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CHANGES IN WOMEN ACCESS TO AND OWNERSHIP OF LAND IN NORTHERN GHANA

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Article Info	Abstract
<i>Article history:</i> Received: 17 November 2021 Revised: 11 March 2022 Accepted: 26 June 2022	Purpose — The paper sought to investigate some of the advocacy interventions on women's rights and their impact on the evolution of culture surrounding women's land rights.
Published: 20 February 2022 Author's email: sjoseph@uds.edu.gh	Methods — The research adopted a qualitative approach; using key expert interviews comprising of planners, traditional authorities and land governance experts. The focus group discussions were composed of Twelve groups consisting of Seven to Nine participants in each group.
DOI: https://doi.org/10.55921/AKUQ6888	 Findings — The evolution of culture on customary land governance has been as a result of advocacy interventions on human rights implemented mainly by NGOs in the Northern part of Ghana. Conclusion & Recommendation — The study revealed that there are positive changes in women's access to and ownership of land even though some challenges still exist. Hence, it is recommended that stakeholders need to equip themselves with the current realities of cultures that border on land ownership and accessibility in Northern Ghana. Keywords — Land rights women customs development
	Keywords — Land rights, women, customs, development, property commodification

Introduction

Ghana's economy is mainly agrarian with 40% of its export earnings from the agricultural sector (Glazebrook et. al., 2020). Agriculture is so critical to the extent that, in 2015 about 36% and 76% of the entire labour force of Ghana and the rural population respectively were employed in this sector (GSS, 2015).

Women constitute 70% of the labour force of subsistence farming in Ghana (Britwum and Akorsu, 2016). Hence, they contribute greatly to the food-basket and so their agricultural productivity is crucial for meeting food security. Research so far has shown that the participation and productivity of many of these women, especially those in the Northern part of the country is however hampered by limited access to land. Even where women are given lands by their husbands or families, these lands are usually unproductive and far from their homes (Williamson, 2021). This limits their participation in agriculture production.

As enshrined in the constitution of Ghana (Article 17[2]), women are to have equal access to land, inheritance of property and should not be discriminated against with regards to access and ownership of land. According to the Land Access and Tenure Security Project of 2016, Ghana has signed a number of conventions aimed at eliminating gender-based discrimination which includes access to economic productive resources. Hence, a lot of organisations have been at the forefront of the campaigns for gender parity with regards to land rights.

The paper sought to investigate some of the advocacy interventions on women's rights, explore the customs regarding women's land tenure and examine the evolution of culture surrounding women's land rights

Conceptualizing Land, Access and Ownership

The Meaning of Land

Land is very important for human existence, recognition, identity, as well as power and wealth creation. Land has economic, social and spiritual values. Its economic attributes include being a

source of income, food, employment and export earnings. Socially, land is a place of settlement, providing a location where people live and to which they return. Other values with symbolic and ritual connotations are that land serves as a burial site, sacred woodlands and spiritual life. Also, the landscape provides different kinds of important environment services which comprise water, biodiversity and many other wild products (Toulmin & Quan, 2000). Bonye and Kpieta (2012) stated that, the traditional tie between rural people and their land is both material and religious or spiritual.

Land can be viewed to have two images, as Earth and as a Commodity (Boye & Kpieta, 2012; Cotula et al., 2004). As earth, land has a physical structure which emanates from the minerals and plants embedded there, minds and senses of beauty, from a relation to its contours, colours, textures, tastes, and smells. The land/earth is said to have a life force or vital energy that invigorates humans, flows through, and is collected in the soil, rocks and plants (Cotula et al., 2003 cited in Boye & Kpieta, 2012).

The notion of land as a commodity is rooted in the cultures of the West. And with modernization, this notion has caught up with Africa and many countries are undergoing land reforms to be able to perfectly play this role. As a commodity, the land is perceived to be a property that can be exploited, bought, sold, exchanged, or treated as the owner desires. As a property, the owner can formalize his/her rights by registering a title deed (Cotula et al., 2003 cited in Boye & Kpieta, 2012).

The Concept of Land Access

Access refers to the ability to gain entrance or admission into a property or the permission to use an asset or thing. Thus, it refers to obtaining a right of entry or the right to use. Cotula and his collaborators reiterated that, access to land entails the processes that "people, individually or

collectively, gain rights and opportunities to occupy and use land (primarily for productive purposes but also other economic and social purposes), whether on a temporary or permanent basis". These include access through the formal and informal land markets, kinship and social networks and through state and other authorities that have control over land (Cotula et al., 2006).

The Concept of Ownership

Like access, ownership has to do with a property and the rights that an individual can exercise on that property. According to Runger (2006), ownership is one of the most important concepts of Jurisprudence. This is a right that relates to one's property. The concept is said to have developed with the evolution of civilization and society. The concept is important with regards to both legal and social interest aspects of the society. 'Own' in the term ownership means to have a hold on something. A relationship between a person and an object he owns is called ownership. It means a bundle of rights which a person has over the object. The right of ownership can either be absolute or restricted and is residuary in nature. The rights of an owner include the right to dispose and destroy the property, enjoy the property, exclude other people from using that property, dispose of the property, and in fact, to whatever the owner wishes so far as it is within the law.

Women Access to and Ownership of Customary Land

Customary lands encompass all lands which are owned by kingdoms, tribes, families and, in some instances, individuals. Customary lands are usually owned collectively, although management and administration are often vested in a chief, an elder or a designated leader, who is appointed in accordance with customs. They constitute an estimated 80 per cent of all lands in Ghana (Kasanga & Kotey, 2001). Access to and ownership of land under the customary management is determined by membership to a landholding community (Kuusaana et al., 2013).

Women gain access to land through their lineage, inheritance, marriage or by contractual arrangements, and in some limited cases through gift or purchase (Rünger, 2006). However,

women's access to land through purchase is of a recent development mainly facilitated by the commoditization of land (Akolgo-Azupogo, 2018). Customarily, women in the Northern, Upper East and Upper West Regions are usually given land for farming by their husbands. Unmarried women may receive land from their fathers or families. Women who gain access to land in their own families and clans lose these rights when they marry and move to join their husbands. In some families, after the death of the husband, she may lose part of the land if she has no grown sons to inherit the land directly. However, with the onset of commoditization of land, women who are economically empowered could get access to land through purchase or lease (Akolgo-Azupogo, 2018).

Equally, as shown below in table 1, institutions have sought to promote the rights of women in owning and accessing land. Such campaigns mainly stemmed from the Beijing Declaration of 1995. Ghana as a signatory to the declaration demonstrated her support for women's equality to men in the ownership of land in major policies and campaigns indicated in table 1 below.

International	Local			
Beijing Declaration, 1995	Gender and Agricultural Development			
	Strategy,1997			
Pan African Conference, Zanzibar, 1999	The Network for Women's Rights, 1999			
Maputo Protocol, 2003	National Gender and Children's Policy, 2004			
SADC Protocol on Gender and Development,2008	Medium-Term Agriculture Sector Investment			
	Plan, 2014			

Table1: Some interventions on women's rights in land

Material and Methods

The study adopted a case study approach where four communities within the Savannah, Northern and Upper West Regions were selected. These communities comprised Damongo in the Savannah Region, Bamaho in the Upper West Region, Sagnerigu, and Young-duni of the Northern Region. These communities were selected based on their peculiar nature of land governance based on customs and the possibility of these customs hindering women's access to and ownership of land. The study used a temporal frame spanning from the Beijing Conference on women as a point of reference. This conference which led to the Beijing Declaration and Action Platform, is considered the foundation of many interventions on women's rights. Literature on these interventions on women rights and land tenure systems were reviewed.

Primary data was collected using the Nominal Group Technique by conducting a total of twelve (12) gender-separated group discussions consisting of Seven to Nine participants in three (3) different regions of Northern Ghana. The final decisions within these groups were mainly obtained through a common majority. Also, purposely selected key experts composed of planners, opinion leaders, and customary land administrators were engaged. The research employed the Delphi technique in engaging with these experts.

The study engaged with both males and females at 40% and 60% respectively in the group discussions. Among those engaged, 69% were literates and the rest had never been to school. Also, 65% of them were unemployed or underemployed while 35 % were employed. Considering indigenes and non-indigenes, 60% of the natives were engaged in these discussions.

Results and Presentation

Women's Ownership of Land

From the discussions, everyone, especially rural folks have a relationship with land – farming, collecting firework, building etc. Their attachment to land is core to the extent that most of the rural people's livelihood is dependent on the availability of land. It was indicated that, customarily, women do not own lands in most parts of the Northern regions of Ghana. The custodians of the traditions of the communities were of the view that a female is not a permanent member of the family. At a point, she might get married to a man in a different location than her own community.

Also, traditionally, it was held that, whatever belongs to a woman is for the husband, so for a woman to own land, then, that land invariably, belongs to the husband.

Marriage and Women's Land Rights

It was pointed out during the discussions that married women by tradition, are under the authority of their husbands. The decisions with respect to accessing land or owning it must be sanctioned by the husband in many customs in the three Northern Regions under this study. So, previously a married woman even with the financial capacity could not own land without the husband's permission. Also, in instances where a woman wanted to acquire land, she had to come to the chiefs or land owners through a man - husband, brother e.t.c to acquire land. This traditional role of men played in women's acquisition of land has drastically changed in many traditional jurisdictions of the study areas.

Advocacy for Women's Land Rights and Evolution of Land Tenure Systems

A variety of advocacy campaigns have been implemented mainly on gender rights in the Northern parts of Ghana. These campaigns advanced the cause of educating traditional leaders on the negative impacts of some traditions or cultures on ownership of property by women. From the discussions, respondents are aware that the constitution of Ghana and international laws frown on depriving women access to or ownership to land. The advocacy campaigns carried out mainly by NGOs have greatly impacted the tradition of women ownership to property. The evolution of culture is a common trend in almost all the spheres of the communities. As alluded to by the chiefs and elders of the study areas; currently, women with the capacity and in need of land can access or own it for any land use.

Discussion of Findings

Evolution of Women's Land Tenure Systems and Tenure Security

The transformation of culture is inevitable and cuts across almost all the spheres of life. The evolution of customs of women's access to and ownership of land is not an exception. Some of the changes are brought about due to land commodification – where land is regarded as a commodity and its acquisition and disposal is seen as a business.

The factors determining whether land can be sold or acquired is mainly economic and hence, gender does not play any strong role in this matter. It must equally be stated that some of the acquisition contracts entered into by women are still led by men. In some cases, land is secretly purchased by married women without the knowledge of their husbands. This poses a great challenge because it is a recipe for legations in the future.

Advocacy and Land Commodification

Advocacy campaigns are still ongoing in many parts of the world. Women are still discriminated against when it comes to land but this is at different levels depending on the traditional area.

However, significant impact has been made in the fight against customs depriving women from accessing or owning lands in Northern Ghana. Also, important to note is the purchase of large tracts of lands by companies for agricultural and non-agricultural uses. These purchases have served as an eye opener to many of the chiefs with regards to the fact that the sale of land could be a lucrative business.

Conclusion and Recommendations

It can be concluded that there has been an improvement with regards to women's access to and ownership of land in the communities studied. The improvements have been influenced by economic factors and advocacy interventions on women's rights. However, it can equally be concluded that, as much as more have evolved with regards to land customs, there are still practices limiting the capacity of women to access or own land in the areas of this study. The Ministries of Lands and Natural Resources, Gender and Children, Local Government authorities and Non-Governmental bodies need to target particularly paramount chiefs in women's rights based advocacies in all communities in the regions under this study. Also, the interests of all land users should be documented through the necessary procedures with the secretary of the chief or the Customary Land Secretariats as stipulated by the new Land Act, 2020. It is further recommended that land should be inclusively managed in all the areas under this study. All stakeholders including women as well as their interests in land should be considered in customary land management.

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THE CONTRIBUTION OF COMPOSITE BUDGETING TO SUSTAINABLE FISCAL AUTONOMY IN THE NANUMBA SOUTH DISTRICT IN THE NORTHERN REGION OF GHANA

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Article Info	Abstract	
<i>Article history:</i> Received: 17 November 2021 Revised: 11 March 2022 Accepted: 26 July 2022	Purpose — The paper looks at the contribution of composite budgeting to sustainable fiscal autonomy in the Nanumba South District.	
Published: 30 December 2022 Author's email: mokrah21@ubids.edu.gh fagbenyo@uds.edu.gh	Methods — A concurrent mixed-method approach was used, with purposive sampling for qualitative data and trend analysis of the district's revenue and expenditure performance for quantitative data.	
DOI: https://doi.org/10.55921/TO005668	Findings — The paper revealed that external sources of funding stood above 97% of its annual total revenue; the revenue autonomy ratio of the district falls below 3%. The pooling of available funds together is limited by the incomplete decentralization of tier two departments.	
	Conclusion & Recommendation — The paper concluded that complete decentralization of all departments will enhance the principle of pooling funds together, prevent fragmentation of revenue sources, and lead to efficient mobilization of more IGF to facilitate sustainable fiscal autonomy. It recommends significant innovation in the mobilization of existing and new revenue points: including intense education and effective enforcement of tax regulations by the management of the district.	
	Keywords — Fiscal autonomy, composite budgeting, revenue mobilization, local-level development, accountability.	

Introduction

Fiscal autonomy is cardinal to Metropolitan, Municipal, and District Assemblies (MMDAs) as local development authorities to deliver desired development for the citizenry under their catchment areas. This can be realized through the call for significant mobilization of resources from diverse sources for the implementation of the MMDAs programs under target 1a¹ of the Sustainable Development Goals (SDG1) (United Nations, 2015). Fiscal autonomy is "the tool that endows local governments with the necessary power and means required to effectively deliver on their services and allocate resources in a way that reflect the needs of their citizens" (Kapidani, 2018, p. 1). In this paper, fiscal autonomy will mean the ability of district authorities to harness all revenues available to the district for development. With this, the satisfaction of local constituents concerning service delivery with accountability and transparency of the local government bodies are being monitored in response to target 16.6² of SDG 16 (United Nations, 2015). Fiscal autonomy is a component of fiscal decentralization (Kim, 2020; Psycharis et al., 2016) because its core aim is to make available more local resources in the provision of quality local services in required quantities (Moisiu, 2017).

The need for a balance between the functions and funds of MMDAs calls for financial sustainability: "The ability of local governments to fulfil their obligations to provide services to the population on an ongoing basis, ensuring a satisfactory financial condition of the local budget, both in the short and long term" (Lysiak et al., 2020, p. 49). Based on this, discussions in this paper will relate more to the conceptualization of Burkey (1993) in Nuhuman (2016). That is, considering the performance, stability, regularity and effective mobilization of a revenue point. Key barriers to financial sustainability in MMDAs include limited ability to increase funding (KPMG, 2020).

¹ SDG 1, target 1a: *Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions* ² SDC 16 torget 16 (c) Davider effective accountable and transport institutions at all leads

To enhance fiscal decentralization and equip local authorities with development power, the MoF developed a framework for the implementation of the Composite Budgeting System (CBS). A system that provides new and better ways of controlling how the MMDAs plan and budget for their activities, use their resources and account for their spending (Ministry of Finance, 2012; Quansah, 2012).

A decade before its inception, Katongo (1993) saw composite budgeting as a tactical means for integrating and coordinating activities and allocating the required financial resources for local government development. At the piloting stage, Nartey (2009) opined that it could boost the transfer of fiscal autonomy to sub-national government levels. These works further heightened the expectation of composite budgeting to improve local government financial resource capacity and enhance fiscal autonomy for MMDAs. Challenges emanating from these studies include limited operational capacity, issues of broader participation, limited knowledge of CBS, ineffective IGF mobilization, incomplete decentralization and issues of compliance with CBS guidelines (Abdul-Kadir et al., 2017; Nartey, 2009; Otchere-ankrah, 2018). However, most of the previous works in the literature have concentrated exclusively on either composite budgeting (Abdul-Kadir et al., 2017; Otchere-ankrah, 2018) or MMDAs financing and revenue mobilization (Owusu, 2015; Puopiel & Chimsi, 2015). This paper assesses the role of composite budgeting in harnessing central government fiscal transfers and the contribution of composite budgeting to the district's internal fund generation. The remaining part of the paper includes a brief review of fiscal autonomy and composite budgeting, research materials and methods, results and discussion; it ends with a conclusion and recommendations.

Fiscal Autonomy, MMDA's Funding and Composite Budgeting

Literature shows that local governments still largely depend on central government transfers to deliver their jurisdictional services (Faridi & Nazar, 2013; Kapidani, 2018). Kapidani attributed the dependence on external funds to a limited capacity to generate local revenues.

Local governments' sources of funds are generally Internally Generated Funds (IGF) like property rates, fees/fines, licenses, land, investment etc (Darison, 2011). and Externally Generated Funds (Appiah-Agyekum et al., 2013; Boateng, 2014). The District Assembly Common Fund (DACF) is the largest share of the external source of revenue for the MMDAs (Adu-Gyamfi, 2014; Boateng, 2014), while District Development Facility (DDF) is identified as the most reliable source of funds for the MMDAs (Abdul-Kadir et al., 2017). About 80% or two-thirds of MMDAs funding comes from external sources (Danquah et al., 2015). Puopiel and Chimsi (2015) in their paper on IGFs and development projects in the Northern Region found that there was limited logistical support, poor supervision, under-reporting, limited personnel and capacity of revenue collectors. Studies revealed limited revenue mobilization as a major problem for MMDAs (Akudugu & Oppong-Peprah, 2013; Institute for Fiscal Studies, 2017).

Abdul-Kadir et al. (2017) highlighted limited knowledge of CBS and inconsistent release of funds, as impediments and recommended transparency and improved local participation as benefits of composite budgeting. Otchere-Ankrah (2018) established ineffective internal revenue mobilization and incomplete decentralization of the Ghana Health Service (GHS) and Ghana Education Service (GES). The above issues highlighted in the literature affirm the need to examine the contribution CBS is making, toward the MMDAs fiscal autonomy, for effective delivery of their mandates.

Materials and Methods

The paper employed a concurrent fully mixed equal status mixed-methods approach where the mixing of the qualitative and quantitative elements; a) cuts across the set objectives of the paper, the nature of data gathering and analysis as well as the conclusions on findings; b) are executed

simultaneously without one depending on the other, and c) qualitative and quantitative approaches having equal weights within the study (Leech & Onwuegbuzie, 2009). This approach was appropriate as it gave room for information gathering and analysis that captures views of participants on their experience of composite budgeting and statistics of the District's revenue and expenditure for complete understanding. Purposive sampling helped to select 21 participants interviewed for the qualitative data; including the coordinating director, directors of decentralized departments, finance, budgeting, and planning unit heads, of the central administration; four (4) assemblypersons, the presiding member and three (3) revenue collectors. For the quantitative data, the paper purposively sampled expenditure and revenue performance statistics of the District over eight years (2012-2019).

The purposive sampling enabled the selection of the district as one of the lowest IGF performing districts, and participants at the centre of composite budgeting decisions. The guide for qualitative data was interviewer-administered, face-to-face with participants and in the English language, along with audio-tape recordings and hand-written notes. Data extraction sheets were used for gleaning the quantitative data from the budget and performance reports. The qualitative data were manually analysed after verbatim transcription and merging of the audio-tape records and hand-written notes followed by coding and development of sub-themes and main themes for the results and discussion sections of the paper (Braun & Clarke, 2006; Tracy, 2013). The quantitative data were analysed using the Microsoft Excel Computer software and presented with descriptive statistical tools (Jansen & Warren, 2020). The interview guides were pre-tested before the data collection in the field. Data gathered was validated with the research participants for reliability. All participants gave their consent for the interviews.

Results and Discussion

Role of Composite Budgeting in Harnessing Central Government Fiscal Transfers Sources of external funds

The sources of external funding to the District include the GoG funds made up of the DACF, DDF and other transfers (for compensations, goods and services). Then the funding from donor interventions such as NGOs. The following expression highlights that:

The GoG is all the funds from the Ghana government: the main one is the DACF, divided into the actual common fund that comes to the district for the execution of the district budget for capital expenditure and goods and services, the MP common fund, and mandatory deductions such as the People Living with Disabilities (PLWDs) percentage share (Interview: DFO, 2021).

This quote reflects available literature on external funding to MMDAs (see: Boateng, 2014; Adu-Gyamfi, 2014). Study participants relayed in line with Boateng (2014) that DACF is the largest share of the MMDAs funding, but the statistics of the District's external source of funds present a different picture, as shown in Figure 1.



Figure 1: External Sources of Revenue to the District Source: Nanumba South District Assembly (2013-2020)

Figure 1 shows contrary to literature (Boateng, 2014) and the opinion of interviewees' that the Nanumba South District had more donor funds over the years of the composite budgeting until 2019: when the DACF increased beyond it. Though the donor funds can be helpful, their sustainability is in doubt: the NGOs often operate for specific periods and leave. The view below highlights that:

One time, we had RING in our District; they were doing marvellously well. What RING did in the District for one year, we would have years of DACF that could not have

undertaken those projects; however, they have ended their project with us (Interview: Ass. F&A Chair, 2021).

In this paper, the most reliable source of funding is the DDF. This aligns with the finding of Abdul-Kadir et al. (2017). Considering the indicators given by Burkey, the information here shows that the DDF funding is regular, but it has a short life in terms of performance and sustainability. The GoG and other government sources have been unsustainable and irregular; this highlights the call for diversity of sources under SDG 1, target 1a. Table 1 gives the share of external funding over the composite budgeting years.

Fiscal Year	External Funding	Total Revenue	% of Total Revenue
2012	2,084,318.42	2,134,962.97	97.6
2013	1,895,063.45	1,935,863.35	97.9
2014	6,020,371.92	6,112,651.92	98.5
2015	6,394,253.35	6,495,515.86	98.4
2016	5,976,129.59	6,090,038.93	98.1
2017	4,372,086.39	4,470,355.94	97.8
2018	5,089,193.00	5,184,819.00	98.2
2019	6,484,215.00	6,576,895.76	98.6

 Table 1: Percentage Share of External Funding in Nanumba South District

Source: Nanumba South District Assembly (2013-2020)

Table 1 shows that funding for the District's development is 97% externally sourced. It reflects the findings of Kapidani (2018) on the heavy reliance of sub-national governments on external funding, resulting from limited capacity to generate internal funds. This percentage is far above 80% or two-thirds of MMDAs' reliance on external revenues reported by Adu-Gyamfi (2014) and Danquah et al. (2015). It also points to some barriers to financial sustainability (KPMG, 2020).

Influence of composite budgeting on release and pooling of funds into one basket

Information from the paper indicates that some departments are not fully decentralized. The statement that follows buttresses this point:

[...] there is a challenge with the way decentralization is practised at the MMDA level. We have tier one and tier two departments, the tier two departments which include the Ghana Health Service (GHS) and the Ghana Education Service (GES) are not fully operating under the assembly system. So, it is not everything they do as departments that pass through the Assembly: [..]some monies flow from various sources to those departments without passing through the Assembly's coffers (Personal Interview: DFO, 2021).

The findings align with that of Otchere-Ankrah (2018) that incomplete decentralization of the tier two departments (GES and GHS) posed a challenge to composite budget implementation. This affects sustainable fiscal autonomy as district authorities are not able to harness all revenues available to the District into one revenue basket. Thereby defeating the principle of pooling funds together, underestimating the IGF and evidence of sustainable fiscal autonomy. Fragmentation of the revenue sources can bring about inefficiency and limit the District's ability to generate more internal revenue to enhance fiscal autonomy. Regarding its influence on how funds are released, the DPO expressed that: *"the composite budget does not influence the release of funds"*. This view is also reflected in the following words:

It has always been the same; just that hitherto, this composite budget thing in a way, is to stop duplications. [...] it is to ensure judicious use of resources. Nothing has changed so much: just that, all the departments have now been brought under one umbrella. So, our funding has not increased because of composite budgeting (Personal Interview: DCD, 2021).

The DCD communicates the potential effect of composite budgeting on accountability and transparency in the use of district resources, strides towards realization of SDG 16, target 16.6. An indirect effect relates to the DDF: a condition of project completion in the District. So, if the assembly members can regulate proposal and project initiation, they will be impacting, much, the funds the District gets from DDF (Adu-Gyamfi, 2014; Abdul-Kadir et al., 2017).

The Contribution of Composite Budgeting to Internal Fund Generation Internal sources of funding

The revenue items of the IGF agree with the ones mentioned in the literature (Darison, 2011; Danquah et al., 2015); most of the revenue points are not functional and contribute nothing to IGF in the District, as shown in table 2.

Table 2: Internativ Generated Funds and their Sources in the District						
Revenue Point	2017	2018	2019	% Change	% Change	
				(2017/18)	(2018/19)	
Property rates	740.64	10,010.00	8,527.33	12.52	-0.15	
Fees	40,614.46	60,512.00	69,714.00	0.49	0.15	
Fines	4,671.82	0.00	0.00	-1.00	0.00	
Licenses	10,409.00	12,449.00	1,835.00	0.20	-0.85	
Land	3,361.00	12,655.00	3,699.05	2.77	-0.71	
Rent	36,712.63	0.00	120.00	-1.00	0.00	
Miscellaneous	1,760.00	0.00	8,785.11	-1.00	0.00	
Total	98,269.55	95,626.00	92,680.49	-0.03	-0.03	

Table 2: Internally Generated Funds and their Sources in the District

Source: Nanumba South District Assembly (2017-2020)

Table 2 shows that the active revenue points, portray a decreasing trend in the IGF. The information also gives a deviation of high earning IGF item in the District (fees) from those of other places where property rates (Darison, 2011; Adu-Gyamfi, 2014) and licenses (Danquah et al., 2015) dominate. With the quantum of IGF, responses from interviewees agree with the statistics that the IGF, which should be the determining factor of the district's fiscal independence, is small (Boateng, 2014). It reflects in the following assertion:

The monies the Assembly gathers from the mentioned sources are woefully inadequate. Even though the mobilization of the IGF is ongoing, it is not enough to help with the major expenditure of the Assembly's budget (Personal Interview: DFO, 2021).

The total IGF for each year has not exceeded 2.4% of the total revenue. This explains the doubt of participants regarding the District leaning on its internal revenues for development. The DCD opined that:

[...] this place, the people are poor; [...] for thinking that we can move to the point where we can get money as a district so that we do not rely on funds from the central government, it will take a very long term" (Personal Interview, 2021).

These words identify with the findings of Pyscharis et al. (2016) that socio-economic factors among others, affect the levels of fiscal autonomy of local governments. The decline of the IGF in the District aligns with the limited capacity of MMDAs in internal revenue generation (Akudugu & Oppong-Peprah, 2013; Institute for Fiscal Studies, 2017).

Review of Internal Revenue Sources in Composite Budgeting

The composite budgeting makes provision for reviewing and fixing fees, rates and other charges for each year in consultation with ratepayers (Ministry of Finance, 2012, pp. 25–27). According to the DFO: "*Revenue collectors and taxpayers are all involved in the decision making concerning the IGF mobilization.* [...] The platform allows for decisions on amounts chargeable on various revenue items, the modes of engagement, sensitization, etc." (Interview: DFO, 2021). The provision for review of fees covers all internal revenue sources available to the District and new sources discovered: to ease payment of the rates and fees to improve IGF. However, the views of some revenue collectors point to a limited understanding of the consultation process as one collector said: "they have never invited me, after the fee fixing that they will print the resolution for us" (Interview: Revenue Inspector-Nakpayili, 2021).

This serves as a justification and response to the finding on the limited capacity of revenue collectors (Poupiel & Chimsi, 2015). The general public has platforms to make inputs into the composite budget; this, interviewees said is yielding a positive impact on revenue mobilization. It points to the effect of the review of fees, charges and rates on IGF and consequently, fiscal autonomy. From the foregoing, it has been argued that when effective consultation and sensitization characterize the planning for internal revenue mobilization, including the discovery of new sources, as provided by the CBS, it will help to improve IGF and have a favourable impact on the District's fiscal autonomy.

Challenges of Internal Revenue Generation

The challenges of Internally Generated Funds (IGF) mobilization in the paper includes *underinvoicing, delayed accounting, inadequate expertise of revenue collectors, lack of accurate data on* ratepayers, inadequate resourcefulness of revenue collectors, as well as unmet expectations of ratepayers and revenue collectors; identified to limit the gains of the IGF. These findings are consistent with those of Puopiel & Chimsi (2015) on underreporting, limited logistical support and the low capacity of revenue collectors. The rate payer's database and poor service delivery by MMDAs align with Adu-Gyamfi (2014) and Owusu (2015). The recurrence of these revenue mobilization challenges in MMDAs over the years calls for innovative strategies to overcome them.

Revenue Autonomy

The statistics of external revenue and IGF from secondary sources have been assessed by measuring revenue autonomy as a ratio of IGF to total revenue (Psycharis & Zoi, 2016); table 3 depicts the results.

Fiscal Year	IGF	EGF	Total Revenue	IGF % of Total Revenue	EGF % of Total Revenue	Ratio
2012	50,644.55	2,084,318.42	2,134,962.97	2.4	97.6	2.4:97.6
2013	40,799.90	1,895,063.45	1,935,863.35	2.1	97.9	2.1:97.9
2014	92,280.00	6,020,371.92	6,112,651.92	1.5	98.5	1.5:98.5
2015	101,262.50	6,394,253.35	6,495,515.86	1.6	98.4	1.6:98.4
2016	113,909.34	5,976,129.59	6,090,038.93	1.9	98.1	1.9:98.1
2017	98,269.55	4,372,086.39	4,470,355.94	2.2	97.8	2.2:97.8
2018	95,626.00	5,089,193.00	5,184,819.00	1.8	98.2	1.8:98.2
2019	92,680.49	6,484,215.00	6,576,895.76	1.4	98.6	1.4:98.6

Table 3: Trend of IGF in the Nanumba South District

Table 3 gives the lowest ratio of 1.4:98.6 and the highest 2.4:97.6 as the level of revenue autonomy of the Nanumba South District over the eight years studied. In its purest sense, revenue autonomy means dependence on own revenues to develop: measured as a ratio of IGF to total annual revenues. However, based on the heavy reliance of local governments on external funding, the focus of this

paper is on the ability to harness all financial resources available to the district by the authorities to improve the IGF, its proportion to the total revenue generated and conclude on the fiscal autonomy of the District. The worsening state of the IGF points to the financial unsustainability of the district; hence, less hope for autonomy status.

Conclusion and Recommendations

The paper established that the Nanumba South District has a worse form of reliance on external revenue compared with the average expressed in the literature. The paper recommends complete decentralization of all departments, believed to enhance the principle of pooling funds together, prevent fragmentation of revenue sources, and lead to efficient mobilization of more IGF to facilitate sustainable fiscal autonomy. The district authorities should endeavour to improve upon IGF through effective engagement with ratepayers which will alleviate the challenges facing internal revenue mobilization in the district resulting in the low contribution of IGF to the District's annual revenue and consequent low degree of fiscal autonomy.

The MLGRD, in collaboration with the MoF and other ministries, should reconsider the status of the tier two departments under the decentralized planning and composite budgeting policies to enhance the pooling together of district financial resources from external sources. Management of the District should explore and exploit additional revenue points: such as investment in facilities and services; employment of innovative strategies for the mobilization of existing revenue points such as collecting property rates at peaks of harvesting by farmers, effective monitoring of revenue collection, sensitization on the need for title deeds as security to properties. The District Authorities should intensify education on the need to pay taxes, rates and fees, with effective enforcement of tax regulations, to help boost compliance and subsequent improvement of the IGF in the District.

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DO PRESIDENTIAL SPEECHES MATTER DURING UNCERTAINTIES? EVIDENCE FROM THE COVID-19 PANDEMIC

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Purpose — This study contributes to the fight and management of the deadly COVID-19 pandemic by investigating the association between knowledge sharing through intermittent Presidential speeches and COVID-19 active cases and deaths in Ghana.

Methods — The study relied on seemingly real-time quantitative time series secondary data and the ordinary least squares (OLS) regression method with robust standard errors for the estimation of the model.

Findings — The results show evidence of a negative and statistically significant relationship between pre- and post-presidential COVID-19 speeches, and the number of COVID-19 active cases and deaths.

Conclusion & Recommendation — Timely and periodic presidential speeches can be adopted as one of the management measures adopted to inform and educate citizens in the fight against the pandemic.

Keywords — Presidential Address, Presidential Speech, COVID-19, Cases, Deaths, Ghana.

Introduction

The World Health Organisation (WHO) on 11th March 2020, declared the COVID-19 outbreak as a pandemic after it had spread rapidly to most countries on the globe with significant number of death cases registered (WHO, 2020). Globally, the total active and death cases which stood at 987 and 17 respectively on 22nd January 2020 rose to 967,782 and 45,487 respectively on 31st March 2020. Even though the spread of the disease was relatively slow in most African countries, elsewhere in Europe, Asia and some North African countries like Morocco and Egypt, and South Africa the spread was rapid and quite devastating.

Ghana registered its first two cases on March 12, 2020 (GHS, 2020). Subsequently, a public statement issued by the Ministry of Health indicated that both cases were imported from Norway and Turkey, and thereafter, the spread of the disease took a study increase with active cases peaking at 8585 (first wave) on 19th June 2020, and 8216 (second wave) on 13th February 2021 (Coccia, 2021). In response to the spread and proclamation by the WHO that the spread of the pandemic could be curtailed through early detection, isolation, effective treatment and contact tracing of patients and those who have come into contact with infected persons, the government through the Ministry of Health, Ghana Health Service, Noguchi Medical Centre and other health centres resorted to the '3T' strategy, namely Tracing, Testing and Treating to help arrest the spread of the pandemic.

Although, the containment and management of COVID-19 pandemic have presented a great and unique challenge to all governments, the effect in Ghana is relatively less severe. Faced with the urgency and mounting magnitude of the challenge the government realised the spread of the disease demanded a rapid policy response. These policies were directly communicated by the President to the nation. The COVID-19 Presidential speech became a household name which was described by many as "Fellow Ghanaians" - the first statement made by the President in all his addresses.

In his maiden address to the nation, the President of Ghana placed restrictions on international travels and social gatherings with immediate effect. The common measures taken include mass and compulsory testing of international travellers, closure of international borders and ports to human traffic, closure of hotels and guest houses except those used for the quarantining of travellers, closure of schools up to the university level, ban of socio-cultural and religious gatherings such as funerals, weddings, parties and partial lockdown of the two main cities in Ghana (KPMG, 2020).

In addition, the President of Ghana periodically addressed the nation on new developments with regard to COVID-19 data (total, active and death cases), the strategies put in place to arrest the pandemic, precaution that must be taken to prevent the spread of the pandemic, successes chalked and to instil hope in the citizens that the pandemic can be defeated with a collective effort. The government communicated the policy approach through the periodic presidential speeches to the nation. Twenty-five presidential speeches have been delivered as of May 2021 since the first in March 2020 when two cases were discovered in Ghana (Appendix 1).

In Ghana, several studies have been produced on the COVID-19 pandemic since the first recorded cases in March 2020 on the economy (Aduhene & Osei-Assibey, 2021) and stock market performance (Tetteh et al., 2022). However, to the best of our knowledge, what has not been empirically investigated is the extent to which the Presidential speeches or addresses influenced the total number of active case and deaths.

The primary aim of this study is to investigate the extent to which the speeches delivered by the President of Ghana correlate with the trends in the number of COVID-19 total, active and deaths cases. That is, the key question this study seeks to answer is: have the COVID-19 Presidential speeches created behavioural change that has led to reduction in COVID-19 total, active and death cases in Ghana?

The study proceeds as follows: The second section reviews presidential addresses and COVID-19 cases in Ghana. This is followed by a conceptual framework of the study. The fourth section captures the methodology employed for the study, followed by the findings of the study. The final section presents the discussion of findings, conclusion and policy implications to the study.

A Review of Presidential Addresses and COVID-19 Cases in Ghana

Due to the structure of government in Ghana, decisions about public policy takes a top-down approach. Generally, it starts at the level of the President and ends at the district/community levels for implementation. This places enormous authority in the President to influence behavioural decisions in Ghana.

Presidential address and Restrictions

After Ghana's first recorded COVID-19 cases, the President of Ghana on the 15th March 2020 presented his first address to the nation which was focused on restrictions as measures to reduce the spread of the virus. ³Travel restrictions on nationals from other nations (excluding residence permit holders) entering Ghana from countries with at least 200 coronavirus cases, as well as a necessary 14-day self-quarantine for those who are otherwise permitted to visit Ghanaian territory, were among the measures taken. The President ordered the country's borders to be closed to human travel starting at midnight on March 22, 2020, as a result of an increase in imported cases. This was made known in the 3rd address to the nation (Refer to Appendix 1). The closure of Ghana's borders and the imposition of obligatory quarantine helped to reduce the number of imported cases registered from arrivals (GHS, 2020).

Again, the President using the Imposition of Restrictions Act, 2020 (Act 1012), imposed a partial lockdown on the Greater Accra and the Greater Kumasi Metropolitan Areas which continued to record new cases of COVID-19 from infected persons who entered the country before the travel

³ Information available at www.presidency.gov.gh. Accessed on 31/12/2021

restrictions. This strategy was taken not just to reduce the spread of the disease, but also to make it easier to track down anyone who had contact with infected people, test them for the disease, and, if required, quarantine and isolate them for treatment if they tested positive. The lockdown was however lifted (Amoah & Amoah, 2021) after rigorous and satisfactory "3T" (tracing, testing, and treating) exercise had been done for a period of three weeks to avoid a spike of cases that could have wreaked havoc on the health-care sector (Sibiri et al. 2021). It is imperative to state that the worsening economic conditions of the poor and the vulnerable also contributed to the lifting of the lockdown (Assan et al., 2022).

Presidential Addresses and Health policies

Almost all the state addresses by the President contained health strategies and measures the government has put in place to fight the pandemic. In his first address to the nation, the President announced that two main medical research institutions have been equipped for the testing all international travellers to the country. Again, these travellers would be screened and quarantined for a mandatory 14 days. All those found to be positive will be sent to isolation and treatment centres for COVID-19 treatment, The intent is to isolate persons who are suspected of being infected with the virus as soon as possible in order to prevent the infection from spreading across the population (Sibiri et al., 2021). The private sector and other civil organisations, such as churches, have aided the government's efforts.

The President in his 5th national address made mention of some private sector interventions in the health sector to motivate health workers to contribute to the treatment of the growing number of infected persons. Commercial banks in Ghana, together with the central bank, the Bank of Ghana, provided a loan facility and stimulus package of GHS3 billion to local businesses, notably those in the pharmaceutical, health, services, and manufacturing industries, to help cushion their production

efforts⁴. Furthermore, an insurance package has been established for all health staff at the forefront of the pandemic fight. In addition, the President announced that all health professionals have been exempted from taxes on their income for three months. During the same time period, all frontline health personnel received an extra allowance of 50% of their basic salary. As announced by the President in his 5th Address to the nation on April 5, 2020, these incentives were extended for another three months (Refer to Appendix 1). The President also directed the Ministry of Transportation to provide free buses to transport health professionals to and from work along certain routes. Furthermore, the Ministry of Gender, Children, and Social Protection stepped up its efforts to educate Ghanaians on how to create hand sanitizers at home (MoGCSP, 2020).

The President in his 24th address to the nation on 28th February 2021, informed the nation that the first consignment of 600,000 doses of the AstraZeneca vaccine had been procured (WHO, 2021). On 7th May 2021, Ghana again received additional 350,000 doses of the AstraZeneca vaccine through the COVAX Facility, with logistical support from UNICEF. The President revealed the intention of the government to vaccinate 20 million Ghanaians before the end of 2021. The vaccination campaign started on March 1, 2021, and to assure Ghanaians that the vaccine is safe, the President received his shot on the same day.

Presidential Addresses and Socio-economic Policies

According to Kugbey et al. (2021) and Amoah & Amoah (2021), COVID-19 pandemic has not been all gloomy, and that there has been some evidence of silver linings. That notwithstanding, it is worthy to acknowledge that the negatives have been severe and dire. Indeed, COVID-19 pandemic has not only brought health hardships and suffering to humans, but it has also dealt a devastating blow to a significant number of businesses especially those in the hospitality, education, human resource and training sectors of the economy. To reduce these hardships socio-economic policies have been instituted by the government of Ghana to bring support to businesses and relief to the poor

⁴ Information available at www.presidency.gov.gh. Accessed on 31/12/2021.

and vulnerable. In order to achieve this, the President in his address to the nation on 5th April 2020 revealed the government's response to the COVID-19 hardships with the establishment of the Coronavirus Alleviation Programme Business Support Scheme (CAPBuSS) purposely to deal with the pandemic's immediate adverse effects (**Abbey**, **2020**). The CAPBuss aims at preventing job losses, preserving livelihoods, assisting small enterprises, and ensuring that the program is administered effectively and sustainably'. Small and medium firms, which account for approximately 85% of the Ghanaian economy and contribute roughly 70% of the country's GDP (Abor & Quartey, 2010), were suddenly given a ray of hope of being covered under the CAPBuSS.

The ban and restrictions have undoubtedly worsened the woes of Ghanaians in the informal sector which employs majority of Ghanaians such as street traders, food vendors, head porters, and the poor, aged and the vulnerable (Diwarkar, 2020). This situation necessitates a social protection system that gives certain benefits in order to address people's needs (ILO, 2020). To lessen the impact of the virus on the most vulnerable, the President in his 5th address announced the decision of the government to grant free water and energy subsidies for three months to Ghanaians as a social protection measure. To this end the government absorbed the water bills for all Ghanaians from April 2020 to June 2020. This was done to meet the WHO recommendation of hand washing and personal hygiene as one of the most effective strategies of preventing COVID-19 from spreading (Sibiri et al., 2021). Stoler et al. (2020) stress that inadequate water supply poses additional challenges to the fight against the pandemic.

In addition, in his 6th address to the nation, the President announced a three-month electricity relief package that included free power for the most vulnerable (life-line users) and a 50% discount for all other consumers. The water and electricity relief packages were extended to the end of 2020. It is worthy to state that in order to recover the COVID-19 expenditure and other related expenditures the Ghanaian Parliament has enacted the COVID–19 Health Recovery Levy, 2021 (Act 1068) to impose a special levy on imports and the supply of other goods and services.

Presidential Addresses and COVID 19 protocols

Almost all the presidential addresses mentioned the need to follow the three principal COVID-19 protocols: The continuous wearing of nose masks, washing and sanitizing of hands and social or physical distancing. The face mask has been one of the effective means of preventing the transmission of COVID-19 disease. COVID-19 has been proven to be transmitted by people who do not display symptoms of the virus. Maximal viral shedding has been found to occur early in the course of the disease (Javed et al., 2020). As a result, patients may be infectious before they show symptoms or know they have been infected. Again, transmission from pre-symptomatic and asymptomatic patients accounted for 40 to 80 percent of initial transmission. Available evidence suggests that the virus may spread by regular breathing and sneezing, and that even healthy people can shed massive volumes of the virus for further transmission. Constant wearing of the nose mask has been found to be one of the effective ways that can be employed to prevent the spread. Additionally, wearing a face mask lowers transmissibility per encounter by limiting transfer of contaminated droplets, as demonstrated in both laboratory and clinical settings (Howard et al., 2020). They claim that using face masks to limit the spread of the virus is most successful when compliance is high among larger population of a country. It is against this background that the President of Ghana re-emphasised the use of the nose mask by all Ghanaians who move out of their homes.

The President of the Republic of Ghana announced the domestic manufacturing of 3.6 million face masks, at a rate of 150 thousand each week, in his 6th address to the nation, to ensure the availability of nose masks for ordinary residents.

Conceptual framework

The conceptual framework adopted to fulfil the objectives of this research is presented in Figure 1. The purpose is to intuitively establish and explain the association between presidential speeches and COVID-19 figures through behavioural change. It also captures the researchers' point of view on the transmission mechanism through which the nexus between presidential addresses and behavioural changes is plausible.



Figure 1: Information, Behavioural Change and COVID-19 Response

COVID-19 knowledge and behavioural change

Education is seen to be ubiquitous to change. Education as a process of gaining knowledge and selfawareness has been identified as a critical component or requirement for behaviour change. McDonald et al. (2016) have emphasised that, the "three Es of injury prevention" education, engineering, and enforcement, should be followed.

However, education on its own is insufficient to facilitate behavioural change, and rarely has desired effect on behavioural change (Arlinghaus & Johnston, 2018). For education to create awareness and have influence on behavioural change, it must offer people with an enhanced understanding of the personal significance of the information given. People are unlikely to change their behaviour because they have been educated about a disease and its implications. There is a high probability of behavioural change occurring if education enhances people's awareness of the consequences of contracting the disease and are personally encountering the effect of the disease. Education should be modified to ensure its content is more relevant to the individual. In addition, tailored education is more likely to contain an explanation of why the information is relevant specifically to the individual (Arlinghaus & Johnston, 2018).

Empirical evidence suggests a strong awareness of COVID-19 symptoms, as well as preventive actions. Siramaneerat (2021) found that having a high degree of awareness of COVID-19 leads to favourable attitudes about preventive behaviours, mild risk perception, and moderate precautionary behaviour adoption. Again, improving people's perception of benefits of COVID-19 prevention practices could lead to COVID-19 prevention behaviours. Furthermore, behavioural change is plausible with COVID-19 prevention guidelines.

COVID-19 awareness and behavioural change

Extant studies suggest that using social networking channels may be helpful in understanding behavioural change and protection against COVID-19. By circulating short messages to targeted population and communities, social networking sites may employ public health authorities as valuable instruments to improve public health awareness (Chauhan & Shah, 2020).

The global effect of the COVID-19 epidemic has been enormous. The disease has altered people's lives all around the world. Work at home, social isolation, the continuous presence of children at home, fear of infection, and the lack of physically interact with others have all negatively impacted on the love relationships of several people. Ibarra et al. (2020) investigated the influence of the COVID-19 pandemic on sexual behaviour in three distinct countries: Iran, Italy, and Spain. They suggest that the influence of the coronavirus is significant in people's sexual lives, and there is the likelihood of experiencing dramatic changes in relationships at all levels in the near future. Due to many contact constraints, the pandemic will have a detrimental impact on sexual behaviour. In employing a multiple regression analysis, Eger et al. (2021) found that health and economic fears as a result of the COVID-19 pandemic are linked to changes in behaviour of customers and influence conventional and online buying behaviour.

COVID-19 consciousness and behavioural change

The evidence for the impact of awareness on behaviour change is vast, adaptable, diverse, and empirically strong. Consciousness, on the other hand, has an indirect and delayed effect that is dependent on the interplay of conscious and unconscious processes. Consciousness appears to be especially crucial for allowing factors like as social and cultural information to influence behaviour, as well as for coping with several competing options. Probably, human behaviour is almost certainly the product of a combination of conscious and unconscious thoughts (Baumeister et al., 2011).

Consciousness is a distinguishing element of human life and experience, yet it is a difficult concept to grasp. Evidence of unconscious, automatic processes has grown over the past two decades, prompting some experts to wonder whether conscious cognition has any impact on behavioural change at all. During the behaviourist period, the concept that conscious cognition is an epiphenomenon was upheld forcefully, and it has resurfaced owing to new studies of automaticity and the brain (Dijksterhuis et al., 2007). However, for a paradigm shift to occur, awareness of the current situation (COVID-19 pandemic) and its consequences is critical.

Presidential addresses - knowledge, health and economy

Presidential speeches have increased public awareness and understanding of current economic challenges (Sibiri et al., 2021). This link has been extended to other areas such as health in other studies. For instance, Allen (2001) highlights the importance of presidential speeches in bridging or eliminating health disparities. In addition, other researchers, such as Sibiri et al. (2021), have shown a link between presidential speeches and improvement in the management of diseases.

Material and Methods

Study design.

This study relies on a quantitative correlational research design which seeks to examine the relationship between presidential speeches and COVID-19 cases and deaths in Ghana.

Setting.
Ghana, officially the Republic of Ghana, is a country in West Africa. It has the Gulf of Guinea which is a portion of the Atlantic Ocean to the south, sharing borders with the Ivory Coast in the west, Burkina Faso in the north, and Togo in the east. Although several countries have suffered from the pandemic, Ghana's experience presents a unique case because of the frequency at which the government engages the citizens through periodic presidential speeches. Against this background, Ghana is considered as an ideal setting of this study.

Population

The study population was the total number of people infected with the COVID-19 in Ghana. However, the target population was the infected and reported as well as deaths cases in a recognised health facility. The GHS was mandated to validate all reported cases before making them public. Thus, all validated number of reported cases and deaths were used for this study. This may be described as a census approach.

Variables and Statistical Methods

Consistent with the conceptual framework (Fig 1), this study employs a regression approach to examine the correlation between COVID-19 presidential addresses in Ghana and COVID-19 pandemic measures in Ghana. The study assumes that knowledge acquired, awareness or a conscious-state stems from information shared which is the transmission mechanism through which behavioural changes that determines the measures of COVID-19 pandemic occurs. Based on this assumption which has its basis in the conceptual framework, a simple linear *event* model is specified as:

$$COVID - 19 = f(Presidential Speech)$$
(1)

where COVID-19 is an outcome variable representing the three COVID-19 measures. These measures include the total number of COVID-19 cases, the total number of COVID-19 active cases as well as the total number of COVID-19 death cases. In this study, the *event* includes dates the COVID-19 speeches are given by the President. The COVID-19 presidential speech has two

measures and are estimated differently for comparison purposes. First, address-day which is the address coded on the day of its delivery whiles post-address is the address coded after a week of its delivery by the President.

A priori, all else held constant, we expect the informative address as delivered by the president to have a negative effect on COVID-19 measures.

Bias

The study uses secondary data with no direct contact with humans. Nonetheless, this is prone to data modifications through the data validation processes. Similarly, under-reporting of cases and deaths is also possible due to traditional and religious practices.

Data Sources and Identification

The study relies on secondary data for all COVID-19 measures used in the study. These data were obtained from the Worldometer website⁵ whiles the data on presidential addresses were obtained (25 addresses) from published presidential speeches⁶. The sample covers the period March 1, 2020, to May 31, 2021. These daily time series datasets (443 observations) are considered large enough for time series analysis.

Of course, presidential speeches in Ghana may be endogenous to COVID-19 measures. Two likely sources of endogeneity can be identified. The first is, the COVID-19 measures are expected to be real time reported figures. Unfortunately, that is not the case as the estimates are collated and validated before they are reported. That is, COVID-19 measures can influence the president's address leading to reverse causality. Second, the bivariate model estimated may have several behavioural and fixed effect variables excluded from our models for lack of data leading to endogeneity stemming from omitted variables bias. Due to data constraints, this study failed to

⁵ Available at <u>https://www.worldometers.info/coronavirus/</u> [Accessed on 31/10/2021)

⁶ Available at <u>https://www.moh.gov.gh/president-akufo-addo-addresses-nation-on-measures-taken-by-govt-to-combat-the-coronavirus-pandemic/(Accessed on 30/10/2021)</u>

account for endogeneity concerns and admits that the results must be interpreted as association and not causal impact.

Admittedly, stationarity is key for time series analysis (Kwablah et al., 2014). However, binary independent variables in a bivariate regression model, tend to spread in a stable manner which might exhibit stationarity. In effect, investigating the stationarity properties of a binary variable appears to be an exercise in futility. Next, we present the descriptive analysis in Table 1 before proceeding to estimate the ordinary least squares (OLS) regression with robust standard errors and present the results in Tables 2 and 3.

Results

Table 1: Descriptive Statistics

Statistics	Pre- Presidential Speech	Post- Presidential Speech	Total Number of COVID-19 Reported Cases	Active Number of COVID-19 Reported Cases	Number of COVID-19 Reported Deaths
Median	0.000	0.000	45655.00	1298.00	294
Standard Deviation	0.215	0.470	32869.25	2088.12	262.47
Skewness	4.211	0.729	0.18	1.16	0.65
Kurtosis	18.731	1.531	1.74	3.48	2.25
Min (%)	0(5%)	0(67%)	0	0	0
Max (%)	1(95%)	1(33%)	93962	8585	785
Ν	517.000	517.000	517.000	517.000	517.000

Table 2: Pre-Speech Regression Results						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	BS: OLS	BS: OLS	BS: OLS
	Death Cases	Active Cases	Total Cases	Death Cases	Active Cases	Total Cases
Presidential Speech Day	-1.2306**	-0.3752	-0.9676**	-1.2306**	-0.3752	-0.9676**

	(0.562)	(0.359)	(0.395)	(0.562)	(0.364)	(0.388)
Constant	10.0809***	7.2598***	5.2862***	10.0809***	7.2598***	5.2862***
	(0.096)	(0.063)	(0.069)	(0.094)	(0.067)	(0.068)
Observations	446	446	437	446	446	437
Replications	N/A	N/A	N/A	1,000	1,000	1,000
F-Test/Wald chi2(1)	4.79	1.09	6.01	4.79	1.06	6.21
R-squared	0.019	0.004	0.022	0.019	0.004	0.022

Dep Variable: Indeath Dep Variable: Inactive Dep Variable: Intotal Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The study examines the effect of COVID-19 presidential addresses on the COVID-19 pandemic fight in Ghana. It is expected that the addresses by the President should create awareness precipitating behavioural change and consequently a reduction in the harm caused by the pandemic. Using a correlational regression analysis with 446 observations, we estimated 6 models. Table 2 presents the regression results. The first three standard models employed the OLS approach with robust standard errors while the last three are the bootstrap OLS approach with robust standard errors. The first three and last three models present converging estimates hence any of them can be chosen for interpretation. Consistent with theoretical propositions, the results show that the coefficients of death cases, active cases and total cases are negative and statistically significant across all the models. Specifically, the findings indicate that COVID-19 presidential address-day is associated with a 1.2306% reduction in average number of death cases, 0.3752 % fall in average number of active cases, and 0.9676 % decline in average number of total cases. Clearly, the number of death cases appear to be more responsive to the President's speech compared to that of active and total cases.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	OLS	BS: OLS	BS: OLS	BS: OLS
	Death Cases	Active Cases	Total Cases	Death Cases	Active Cases	Total Cases
Post-Presidential Speech Day	-1.8577***	-0.5143***	-1.2691***	-1.8577***	-0.5143***	-1.2691***
	(0.216)	(0.145)	(0.150)	(0.214)	(0.146)	(0.150)
Constant	10.7228***	7.4356***	5.7028***	10.7228***	7.4356***	5.7028***
	(0.054)	(0.054)	(0.059)	(0.055)	(0.053)	(0.059)
Observations	446	446	437	446	446	437
Replications	N/A	N/A	N/A	1,000	1,000	1,000
F Test/Wald chi2	74.19***	12.60***	71.96***	75.66***	12.48***	71.86***
R-squared	0.198	0.036	0.179	0.198	0.036	0.179

Dep Variable: Indeath

Dep Variable: Inactive

Dep Variable: Intotal

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents the post address regression results. The bootstrap OLS models indicate that the coefficients of death cases, active cases and total cases are negative and significant indicating a reduction in harm caused by the virus. The results show that the post-presidential day address is associated with 1.8577 % reduction in death cases, 0.5143 % fall in active cases, and 1.2691 % decline in total cases. Though, there is a general decline in association, however, the number of COVID-19 death cases are more sensitive to the post-presidential day address relative to the other measures. This could be explained by the fact that death is highly risky and irreversible as compared to being infected, thus efforts toward avoiding death are intensified by the individual, family and

government as compared to activities leading to being infected and reporting to the appropriate health facility.

Furthering the analysis by comparing the effect of the speech on the day the address is delivered and the post-presidential day address, it could be observed that the impact of the address is greater after the speech compared to the Presidential address day. The percentage change in death cases between pre and post presidential addresses dropped by approximately 51 percent and that of active cases declined by 37 percent while that of total cases fell by 31 percent. The results show differences in magnitude between the pre and post presidential addresses with respect to death, active and total cases. With the post-address reporting larger magnitudes as compared to the pre-address. The difference could stem from the post-presidential address sensitivity to health and socio-economic impacts and the degree of response by the citizenry. That is, whiles the people's attention was being drawn to the number of infected cases, deaths and socio-economic challenges, they were observed over-time to have responded positively through behavioural changes.

Discussion of Results

The objective of the study is to ascertain the degree to which the addresses by the President of Ghana correlate with death, active and total cases of the COVID -19 pandemic in Ghana. Using a correlational regression analysis, the study showed that pre-presidential speech led to a reduction in death, active and total cases in Ghana. This result is consistent with the findings of Sellnow (2015) who revealed that the provision of timely information during pre-crisis phase does not only prepare the minds of the citizens but also make them ready for the occurrence of a pandemic and has the potential of lessening the harm caused by the pandemic.

Similarly, the post presidential speech also led to the reduction in death, active and total cases. Thus, both pre and post presidential addresses correlates negatively with death, active and total cases. According to Baumgartner and Jones (1993), presidents are the main agenda–setters among political

players, therefore citizens look up to the President for leadership. Thus, it is plausible that the speeches of the President might have shaped the opinion of the citizens regarding the pandemic thereby reducing the fatality associated with it.

The President's recommendation of the use of face mask, washing of hands, the use of hand sanitizers, good eating habits, regular exercise, staying at home and social distancing might have accounted for these reductions. Existing studies (Howard et al., 2020) revealed that the greatest reduction in viral infections occurs at the early stages of the disease and thus wearing of nose mask could help to prevent the spread or transmission of the virus. Howard et al. (2020) noted that the use of nose masks could be most effective at preventing the spread of the virus when compliance is high among larger populations.

Furthermore, the speeches which show areas with high prevalence and infection rates might have helped those communities or individuals to take prompt action to attenuate the effect of the virus. Moreover, revealing the severity of the virus and indicating the number of deaths associated with it might have sent a strong signal to the public that they stand a chance of being infected by the virus if care is not taken. Eger et al. (2021) noted that health and economic fears are closely related to behavioural change of customers and affect the purchasing behaviour of buyers associated with COVID-19.

Again, the President also touched on stigma which could aggravate the sufferings of infected individuals and discourage infected people from seeking medical attention thereby increasing the difficulty in dealing with the pandemic. This might have encouraged infected persons to disclose their COVID-19 status in order to receive timely treatment reducing the spread of the virus. Also, the closure of international borders and ports, schools, hotels and guest houses, ban on social and religious activities, partial lockdown as well as tracing, testing and treatment of infected individuals might have also accounted significantly to the fall in death, active and total cases (GHS, 2020).

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In line with the theoretical framework shown in Figure 1, it is likely that the address of the President might have triggered behavioural change via the education it provided about the COVID-19 pandemic and its implications leading to a reduction in death, active and total cases. It could therefore be argued that education through a well understood information shared is the channel through which behaviour could be modified. Interestingly, other studies have revealed that education is a necessary but not a sufficient condition for behavioural change (Arlinghaus & Johnston, 2018). They argued that for education to create awareness and modify behaviour, it must provide better understanding of the relevance of the information. Thus, having a high degree of awareness and enhanced perception of the benefits of COVID-19 prevention practices could lead to a positive behavioural outcome (Siramaneerat, 2021).

In as much as the evidence is robust, we cannot gross over some limitations associated with the study. Data on COVID-19 cases and deaths is seemingly real time and not actually real time because the figures have to be validated by the Ghana Health Service (GHS) before they are published. The process can be susceptible to political influence which could lead to under-reporting or over-reporting. Again, infection rate could be under-reported as asymptomatic patients may not have reported to health facilities for testing. Belief systems may have influenced underreporting. Some people may have decided to treat themselves at home using religious and traditional practices.

Conclusion

Ghana has been found to be among the countries that effectively controlled the spread and effect of the COVID-19 epidemic. Indeed, timely presidential speeches have been identified as one of the management measures adopted to inform and educate citizens in a fight against the disease. However, the possible role of periodic addresses of the President in the fight against the pandemic has been unattended to by previous studies.

The study established that both pre and post presidential covid-19 addresses have impact on the

COVID 19 pandemic even though the magnitude for the post-presidential COVID-19 addresses is found to be greater than pre-presidential COVID-19 addresses. Thus, a more pronounced effect on COVID-19 cases and deaths is realised in the "post" than in the "pre" COVID-19 presidential addresses.

The study posits that knowledge acquired, awareness and the state of consciousness of the citizens stem from information shared which is the transmission mechanism through which behavioural changes that determine the measures of COVID-19 pandemic occur. The study serves as an eye opener to both researchers and policy makers in the effectiveness of presidential speeches in fighting epidemics. For policy purposes, we highlight the relevance of leadership, responsibility and initiatives through presidential speeches or addresses as a key component in the fight against uncertainties such as COVID-19 pandemic. Further, this study emphasises the need for leaders not to trivialise their reassuring engagements with their citizenry as it matters in periods of uncertainties.

Competing Interest

The authors declare no competing interest.

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Appendix

Appendix 1: Policy responses Captured in the Presidential Addresses and their compliance

	Presidentia			
Dates	1 Address	Major measures - policy response and important feat.		
		Screening and quarantining all travellers to Ghana for mandatory 14 days.		
		Two main medical research institutions in place for testing.		
11th March		Ban on international travels by public officials. Emphases on preventive		
2020	1	protocols.		
		Ban on religious and social gatherings for four weeks. All schools closed till		
		further notice.		
		Offices, shops, commercial buses observe strict hygienic procedures and		
15th March		social distancing.		
2020	2	Contact tracing to curb the spread and treat those infected.		
		Continuation of previous policy responses.		
21st March		Ministry of Health is contracting newly trained and retired healthcare		
2020	3	professionals.		
27th March				
2020	4	Partial lockdown for two weeks to enhance contact tracing.		
5th April 2020	5	Clean ups and sanitization campaign.		
		3-Ts, i.e. tracing, testing and treatment intensified. More samples taken for		
		testing.		
		Food items being distributed in Accra and Kumasi to the vulnerable and		
12th April		needy are being done through National Disaster Management Organization		
2020	6	and Metropolitan and Municipal Assemblies		
		Introduction of the use of drones to expedite the transportation of samples to		
		laboratory centres.		
		Introducing rapid results test. Enhancement of capacity of testing. Schools		
		remain closed.		
		Restrictions on religious and social gatherings still enforced Partial		
19th April		lockdown lifted.		
2020	7	Recovery recorded in some health centres.		
26th April		Construction of 6 regional and 88 district hospitals in a year to contain future		
2020	8	epidemics.		
		Continuous ban on public, religious and social gathering.		
		Soft loan scheme of GH¢600 million to support small and medium scale		
		businesses, GH¢3 billion credit and stimulus package, to help revitalise		
		industries, especially in the pharmaceutical, hospitality, services, and		
		manufacturing sectors.		
		Ghanaians advised to exercise and eat well to improve their immune system		
10th May 2020	9	Seven more testing facilities established. More recoveries recorded.		
24th May 2020	10	Ban on religious and social gatherings listed but limited to 100 people.		
14th June 2020	11	Final year students of Universities and SHS to go back to school to complete		

		programme following the laid down protocol.
		Ban on sporting activities still enforced. Contract tracing still enforced.
		Ban on gatherings still enforced.
21st June 2020	12	Contract tracing still enforced.
		Arrangements for students to go back to school to complete the term/
		semester.
28th June 2020	13	Incentive package for health workers.
		COVID-19 safety protocols enforced in schools.
		Borders, by air, land and sea, remain closed. Ban on internal flights lifted.
		Restrictions on religious gathering lifted but duration under 2 hours and 25%
		capacity.
		National Unemployment Insurance Scheme to be established to provide
		temporary income support to workers that have lost their jobs.
		Establishing a Guarantee Scheme of $GH \notin 2$ billion to enable businesses
		access credit at more affordable rates so they can survive, and able to retain $\frac{1}{2}$
		JODS. 100 had Change Infactious Diseases Contra established at the Co Fact
26th July 2020	14	100 bed Ghana. Infectious Diseases Centre established at the Ga East
20th July 2020	14	Municipal Hospital.
2020	15	Borders by air land and sea remain closed to human traffic
2020	15	Passengers arriving in Ghana must be in possession of a negative COVID-19
		PCR test result from an accredited laboratory in the country of origin
		Upon disembarking from the aeroplane, each passenger will undergo a
30th August		mandatory COVID-19 test at the airport terminal. Active cases continue to
2020	16	decline as majority of patients recover.
		Ban on sporting activities lifted but number of number of spectators limited.
		Testing of sportsmen and women, technical and management staff.
		Private burials, still, with a maximum of one hundred (100) persons.
		Borders, by land and sea, will remain closed to human traffic until further
		notice.
		Beaches, pubs, cinemas and nightclubs remain closed until further notice.
		All other institutions that have been cleared to function are to continue to do
		so in strict adherence to the COVID-19 protocols.
20th Sept 2020	17	More recoveries. Death cases dropped significantly.
		Kotoka International Airport was reopened to passengers. Testing of air
		travellers held. $\mathbf{E} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} & \mathbf{E} \end{bmatrix} = \begin{bmatrix} \mathbf{E} & \mathbf{E} \\ \mathbf{E} 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		Expansion of COVID-19 testing facilities, 12 more established (now 16),
		which include those of private sector provider.
		Some nospitals across the country equipped with the capacity to test for
		COVID-19. More dedicated treatment facilities for dealing with the disease
		More PPEs made available for our health workers. More COVID-19 patients
18th Oct 2020	18	recover
1000 000 2020	10	International passengers arriving in the country should submit proof of
		seventy-two (72)-hour old negative PCR test.
		Release of additional logistics to the Ghana Health Service for contact
		tracing.
		The use of technology to augment contact tracing efforts and monitoring of
		home care cases.
8th Nov 2020	19	Incentive package for health workers extended to the end of the year (2020).

		Active cases increase from 398 to 1,139 in 6 th November 2020.
		Approval of COVID-19 vaccines, by the Food and Drugs Administration of
		the United States of America, and the Medicines and Healthcare Products
		Regulatory Agency of the United Kingdom. Provision of hope for
		Ghanaians.
		Social events are to be held outdoors or in very well-ventilated halls, rather
		than in closed, air-conditioned spaces.
		Persons with underlying ailments to pay particular attention to their
		immunity and health during the COVID-19 era. Active cases reduced
20th Dec 2020	20	significantly.
		Kindergarten, primary and Junior High, in both private and public schools'
		re-opens.
		All institutions, public and private, are fumigated and disinfected.
		Institutions, with their own hospitals and clinics, will be equipped with the
		necessary personal protective equipment, and have isolation centres to deal
		with any positive cases.
		Those without their own health facilities hospitals, have been mapped to
		health facilities.
		Testing of traveller to Ghana, asymptomatic or not, and mandatory isolation
		and treatment at a designated health facility or isolation centre is still
		enforced'
3rd Jan 2021	21	No mass gathering, no sporting activities.
		People cautioned to observe Covid-19 protocol. Strick sanctions foe
		offenders.
17th Jan 2021	22	Partial lockdown imminent. Increase in active cases.
31st Jan 2021		Restrictions reintroduced and tightened.
		Funerals, weddings, concerts, theatrical performances, and parties are
		banned. Private burials, with no more than twenty-five (25) people, can take
		place, with the enforcement of the COVID-19 protocols.
		Beaches, night clubs, cinemas, and pubs continue to be shut.
		Borders by land and sea remain closed.
		All workplaces must employ a shift-system for workers, in addition to the
		use of virtual platforms for business or work.
		Conferences and workshops advised to use virtual platforms. Active cases
		doubles in two weeks.
		Virus mostly occurs indoors, confined spaces with poor ventilation, where
	23	people talk, sing, or shout without their nose masks on.
		Arrival of 600,000 doses of the AstraZeneca vaccine. The first consignment
		of many more to come.
		20 million Ghanaians to be vaccinated. Ghanaians assured the vaccine is
28th Feb 2021	24	safe.
		The Imposition of the Restrictions Act 2020 (Act 1012) remains in force
		and security agencies will continue to enforce it until the required
		number of Ghanaians have been vaccinated.
		The government has received additional 350,000 doses of AstraZeneca
		vaccines through COVAX.
		Significant reduction in active cases. Rate of infection also reduces
16th May 2021	25	drastically.

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TOWARDS SUSTAINABLE RAINWATER HARVESTING: UNVEILING THE

CONCERNS OF RESIDENTS IN YILO KROBO MUNICIPALITY

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Article Info	Abstract
<i>Article history:</i> Received: 02 October 2022 Revised: 23 January 2023 Accepted: 07 February 2023	Purpose — The study aimed at investigating residents' concerns about rainwater harvesting and its use among households in the Yilo Krobo Municipality.
Published: 30 December 2022 Author's email: feshun@uesd.edu.gh	Methods — The study used questionnaires to solicit the views of residents in the Yilo Krobo Municipality and the results were analyzed using descriptive and nominal logistics regression approaches
DOI: https://doi.org/10.55921/ZCXT3548	Findings — The study found that residents have concerns about the quality of rainwater which had implications for their harvesting and usage. They were also concerned about the mode of collecting as well as storage facilities used in storing rainwater. Variables such as age, occupation, and education were factors contributing to residents' desire to harvest rainwater.
	Conclusion & Recommendation — The study concluded that people's concerns about the quality of rainwater influence their desire to harvest it. Respondents with low education and farmers tend to harvest rainwater. The study recommends education on how to harvest and store rainwater to reduce contamination in the water.
	Keywords: Domestic water, climate change, water scarcity, fresh water, water storage

Introduction

Water scarcity is a global phenomenon and even though about two-thirds of the earth's surface is made up of water, saltwater makes up about 97% and the remaining is fresh water which limits the supply of fresh water in large quantities (Owusu & Asante, 2020). About 1% of the 3% is available for human consumption. The rests are glaciers or cryosphere. With the increasing world population, the demand for freshwater continues to increase, thus putting pressure on the limited sources, hence alternative sources of water become critical (Andoh et al., 2018). Water has no substitute and various sources of good drinking water need to be explored. It has been estimated that about 2.2 billion people worldwide struggle to have access to safe water which has become worse with climate variability especially long drought conditions (Owusu & Asante, 2020). Rainwater harvesting (RWH) is a long tradition among several people in different geographical areas and is used for domestic, industrial, and agricultural purposes (Owusu & Asante, 2020; Velasco-Muñoz et al., 2019). Various underground and surface water sources are fed by rainwater. However, climate variability can affect the supply of these water sources when there are prolonged droughts with intermittent rainwater supply.

Water resources are threatened and face various forms of degradation and other challenges such as an increase in urban growth, an increase in the use of water for industrial and agricultural purposes, and inadequate distribution of water resources (Velasco-Muñoz et al., 2019). RWH, therefore, provides the opportunity for people to have access to fresh water to supplement their water needs. RWH implies the application of different means to collect, store, manage, and use rainwater (Owusu & Asante, 2020; Velasco-Muñoz et al., 2019). Some of the uses of rainwater for domestic purposes include washing, bathing, cleaning, and car washing, and when rainwater is treated to meet the quality of drinking water standards, can fully replace household water needs and reduce the pressure on pipe-borne water. About 60% of domestic water use can be replaced with rainwater (Struk-Sokołowska et al., 2020). Furthermore, rainwater for laundry activities can account for about 15% of household water use. Rainwater is soft, prevents limescale from settling in washing machines, it leathers quickly and so reduces the amount of detergent used, and can help to reduce the amount of energy used in washing and increase the lifespan of the machine. Using less energy and detergent can reduce pollution and be safe for the environment (Struk-Sokołowska et al., 2020).

In Ghana, people get their water supply from ground and surface water sources such as boreholes, wells, rivers, lakes, and RWH. The quality concerns of surface water such as rivers and lakes as well as the cost of constructing boreholes and wells usually limit their usage (Owusu & Asante, 2020). RWH becomes a cheaper alternative, however, peoples' perception of rainwater can influence their desire to harvest it. Even though RWH can help reduce water scarcity for domestic and commercial use, people's desire to harvest it matters. When people perceive the benefits associated with RWH, they are likely to harvest it. Even when people are on the national grid and receive water from service providers, RWH could help supplement their water needs and reduce the cost of their water usage. The quantity that could be stored at a time could also help reduce water scarcity. The concerns that people may have about rainwater could also influence their decisions to harvest it. This study seeks to investigate residents' concerns about rainwater usage and the factors influencing RWH in the Yilo Krobo Municipality in the Eastern Region of Ghana.

The study is relevant in the context of the study area and other similar municipalities for these two reasons. First, a study shows that rainwater use constitutes a small share (less than 1%) of the sources of water in the Yilo Krobo Municipality (Gbedemah et al., 2022). However, access to other sources has been problematic, either due to erratic supply in the case of pipe-borne water from service providers, or quality concerns in the case of unimproved sources such as rivers and streams.

While previous studies have highlighted the challenges and benefits of RWH in the global south countries (Abraham et al., 2020; Andoh et al., 2018; Owusu & Asante, 2020), few studies have been conducted in the Yilo Krobo Municipality on factors that influence residents concern on the use of

RWH, especially between rural and urban settlements where water infrastructure and services are relatively poor. This study, therefore, fills this gap by examining residents' concerns in the utilization of RWH and further examines how their background characteristics such as age, gender, and level of education among others play a significant role in influencing these concerns associated with RWH. Thus, providing perspectives on ways to improve the use of rainwater will significantly address water challenges in the municipality. Second, the findings can be used as an exemplar to understand RWH challenges in other similar study contexts, and can also be built on for other exploratory and detailed studies on RWH in small towns and rural communities.

1.1 Perceptions of people regarding rainwater

People's perceptions can influence rainwater harvesting. Perception according to Bennett et al. (2016; 585) is the way people or a particular person "observes, understands, interprets, and evaluates a referent object, action, experience, individual, policy, or outcome". These authors go on to show that perception is a broad term that is used to show attitudes, beliefs, and values. These broad evaluations of behaviors of people in a particular situation can be positive or negative (Fishbein & Ajzen, 2011). People's perceptions can be influenced by their attitudes, knowledge, beliefs, lived experiences, other people's opinions, outreach campaigns, groups with different perspectives, emotional responses, socio-cultural backgrounds, etc (Vaske et al., 2021; Niemiec et al., 2020). According to Upham et al. (2009), research findings on people's perceptions of a particular situation will inform policy on the right course of action to take or recommend. Mankad et al. (2015;184) for instance point out that people's "decision to install a rainwater tank will increase when householders feel threatened by water scarcity, and believe that a rainwater tank is an effective way to address that threat". Another study by Chubaka (2017; 308) found that Adelaide's "households' drinking water preference was based on the community's perception of municipal water, and the choices of many households were driven by water taste rather than water quality".

Chew et al. (2019) found that women's daily water source choices and perceptions in the Eastern Region of Ghana were based on multiple factors, including seasonality, accessibility, physical burden, spiritual, religious, or community messaging, and ease of use. In Ghana, a study by Abraham et al (2020) on RWH in the Cape Coast Metropolitan area concluded that harvesting and use of this rainwater are low. Relatedly, Owusu & Teye (2014) researched RWH in Ghana and points out that high levels of unmet demand for pipe-borne water are being experienced in peri-urban areas of the capital city of Ghana (Accra), and as such residents have resorted to RWH to meet these needs. The main hindrance to harvesting rainwater on a large scale is the nature of tenancy arrangements in Ghana which makes it difficult for tenants to construct their own system of collecting water because their tenure in the house is not guaranteed.

1.2 Factors influencing rainwater harvesting

People are also concerned about the quality of rainwater. Studies show that the quality and quantity of rainwater depend on the geography, characteristics of the climate, prevailing human activities, and the volume of the storage tank (Hamilton et al., 2019). Rainwater is found to be generally clean and has low hardness and a quasi-neutral pH (Liuzzo et al., 2016). Rainwater is said to be free from geogenic chemicals but is mainly contaminated through anthropogenic sources which can also be described as low (Qi et al., 2019). The quality of rainwater may be contaminated due to trace metals, pathogenic organisms, and physical objects such as dead leaves or animal droppings (Hamilton et al., 2019).

1.3 Domestic rainwater harvesting: principles, system components, and quality issues

Center for Affordable Water and Sanitation Technology (CAWST, 2011) asserts that RWH systems can be divided into three main components: the catchment surface; and the storage. Khayan et al. (2019) posit that the quality of RWH will depend on these three main components.

Other studies assert that the quality and quantity of rainwater depend on the geography, characteristics of the climate, the prevailing human activities, the volume of the storage tank, contamination of the catchment area, intensity of rainfall, periods of dry season preceding the rains, and method of collection (Andoh et al., 2018; Biswas & Mandal, 2014). Rainwater is found to be generally clean and has low hardness and a quasi-neutral pH (Liuzzo et al., 2016).

The main quality issues of RWH come from debris, dirt, and dust that gathers on the catchment area, which in Ghana is mainly the roof. These unwanted materials are not supposed to enter the delivery system which will be transported into the storage tank when the first or second rain falls. There is a need to devise a system that is to divert these unwanted rainfalls (first flush) outside the system (DTU, 2002). The second area of the RWH component that hinders the quality of the harvested water is the storage device which is also the component that requires the largest capital investment. There is no single requirement for the storage device as one can construct it by him/herself or purchase them in the market. Some people use cement or brick blocks to construct it while others depend on commercially constructed plastic storage devices. Others use local materials such as plastic, or fiberglass containers as storage devices.

2 Materials and methods

2.1 Study Area

The Yilo Krobo Municipality is situated in the Eastern Region of Ghana and falls within latitudes $6^{0}00$ 'N- $0^{0}30$ 'N and longitudes $0^{0}30$ 'E- $1^{0}00$ 'W. In 2020, it was shown that 122, 705 people lived in the municipality, and out of this, 59,656 are males while 63049 are females (GSS, 2021). According to the Ghana Statistical Service (GSS, 2014), approximately 34 percent of the population is between the ages of 15 and 35, while approximately 37 percent is under the age of 14. The population is made

up of 52 percent women and 48 percent men. The population of these communities makes up 61 percent of the population of the municipality, while about 212 of the 237 settlements in the municipality have fewer than 500 residents. Since there are so many small rural villages in the municipality, it is impossible to supply water and other infrastructure services to them all, this condition presents challenges for the Municipal Assembly in terms of providing potable water facilities. A map of the study area is shown in Figure 1 below.



Figure 1: Map showing the study area.

About 27.1 percent of the households in the Yilo Krobo Municipality rely on rivers or streams for domestic usage, according to the GSS (2014). Other water sources utilized for residential purposes include borehole/tube wells (12.9%), public taps/pipes (13.9%), and pipe-borne sources outside the home (14.3%). 20.0 percent of the population has access to public taps and standpipes, which are the primary sources of water for domestic use in the municipality's urban districts.

2.2 Methods

The target population for the study consists of people who live in the municipality and are at least 18 years old. The same family did not have more than one sample of a given age group. The household was used as the analysis unit since several questions were specific to the household the respondent was a member of. With a 95% level of confidence, a 7% margin of error, and an expected total of 20,613 residences, the sample size was calculated (Israel, 1992). The overall sample size collected was 400, and of this total sample, 160 (40%) were drawn from rural populations and 240 (60%) from the urban population. According to official records, the municipality is primarily rural, yet, because of the municipality's rugged terrain, the dispersed nature of the rural villages, government restrictions on mobility, and resource constraints, the researchers took more samples from urban areas.

The research design used for this study was a cross-sectional survey. This research design allows for studying the attitudes and perceptions of a subset of a population at a point in time (Creswell, 2014). Regarding the sampling of respondents, the study used a multi-stage sampling approach (Fuller, 2011; Lohr, 2019). An initial stratified sampling of the respondents was conducted. At this point, a portion of the sample was divided between the two research populations, which were divided into urban and rural areas (i.e. rural and urban). Fourty (40%) was allotted to rural areas, because of the difficulty in reaching the villages, such as inadequate roads and resource limitations, with about 60% going to metropolitan areas. Due to the small number of rural communities, the population was sampled randomly. Ayemesu, Adzekpo, and Ogome were the three rural communities covered by the sample survey; each had about 53 respondents sampled. For the urban community which was Somanya, a multistage cluster sampling procedure was adopted. To facilitate the sampling process, Somanya was divided into thirteen clusters using the already established unit committee demarcated areas. Four clusters (unit committees) were then sampled from the list of thirteen clusters in the

second stage of the sampling process. The third and final stage involved a simple random sampling of sixty (60) respondents (heads of households) from dwelling units in each of the four clusters selected.

The results were analyzed using both descriptive and inferential statistics. The descriptive statistics were frequency and percentage distribution of variables. These variables include demographic variables, perception of RWH, and concerns about the quality of harvested rainwater. Nominal logistics regression was performed to predict the effects of respondents' characteristics on their desire to harvest rainwater.

Regarding the qualitative data, a total of thirty (10) households that have RWH systems in place were observed to ascertain their concerns and how they harvest water. In-depth interviews were held with some of these household heads on issues concerning RWH in the Yilo Krobo municipality. Thematic content analysis was used to analyze the qualitative data. This data was analyzed by first transcribing the interviews conducted with household heads. This was followed by a first reading of the transcripts to get a general overview and insight into the responses provided. The second reading followed next and sought to identify responses that fit under specified themes that have bearing on the study. These themes include quality, components of the RWH system, water storage, and accessibility.

3.0 Results and discussions

3.1 Profile of respondents

There were more female respondents than males and the highest age group falls within 31-40 followed by those between the age group of 41-50, then 18-30. The pattern of age distribution

indicates that the majority of the respondents fell within the working class. Respondents who were married constituted the largest proportion, followed by those who were single. The greater number of respondents have had Senior Secondary School education and the majority were traders. The respondents' characteristics are shown in table 1.

Background of	Type of settlement		Tatal
respondents	Rural	Urban	Total
Gender			
Male	58 (36.2%)	108 (45.0%)	166 (41.5%)
Female	102 (63.8%)	132 (55.0%)	234 (58.5%)
Total	160 (100.0%)	240 (100.0%)	400 (100.0%)
Age			
18-30	8 (5.0%)	70 (29.2%)	78 (19.5%)
31-40	60 (37.5%)	70 (29.2%)	130 (32.5%)
41-50	58 (36.2%)	46 (19.2%)	104 (26.0%)
51-60	20 (12.5%)	20 (8.3%)	40 (10.0%)
61+	14 (8.8%)	34 (14.1%)	48 (12.0%)
Total	160 (100.0%)	240 (100.0%)	400 (100.0%)
Education			
None	10 (6.2%)	16 (6.7%)	26 (6.5%)
Non-Formal Educ.	18 (11.2%)	20 (8.3%)	38 (9.5%)
Primary	4 (2.5%)	12 (5.0%)	16 (4.0%)
JHS/Middle	16 (10.0%)	30 (12.5%)	46 (11.5%)
SHS/O'Level	46 (28.8%)	66 (27.5%)	112 (28.0%)
Voc/Technical	24 (15.0%)	24 (10.0%)	48 (12.0%)
Polytechnic/Nursing	40 (25.0%)	18 (7.5%)	58 (14.5%)
University	2 (1.2%)	54 (22.5%)	56 (14.0.0%)
Total	160 (100.0%)	240 (100.0%)	400 (100.0%)
Occupation			
Farming	34 (21.2%)	8 (3.3%)	42 (10.5%)
Trading	52 (32.5%)	74 (30.8%)	126 (31.5%)
Civil servant	24 (15.0%)	30 (12.5%)	54 (13.5%)
Teaching	8 (5.0%)	34 (14.2%)	42 (10.5%)
Artisan	36 (22.5%)	26 (10.8%)	62 (15.5%)
Others	6 (3.8%)	68 (28.4%)	74 (18.5%)
Total	160 (100.0%)	240 (100.0%)	400 (100.0%)

Table 1: Demographic background of respondents

The background of respondents is important in our understanding of RWH. In most African societies, women perform most household chores, and such gender roles can have implications for

those who harvest rainwater. The educational characteristics of respondents could also influence their knowledge of the need to harvest rainwater. Education could be formal or informal, and the majority of respondents have had formal education. Again, the type of occupation can influence peoples' desire to harvest rainwater. Most of the respondents are traders followed by those in public service. In a study from Ethiopia, it was found that farmers harvested rainwater because of the benefits they get from it to irrigate their farms and that knowledge of people has a positive influence on RWH techniques (Mengistu, 2021).

3.2 Perception of rainwater harvesting

Respondents were asked to indicate whether they believe RWH will be welcomed by residents. The majority (72%) were positive that this is possible. People are positive about harvesting rainwater in the future since there have been challenges with water emanating from erratic supply from service providers, coupled with the rising cost of accessing water in recent times (Gbedemah et al., 2022). Thus, respondents may probably be viewing RWH as a viable option, especially when average rainfall is also rising.

Respondents were asked to provide their reasons for their choice and the majority said they will harvest it because it is the only available alternative (72%) whilst a good number felt it is not a clean source of water (28%). Cross-tabulation results show that more women (42%) believe that RWH is possible and can be harvested on a large scale. However, most respondents were concerned about the quality of rainwater (see figure 2). In many developing countries, women usually fetch water to perform household chores (de Moraes & Rocha, 2013), and their perception of RWH is crucial since it can influence their desire to harvest it. Some women collect rainwater based on seasonality, and ease of access (Chew et al., 2019). When there is water scarcity, they are those who suffer the most, and even girls of school-going age may equally be affected. Water is one of the greatest challenges

facing poor urban households and more women preferred that governments and institutions address their water challenges (Eshun & Denton, 2022a, 2022b) which requires critical attention. Just about 2% of the respondents indicated that they are harvesting rainwater, even though the majority perceive that they will do so if the quality concerns are addressed. The low patronage of RWH was noted by Abraham et al (2020) and this requires critical attention.

The quality of rainwater could be analyzed from laboratory testing, however, people's experiences could influence their perceptions about the quality of rainwater. Rainwater quality could also depend on other issues including the location, the intensity of rainfall, the number of dry periods before the rains, the method of collection, and the storage systems used (Andoh et al., 2018; Biswas & Mandal, 2014). There are cases where excretion from lizards, birds, and other flying insects falls on rooftops which happens to be the main source of collection. Debris, dust, and related foreign materials can also find their way into the storage, and techniques to filter the water become crucial (Andoh et al., 2018). About 16% of the respondents said they are artisans who could be engaged to come out with technological designs that can help the local members to harvest rainwater in a manner that could reduce contamination. Creating awareness and training artisans can stimulate peoples' interest in RWH (Andoh et al., 2018) and also create jobs.



Figure 2: Residents' perceptions of rainwater

The quality concerns of rainwater are a global issue as studies from Indonesia report that the quality does not meet the requirements for drinking, yet rainwater is the main source of drinking water for residents in West Kalimantan, Indonesia (Khayan et al., 2019). In Ghana, studies from the central Gonja district show that rainwater can be used for bathing, cooking, and drinking (Andoh et al., 2018). Even where people do not directly drink the rainwater, it is used to wash clothes and hands, and even to cook meals. Other authors have also found that the high cost of the system, limited institutional support, inadequate information, and perception of the quality of rainwater as barriers influencing RWH (Akuffobea-Essilfie et al., 2020). Qualitative information from the study highlights the quality concerns which prevent respondents from drinking the rainwater:

"We harvest rainwater, even though the volume is small. But because of the quality concerns, we use it for cooking, washing clothing, and bathing. If there is a way that the quality can be improved, we will use it as drinking water (Respondent from Adzekpo)."

Rainfall figures from the municipal assembly point to the fact that the rainfall figures within the municipality range between 750 mm in the southern section of the municipality to 1600 mm on the mountainous areas. The average rainfall distribution in the Yilo Krobo Municipality has a mean value of about 1,270 mm. These figures indicate that there is much potential for RWH in the municipality. This is because, other areas in Ghana that are water-stressed and worse off as far as rainwater is concerned are harvesting rainwater (Owusu-Boateng & Gadogbe, 2016). The most important issue is whether households are ready to harness rainwater and more so whether they can do so.

3.3: Factors influencing rainwater harvesting

The background characteristics of respondents were run with their perception of RWH. This is shown in table 2. The nominal regression results indicate that an increase in the odds of the age category of respondents will increase their desire to harvest rainwater on a large scale and this is significant for all age groups. However, those who are between the ages of 41-50 have increased odds to harvest rainwater more than those within the age group 51-60, 31-40, and 18-30 respectively.

Item	Estimate	Significant	Lower bound	Upper bound
Age				
18-30	2.099	0.002	2.225	29.997
31-40	2.364	0.000	3.351	33.776
41-50	2.804	0.000	4.361	62.482
51-60	2.541	0.000	3.191	50.490
Education				
None	2.029	0.011	1.579	36.647
SHS	1.520	0.005	1.594	13.126
Occupation				
Farming	-2.548	0.000	0.024	0.253

Table 2 Factors influencing rainwater harvesting

Nagelkerke R² 0.297

Again, those who have no education also have increased odds of harvesting rainwater than those who have attained Senior High School education. Education and knowledge about people can influence their perception to harvest rainwater (Mengistu, 2021). This study found that those who have had some formal education have a decased odds of harvesting rainwater. This could be related to their concerns about the quality of rainwater. Those who are farmers have a decreased odds of harvesting rainwater even though this is significant at 0.000 and explains 29% of the model. The study, therefore, shows that age, education, and occupation influence people's perception of RWH.

Farmers due to the nature of their work are likely to harvest rainwater for irrigation purposes. In a study in northern Ethiopia, farmers perceived the harvesting of rainwater as a motivation and a sense of belonging. They believe that it helps them to increase crop production and their desire to apply RWH technologies was influenced by their education, size of the farm, and income (Mengistu, 2021). Educating farmers about the importance of RWH techniques could help increase their odds of harvesting rainwater for their farming activities. Furthermore, educating other groups such as women about RWH can reduce the pressure on portable drinking water from a centralized source. RWH can replace the water used in domestic activities such as cooking, washing, cleaning, bathing, and

laundry which can reduce money spent on pipe-borne water (Struk-Sokołowska et al., 2020). Other studies found that the mode of housing, mode of RWH, income, water availability, and services influence RWH (Lebek & Krueger, 2021). A study in Ghana found that sex is a good predictor than the education of respondents to harvest rainwater. This study found that education is a significant predictor of residents' desire to harvest rainwater.

Respondents were asked to provide their reasons for not harvesting rainwater. Their responses are shown in figure 3.



Figure 3: Reasons for not harvesting rainwater.

The majority of the respondents believe that rainwater is not clean so they do not harvest it. This goes to strengthen the quality concerns residents have about the rainwater. Others shared that it is difficult to harvest. This suggests that people require education in the method of RWH that could be easier for residents to use. It has been reported that RWH is usually cost-effective compared to the drilling of wells and boreholes (Biswas & Mandal, 2014; Owusu & Asante, 2020). However, some of the respondents complained about the cost of harvesting rainwater. Education on the appropriate

methods can reduce people's perception of the cost and challenges associated with RWH and embrace the practice. This can help reduce water scarcity and reduce surface run-offs. Depending on the technology one may want to apply, the cost associated with it will in the long run become effective. Other authors share the view that the cost of harvesting rainwater is low (Owusu & Asante, 2020; Struk-Sokołowska et al., 2020).

The findings indicate that people perceive RW to be of low quality hence the low patronage. Observation in the field regarding those who harvest rainwater shows that the majority of them did not harvest rainwater based on the principles and systems outlined by the CAWST (CAWST, 2011). The observed RWH systems in the Yilo Krobo municipality did not have good surface catchments for RWH. Some of the houses have trees that extend into the catchments which will make the collected rain dirty. Other houses used catchment systems that are rusty because they used galvanized or corrugated iron sheets. Corrugated roofing sheets "affect the total alkalinity and methyl orange alkalinity of the harvested rainwater but had no impact on their physical appearance" (Omuku et al.,2022; 134). None of the observed ten households used nets to sieve the water that is entering the storage tank to prevent dirt. This mechanism should be constructed in such a way that, it can be removed, cleaned, and fixed back when the desired quality water is falling. In other words, the delivery system has to contain a flexible part that can be removed and replaced when rain is falling but this is not the case with about 90% of the ten RWH systems that were observed.

The continuous use of rainwater and its harvesting can lead to environmental conservation and poverty reduction because people will no longer go and purchase it from vendors. It can also be used as a climate change adaptation measure in areas where the rainfall pattern is becoming erratic (Abdeladhim et al., 2022). The development and propagation of domestic RWH in Ghana and other communities is a sure way to propagate the sustainability of water sources because it has been

implemented and used in numerous countries around the world (Kim et al., 2016; Owusu & Teye, 2014; Prihanto et al., 2018).

4.0 Conclusion and recommendations

Residents perceive that rainwater is of low quality which inhibits them from harvesting it. This study found that those who are connected to the Ghana Water Company Limited (GWCL) grid do not have the desire to harvest rainwater however, respondents believe they will harvest it when it is the available alternative. Another finding is that those with lower educational backgrounds have increased odds of harvesting rainwater and among other occupational categories, farmers are those who harvest rainwater. The study recommends the education of residents on the need to harvest rainwater as well as the appropriate technology to employ to reduce contamination in the water. The municipal authorities and educational institutions in the municipality and the country at large should promote RWH technologies to reduce pressure on freshwater resources, and as an alternative to reduce the cost of paying for water from the grid. The municipal authorities should also engage the media to publicize the environmental and cost benefits associated with RWH. Time and resources served as constraints in examining various roles artisans within the municipality can play in promoting RHW and further studies can look at this.

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