for support or opposition are similar. Notably, perceived benefits, trust in institutions, and satisfaction with existing service delivery emerge as key determinants from Acey et al[8] and Kisiangani et al's[17] study. In the case of Kumasi, the opposition to the imposition of surcharge by is rooted in concerns such as skepticism about the *Assembly's efficient use of funds*, *perceived excessive existing tax burdens*, *lack of trust in the Assembly*, *the perceived high cost of property rates*, *doubts about personal benefit*, and *financial constraints (see Supplementary sheet SI 1)*.

The study's revelation that property owners or landlords are more willing to pay the sanitation surcharge than caretakers or tenants aligns with findings from the broader literature. A study in Kenya showed a high willingness (approximately 90%) among households headed by property owners to pay for improved sanitation facilities.[41] Similarly, research in Kisumu, Kenya, as indicated by Mulatya et al,[42] supports the current study's observation that tenants and caretakers are hesitant to invest in sanitation, primarily due to their perceived temporary status and the expectation that property owners should bear such costs. These consistent patterns across different regions emphasize the importance of understanding property ownership dynamics and residents' roles in influencing sanitation investment decisions. The likelihood of paying the sanitation surcharge was higher among respondents in support of it, contrasting with studies reporting less than 10% willingness to support such payments.[43]

Participants already paying property rates were less likely to pay the sanitation surcharge. This finding is consistent with the economic burden perspective, as elucidated in previous studies. The existing tax burden on property owners within the Metropolis appears to shape their resistance to additional financial obligations. Thus, it is perceived that the imposition of a new sanitation surcharge, irrespective of the amount, would compound their financial challenges. This aligns with findings from previous studies that have explored the attitude of individuals to support additional charges, such as sanitation surcharges, due to perceived financial strain[9,44]

The study revealed a noteworthy association between respondents aged 61 to 80 years and an increased likelihood of supporting pro-poor sanitation surcharge spending. This observed trend can be rationalized by the elderly population's heightened awareness of their vulnerability to diseases stemming from inadequate environmental and unhygienic conditions (see Supplementary sheet SI 2). Consequently, their inclination to endorse pro-poor spending is rooted in a motivation to ameliorate sanitation conditions in low-income communities. This finding resonates with existing literature highlighting the socioeconomic equity implications of sanitation, particularly for vulnerable demographics such as individuals aged 60 and above, who bear a disproportionate burden of the economic repercussions of substandard sanitation practices.[45,46]

Furthermore, respondents expressing a willingness to contribute to the sanitation surcharge demonstrated an elevated likelihood of supporting pro-poor spending. This inclination is underpinned by their confidence in the efficient utilization of funds to enhance sanitation conditions in poor neighborhoods. A corroborating study reported a similar sentiment, as respondents believed that pro-poor spending directly benefits

sanitation-challenged communities, shielding them from sanitation-related diseases and environmental hazards.[9]

Conversely, respondents residing in medium-class communities and asserting an improved sanitation status exhibited diminished odds of supporting pro-poor spending. This perspective stems from their belief that initiatives of this nature should be specifically targeted at impoverished or unsanitary areas within their communities to enhance sanitation conditions. A parallel study in Ghana advocated for strategic resource allocation, emphasizing the prioritization of poor areas for optimal sanitation improvement outcomes.[47] This aligns with broader research indicating that individuals with lower satisfaction regarding their community's sanitation situation are more inclined to support pro-poor spending.[48]

The study also identified notable associations wherein respondents possessing a toilet facility in their homes exhibited diminished odds of supporting pro-poor sanitation spending. This can be ascribed to the prevailing perception that ownership of a toilet facility symbolizes good sanitation practices or satisfaction with their current sanitation status. Consequently, this perception leads to a reduced motivation to contribute to the sanitation surcharge or advocate for pro-poor spending. A parallel observation was documented in rural Kenya, where households lacking a toilet facility displayed a greater willingness to pay for sanitation services and support pro-poor spending.[17] Similarly, a study conducted in the Republic of Peru reported a similar trend, emphasizing that households without a toilet facility were more amenable to paying for sanitation services and endorsing pro-poor spending.[48]

Strengths and limitations

The study is novel because it presented updated information on the willingness to pay sanitation surcharge in the Kumasi Metropolis. Additionally, the researchers applied appropriate statistical and analytical methods to analyze the data for the study, making it robust. However, despite the above-mentioned strengths, the study had its limitations that cannot be overemphasized. The study utilized a dataset collected from respondents' self-reports, making recall bias inevitable. The study is also liable to social desirability biases (the tendency of respondents to bias responses to make them appropriate or socially acceptable) due to the cross-sectional nature of the study. Another notable limitation of our study pertains to the utilization of 2010 Population and Housing Census data as the foundational dataset for our sampling methodology. Conducted nearly a decade prior to our study period, this census data may not fully capture the dynamic changes in population demographics and housing infrastructure that may have occurred over time within the study communities.

Conclusion

In conclusion, our study on taxpayers' attitudes toward a potential sanitation surcharge in Kumasi reveals a nuanced landscape where concerns about fund utilization, perceived tax burdens, and trust in local institutions significantly shape public sentiment. The limited support, with only 36.1% of property owners expressing willingness to pay the surcharge, highlights the importance of addressing these concerns for successful policy implementation. Furthermore, demographic factors, such as age and property ownership, play pivotal roles in influencing attitudes toward pro-poor sanitation spending, emphasizing the need for targeted and inclusive policy approaches. To enhance public acceptance and participation, policymakers should prioritize transparent communication to build trust and convey the effective utilization of funds from the sanitation surcharge. Tailored community engagement strategies, considering the diverse perspectives of different demographic groups, should be implemented to address specific concerns. Additionally, adopting an equity-centric approach by strategically prioritizing poor or unsanitary communities in sanitation initiatives can maximize impact. Policymakers should also explore measures to mitigate financial burdens, such as progressive tax structures or subsidies, to ease resistance to additional financial obligations.

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Author Contributions

EAE, GAD, CO, and KBN developed the concept. KB and GAD conducted a formal analysis and interpreted the results. EAE, GAD, KB, CO, and KBN drafted the final manuscript. All authors proofread the manuscript for important intellectual content.

Availability of data and materials

All data generated or analyzed during this study are included in this article.

Ethics Approval

The Committee for Human Research, Publication, and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology, Ghana, provided ethical clearance for the study. The study followed all ethical procedures and ensured participants' rights were not violated. Written informed consent was obtained from all study respondents before data collection.

Consent for publication

Not applicable.

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Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. Drummond P, Daal W, Srivastava N, Oliveira LE. Mobilizing revenue in Sub-Saharan Africa: empirical norms and key determinants. IMF Working Papers 12(108) . International Monetary Fund; 2012.
2. Ali M, Fjeldstad OH, Sjursen IH. To pay or not to pay? Citizens' attitudes toward taxation in Kenya, Tanzania, Uganda, and South Africa. *World Dev*. 2014;64:828-842.
3. Khwaja AI, Haq O, Khan AQ, Olken B, Shaukat M. *Rebuilding the Social Compact: Urban Service Delivery and Property Taxes in Pakistan*. International Initiative for Impact Evaluation; 2020.
4. Besley T, Persson T. Taxation and development. In: Auerbach A, Chetty R, Feldstein M, Saez E eds. *Handbook of Public Economics*. Elsevier; 2013:51-110.
5. Kresch EP, Walker M, Best MC, Gerard F, Naritomi J. Sanitation and property tax compliance: analyzing the social contract in Brazil. *J Dev Econ*. 2023;160:102954.
6. Appiah-Effah E, Boakye K, Salihu T, et al. Determinants of open defecation among rural women in Ghana: analysis of demographic and health surveys. *Environ Health Insights*. 2024;18:1–12.
7. Appiah-Effah E, Duku GA, Azangbego NY, Aggrey RKA, Gyapong-Korsah B, Nyarko KB. Ghana's post-MDGs sanitation situation: an overview. *J Water Sanit Hyg Dev*. 2019;9:397-415.
8. Acey C, Kisiangani J, Ronoh P, et al. Cross-subsidies for improved sanitation in low income settlements: assessing the willingness to pay of water utility customers in Kenyan cities. *World Dev*. 2019;115:160-177.
9. Oduro CY, Appiah-Effah E, Nyarko KB. Assessing policymaker and taxpayer attitudes towards public finance for urban sanitation: the case of sanitation surcharges in two Ghanaian municipalities. *Int J Urban Sustainable Dev*. 2020;13:83-96.
10. De Oliveira A. Financial innovations and sanitation services: the battle between low-income users and shareholders. *Bull Geogr Socio-Econom Ser*. 2020;47:63-74.
11. REAL-Water. *Financial Innovations for Rural Water Supply in Low-Resource Settings*. USAID; 2023. Accessed September 22, 2023. https://www.globalwaters.org/sites/default/files/financial_innovations_report.pdf
12. WSUP. Sanitation surcharges collected through water bills: a way forward for financing pro-poor sanitation? Discussion Paper. 2012. Accessed April 24, 2018. http://www.wsup.com/resource/sanitation-surcharges-collected-through-water-bills-a-way-forward-for-financing-pro-poor-sanitation/
13. Andres LA, Thibert M, Lombana Cordoba C, Danilenko AV, Joseph G, Borja-Vega C. *Doing More with Less: Smarter Subsidies for Water Supply and Sanitation*. World Bank Group; 2019. Accessed February 22, 2023. http://documents.worldbank.org/curated/en/330841560517317845/Doing-More-with-Less-Smarter-Subsidies-for-Water-Supply-and-Sanitation
14. Boex J, Edwards B. *Triggering Increased City-Level Public Finance for Pro-Poor Sanitation Improvements the Role of Political Economy and Fiscal Instruments*. The Urban Institute; 2014. Accessed February 13, 2024. https://webarchive.urban.org/UploadedPDF/2000063-triggering-increased-city-level-public-finance.pdf
15. Boex J, Edwards B, Joel J, et al. *Urban Service Delivery Assessment Framework*. The Urban Institute; 2014. Accessed February 13, 2024. http://decentralization.net/wp-content/uploads/2022/01/usd-assessment-framework-18apr14.pdf
16. WSUP. *Willingness of Kenyan Water Utility Customers to Pay a Pro-Poor Sanitation Surcharge. Policy Brief*. WSUP; 2018. Accessed May 22, 2019. https://www.wsup.com/content/uploads/2018/03/PBrief_Willingness-of-Kenyan-water-utility-customers-to-pay-a-pro-poor-sanitation-surcharge_Kenya.pdf
17. Kisiangani J, Macleod C, Acey C, et al. Are Kenyan water customers willing to pay a pro-poor sanitation surcharge ? In: Shaw RJ, ed. *Trans- Formation Towards Sustainable and Resilient WASH Services: Proceedings of the 41st WEDC International Conference, Nakuru, Kenya, 9-13 July 2018, Paper 2905*. Water, Engineering and Development Centre; 2018:1-5. Accessed May 22, 2019. https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/35789/1/Kisiangani-2905.pdf
18. Cities Alliance. *Assessing the Institutional Environment of Local Governments in Africa*. Cities Alliance; 2013. Accessed February 22, 2024. https://www.local2030.org/library/74/Assessing-the-Institutional-Environment-of-Local-Governments-in-Africa.pdf
19. Evans B, Voorden C, van der Peal A. *Public Funding for Sanitation. The Many Faces of Sanitation Subsidies*. Water Supply & Sanitation Collaborative Council; 2009. Accessed April 15, 2024. https://eprints.whiterose.ac.uk/10179/1/Public_Funding_for_Sanitation_the_many_faces_of_sanitation_subsidies.pdf
20. Toubkiss J. Meeting the sanitation challenge in Sub-Saharan cities: lessons learnt from a financial perspective. In: van Vliet B, Spaargaren G, Oosterveer P eds. *Social Perspectives on the Sanitation Challenge*. Springer; 2010:163-176.
21. Vezina M. The ouagadougou strategic sanitation plan: an holistic approach to a city's problems. *Water and Sanitation Program-Africa Region (WSP-AF)*. The World Bank Water and Sanitation Program; 2002:1-8. Accessed October 22, 2023. www.wsp.org
22. Becker GS. Crime and punishment – an economic approach. *J Polit Econ*. 1968;76:169-217.
23. Allingham MG, Sandmo A. Income tax evasion: a theoretical analysis. *J Public Econ*. 1972;1:323-338.
24. Terkper S. Improving taxpayer accounting for SMEs and individuals. andrew young school of policy studies. In: *Annual Conference on Public Finance Issues: Alternative Methods of Taxing Individuals*. Georgia State University, Georgia State; 2007:22-23.
25. Torgler B. *Tax Compliance and Tax Morale: A Theoretical and Empirical Analysis*. Edward Elgar Publishing Limited; 2007.
26. Feld LP, Frey BS. Tax compliance as the result of a psychological tax contract: the role of incentives and responsive regulation. *Law Policy*. 2007;29:102-120.
27. Levi M. *Consent, Dissent, and Patriotism*. Cambridge University Press; 1997.
28. Alm J, Torgler B. Do ethics matter? Tax compliance and morality. *J Bus Ethics*. 2011;101:635-651.
29. Feld LP, Tyran J. Tax evasion and voting: an experimental analysis. *Kyklos*. 2002;55:197-221.
30. Cialdini RB, Goldstein NJ. Social influence: compliance and conformity. *Annu Rev Psychol*. 2004;55:591-621.
31. Sausgruber R, Tyran JR. Testing the mill hypothesis of fiscal illusion. *SSRN Electron J*. 2004;122:39-68.
32. Tyler TR. Enhancing police legitimacy. *Ann Am Acad Pol Soc Sci*. 2004; 593:84-99.
33. Feld LP, Frey BS. Trust breeds trust: how taxpayers are treated. *Econ Governance*. 2002;3:87-99.
34. Hagan GP. *Transactions of the Historical Society of Ghana*. Historical Society of Ghana; 1972. Accessed March 26, 2021. http://www.jstor.org/stable/41406414
35. Ghana Statistical Service (GSS). *Ghana 2021 Population and Housing Census General Report. Volume 3A: Population of Regions and Districts*. Ghana Statistical Service; 2021. Accessed March 27, 2024. https://statsghana.gov.gh/gssmain/fileUpload/pressrelease/2021PHCGeneral Report Vol 3A_Population of Regions and Districts_181121.pdf
36. GSS. *2010 Population and Housing Census: District Analytical Report Kumasi Metropolitan*. Ghana Statistical Services; 2014. Accessed February 3, 2021. http://www2.statsghana.gov.gh/docfiles/2010_District_Report/Ashanti/KMA.pdf
37. Antwi-Agyei P, Dwumfour-Asare B, Amaning Adjei K, Kweyu R, Simiyu S. Understanding the barriers and opportunities for effective management of shared sanitation in low-income settlements—the case of Kumasi, Ghana. *Int J Environ Res Public Health*. 2020;17:4528.
38. Duku GA, Appiah-Effah E, Nyarko KB, Dwumfour-Asare B. Early live-prototype testing of a low-cost latrine technology for rural and peri-urban communities: the case of a modified pour-flush latrine. *Sci Afr*. 2020;8:e00338.
39. StataCorp. *Stata Statistical Software: Release 16*. StataCorp LLC; 2021.
40. Abdul-Razak A, Adafula CJ. Evaluating taxpayers attitude and its influence on tax compliance decisions in Tamale, Ghana. *J Account Taxation*. 2013;5:48-57.
41. Peletz R, Delaire C, Kones J, et al. Will households invest in safe sanitation? Results from an experimental demand trial in Nakuru, Kenya. *Int J Environ Res Public Health*. 2021;18:4462.
42. Mulatya DM, Were V, Olewe J, Mbuvi J. Willingness to pay for improvements in rural sanitation: evidence from a cross-sectional survey of three rural counties in Kenya. *PLoS One*. 2021;16:e0248223.
43. Delaire C, Peletz R, Haji S, et al. How much will safe sanitation for all cost? Evidence from five cities. *Environ Sci Technol*. 2021;55:767-777.
44. Simiyu S, Swilling M, Rheingans R, Cairncross S. Estimating the cost and payment for sanitation in the informal settlements of Kisumu, Kenya: a cross sectional study. *Int J Environ Res Public Health*. 2017;14:49.
45. Prüss-Üstün A, Bos R, Gore F, Bartram J. *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*. World Health Organization; 2008.
46. Hutton G, Rodriguez UP, Winara A, et al. Economic efficiency of sanitation interventions in Southeast Asia. *J Water Sanit Hyg Dev*. 2014;4:23-36.
47. Mensah J. Managing environmental sanitation in the catchment area of Benya Lagoon, Ghana: education, regulation or infrastructure management as a matter of strategic priority? *Cogent Soc Sci*. 2019;5:1709347.
48. Fujita Y, Fujii A, Furukawa S, Ogawa T. Estimation of willingness-to-pay (WTP) for water and sanitation services through contingent valuation method (CVM): a case study in Iquitos City, The Republic of Peru. *JBICI Rev*. 2005;11:59-87.