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FOREWORD BY THE VICE CHANCELLOR

On behalf of Management of Kampala University, I wish to introduce to you our Scientific Research Journal KUSRJ 2023. This publication is in pursuit of our University's mandate to conduct research and promote innovation.

Scientific research is critical to help us navigate our ever-changing world. Without it, we would have to rely on people's opinions, our intuitions and luck. Systematic scientific research offers us an objective understanding because scientific knowledge is grounded in objective and tangible science.

Further, Publishing is the backbone of academic studies. It is the traditional means of disseminating research results, communicating new ideas and techniques, and we must not forget it is also used for securing tenure for those in the academic field. Research journals provide a source of useful information and knowledge that can easily be located and read.

Therefore, I extend a vote of thanks to all our students and faculty, who have highly contributed to this publication by writing journals. On the same note, I highly commend our Editorial team for their great efforts in assessing papers for publication.

I encourage all scholars to develop a culture of reading research papers in order to add to their existing knowledge and improve their overall understanding; to gain insight into the latest scientific techniques being used and the new development opportunities available; to create a rich repository of relevant references; to develop critical thinking; and to build professional relationships and stronger networks among others.

Amb. Al. Haj. Prof. Badru Dungu Kateregga,

FOUNDING VICE CHANCELLOR

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Effect of NPK Fertilizer application on Productivity of selected Cassava varieties grown on a Ferralsol in Uganda

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Abstract

The study assessed the effect NPK (17:17:17) fertilizer on the growth and fresh tuber yields of two cassava (Manihot esculenta Crantz) varieties, namely NAROCASS 1 and NASE 14 grown on a Ferralsol in Uganda. A Field experiment was conducted in a randomized complete block design arranged as a split-plot with three replications during the first and second rains of 2015. Cassava varieties were assigned as main plot, while NPK fertilizer rates (zero as the control, 200, 400 and 600 kg/ha) were assigned as sub-plots. The fertilizer was applied in two splits at planting and four months after planting. Application of NPK fertilizer significantly ($P<0.05$) increased the cassava stem heights up to first branching, plant heights at harvest and the number of stems per plant when compared with the control. Application rate of 400 kg/ha increased ($P<0.05$) the tuber length, number of tubers per plant and fresh tuber yield when compared with the control. The NPK rate of 400 kg/ha significantly ($P<0.05$) increased the tuber girth of NASE 14, but not ($P>0.05$) that of NAROCASS 1. Therefore, to achieve optimum tuber yield potentials of newly developed cassava varieties, farmers will have to integrate soil fertility management through NPK fertilizer application at 400 kg/ha into already existing improved management practices such as use of high-quality planting materials of improved varieties and integrated pest, disease and weed management.

Key words: Cassava, NAROCASS 1, NASE 14, NPK fertilizer, Ferralsol, tuber weight, tuber yield

1. Introduction

Cassava (*Manihot esculenta* Crantz) is a perennial crop that is mainly grown for its tuberous roots which mainly provide carbohydrates to humans and livestock (El-Sharkawy, 2004). It is the sixth world food crop for more than 500 million people in tropical and sub-tropical regions of the world. Depending on the cultivar and growing conditions, the tubers can be harvested between six and 24 months after planting [MAP] (El-Sharkawy, 1993). The tubers can be left to stay in the ground for a long period of time without deteriorating, which makes cassava a food security crop against famine in developing countries (El-Sharkawy, 2004).

Cassava grows well in over 80% of the arable land in Uganda, and the production volumes per region in the 2008/2009 fiscal year were 37% for the eastern, 34% for northern, 15% western and 14% for central (Buyinza and Kitinoja, 2018). It is one of the most important staple foods for many people, and is consumed by about 90% of the people in different forms. It is mainly consumed either boiled, fried, or roasted when fresh, and in form of a paste obtained after mingling cassava flour either alone or mixed with millet (Buyinza and Kitinoja, 2018).

The production of cassava has been gradually increasing over the years due to the rising demand for it as source of human food, livestock feed and industrial uses such as bakery, and beverage, industrial alcohol and paperboard manufacturing (Graffham, Guotao, Kleih, Alacho, Okello, & Akullu, 2017; FAO, 2013). In Uganda and Kenya, cassava has the potential of becoming an important part of the solution

to improving household incomes as it is marketed by a large proportion of households (Fermont, Babirye, Obiero, Abele, & Giller, 2010a), and food security at local level (Graffham *et al*., 2017). But for many years, cassava has been regarded as a subsistence crop mainly grown by low-income households for home consumption, although a study conducted by Fermont *et al*. (2010a) revealed that in Uganda wealthier households planted cassava on larger acreages and earned more income from cassava than poorer households. In Uganda, because of its significant contribution to household food security and incomes, and its industrial purposes as well as adaptation to climate change, cassava is proving to be one of the crops that are positively impacting the economic and industrial development of the country (Graffham *et al*., 2017; FAO, 2013).

Despite its rising importance, cassava tuber yields in Uganda are still low when compared with the projected yield potentials of 75-90 MT/ha (Landell Mills, 2017; Fermont, van Asten, Tittonell, van Wijk, & Giller, 2009). Some of the reasons for low yields include planting of low yielding varieties, poor agronomic practices, soil infertility, damage by pests and diseases, and unfavourable climatic conditions especially drought (Nakabonge, Samukoya, & Baguma, 2018; Kawuki, Kaweesi, Esuma, Pariyo, Kayondo, Ozimati, & Baguma, 2016; Fermont, Tittonell, Baguma, Ntawuruhunga, & Giller, 2010b; El-Sharkawy, 2004; Howeler, 2002). Majority of farmers use planting materials from their own farms, fellow farmers and relatives, and they rarely apply fertilizers and agro-chemicals (Graffham *et al*., 2017).

In Uganda however, to address some of these constraints, improved cassava varieties have been developed and released over the years, and are increasingly being grown by farmers (Graffham *et al*., 2017; Abele, Twine, Ntawuruhunga, Baguma, Kanobe, & Bua, 2008). In areas where improved varieties that are tolerant to drought and resistant to pests and diseases have been introduced, yields have tremendously increased (Legg, Owor, Sseruwagi, & Ndunguru, 2006). It is envisaged that the productivity of cassava could further be enhanced if farmers apply fertilizers (CABI, 2017; FAO, 2013). But there is limited information on the response of improved cassava varieties to inorganic fertilizers. There has been a general belief that cassava can perform well in poor soils without fertilizer application, and for that matter farmers have been growing it as the last crop where crop rotation is practiced (Byju and Suja, 2020; Fermont *et al*., 2010a). This study, therefore, was undertaken to determine the production potential of newly released cassava varieties when supplied with NPK fertilizer. Higher cassava yields are expected to improve the livelihoods of farmers' households, and to contribute to national economic development.

2. Methods

2.1. Study site and land preparation

The study was conducted during the first and second rainy seasons of 2015 at the farm of Kyambogo University located at an altitude of 1189 m above sea level, at coordinates 0°20'54" N and 32°37'49" E (Latitude 0.348 and Longitude 32.630).

(https://en.wikipedia.org/wiki/Kyambogo). To assess status of soil at the experimental site prior planting, soil samples were randomly collected from the top 15 cm of the soil, air-dried, crushed, sieved using a 2 mm sieve and analysed for chemical and physical properties according to Okalebo, Gathua & Woomer (2002). Analytical results showed that the soil was sandy loam (sand 71.0%, silt 12% and clay 19%) with a pH 6.8, organic carbon 2.27%, total nitrogen 0.12%, available phosphorus 4.96%, and exchangeable potassium 0.38 cmol/kg.

The land was ploughed twice. First and second land preparation was done at two weeks' interval to improve soil structure, reduce weeds, facilitate organic matter decomposition and enhance the circulation of soil air so as to optimize plant growth. The land was then divided into blocks and plots.

2.2. Test materials and experimental design

Cassava cuttings (stakes) of NASE 14 and NAROCASS 1 varieties for planting were obtained from the National Crop Resources Research Institute (NaCRRI), Namulonge, and they were 13 months old. These varieties were selected for the study because they were among the newly developed and released varieties, and are predominantly grown by farmers in Uganda (Buyinza and Kitinoja, 2018). They are quick maturing as they can be harvested at 8 to 10 months after planting, are resistant to cassava mosaic disease and cassava brown streak disease, and both have high tuber yield potentials averaging 30 - 35 MT/ha (Mukiibi, Alicai, Kawuki, Okao-Okuja, Tairo, Sseruwagi, Ndunguru,

& Ateka, 2019; Buyinza and Kitinoja, 2018). NASE 14 was released in 2011 while NAROCASS 1 was released in 2015. The cuttings were 25 - 30 cm long with about 5 - 9 buds, and were planted horizontally in rectangular holes spaced 1 x 1 m.

Randomized complete block design set as a split-plot arrangement with three replications was used. The cassava varieties formed the main plots and NPK fertilizer rates formed the sub-plot treatments. Sub-plot size was 4 × 5 m with a total of 12 cassava plants per plot. Two metre and one metre paths were left between replicates and sub-plots, respectively.

The treatments consisted of four levels of NPK fertilizer and these were zero or no fertilizer applied (the control), 200, 400 and 600 kg/ha. The fertilizer was split applied in two doses at 4 and at 16 weeks after planting (CABI, 2017). The quantity of fertilizer applied per plant was calculated as rate of fertilizer application per hectare in grams divided by the land area of a hectare in square metres. The fertilizer was placed at a distance of 10-15 cm from the stem in the drill holes to reduce fertilizer loss through run-off. During second application, the fertilizer was placed in a semi-circular furrow about 3-5 cm deep and 20 cm away from the base of the plant and covered (CABI, 2017). Weeding was done four times by hand pulling to avoid cutting the cassava roots and interfering with fertilizer nutrient uptake.

2.3. Data collection and analysis

Parameters that were measured include cassava stem heights up to first branching and plant heights at harvest, number of cassava stems per

plant, number of tubers per plant, tuber girth, lengths of fresh tubers, fresh tuber weight per plant, and tuber yield per plot. These measurements were taken from four randomly selected plants from the middle rows of each plot. Cassava stem heights up to first branching were taken from the bases of plants at soil level to the point of first branch with a measuring tape. The plant heights at harvest were taken from these same plants 11 MAP. The height of each plant was taken with a measuring tape from the base of the plant at soil level to the tip of the tallest branch. Number of stems per plant of the selected plants was determined by counting. Number of tubers per plant was determined by counting the tubers that were big enough to be consumed or marketed. Tuber girth was determined by measuring the circumference of the mid region of each tuber using thread, and later transferring the thread to the metre rule to determine the circumference. The length of each tuber was taken using a measuring tape. Fresh tuber weight per plant was determined by weighing the tubers using a weighing scale. Total tuber yield per plot was determined by harvesting all the tubers from each plot, weighing them in kilograms, and then converting the weight into metric tons per hectare (MT/ha). All the data were subjected to the analysis of variance using Genstat Statistical Package (Version 12). Treatment means were compared using the Least Significant Difference (LSD) at 5% level of significance.

3. Results and discussion

3.1. Effect of NPK fertilizer on the growth characteristics of cassava

3.1.1. Cassava stem heights

Significant differences (P<0.05) in cassava plant heights at branching and at harvest due to fertilizer treatments were observed (Table 1). However, the interaction effect of NPK fertilizer application and cassava varieties was non-significant. Stem heights up to branching gradually increased as fertilizer levels increased for both cassava varieties (Table 1). Overall, cassava heights were significantly (P<0.05) higher for the fertilizer treatments when compared with the control. But increasing the fertilizer levels from 400 to 600 kg/ha did not (P>0.05) significantly increase the stem heights for both varieties (Table 1).

Table 1: Effect of NPK fertilizer on cassava stem heights up to first branching, plant heights at harvest and number of stems per plant

NPK application rates (kg/ha)	Stem heights up to branching		Plant heights at harvest		Number of stems per plant	
	NARO CASS I	NASE 14	NAROC ASS I	NASE 14	NAROC ASS I	NASE 14
0 (Control)	64.98[a]	54.22[a]	142.50[a]	130.60[a]	1.90[a]	1.90[a]
200	99.88[b]	89.53[b]	193.90[b]	152.90[ab]	3.10[b]	3.33[b]
400	103.90[b]	94.30[b]	200.30[b]	168.50[ab]	3.07[b]	3.07[b]
600	106.53[b]	101.73[b]	212.10[b]	190.90[b]	3.13[b]	3.27[b]
Mean	**93.82**	**84.95**	**187.20**	**160.73**	**2.80**	**2.89**
F-Prob.	**<.001**		**<.001**		**<.001**	
LSD (0.05)	**12.28**		**40.59**		**0.78**	

[abc]=Means within a column having similar superscripts are not significantly (P>0.05) different.

A similar trend in plant heights was observed at harvest in NAROCASS 1, where plants that received fertilizer treatments were taller ($P<0.05$) than those from the control (Table 1). But there were no significant ($P>0.05$) increases in heights as the fertilizer rates increased from 200 to 600 kg/ha for NAROCASS 1. In contrast for NASE 14, the heights of plants from treatments that received 200 and 400 kg/ha of NPK were not significantly ($P>0.05$) different from those of the control (Table 1). But the increase in the fertilizer rate to 600 kg/ha resulted in a significant ($P<0.05$) increase in plant height when compared with the control.

The increase in stem heights at branching and at harvest in the treatments that received NPK fertilizer could be attributed to the availability of nutrients that were partitioned to stem growth. Similar findings were reported by Munyahali, Pypers, Swennen, Walangululu, Vanlauwe, & Merckx (2017) who observed a significant ($P<0.05$) increases of both cassava stem height and diameter as a result of NPK application. It's also important to note that the branching behavior of cassava stems varies widely among varieties ranging from zero to about four branches per branching point (Tan and Cock, 1979) and planting density. The branching in cassava is important because it leads to formation of the typical canopy which in turn determines total biological productivity as well as economic yield (El-Sharkawy, 2004).

3.1.2 Number of cassava stems per plant

For both cassava varieties, the application of NPK fertilizer resulted in significant ($P<0.05$) increases in the number of stems when

compared with the control. But the number of stems did not significantly (P>0.05) increase as the fertilizer levels were increased (Table 1). These observations are in line with the findings of Pellet and El-Sharkawy (1997) and Howeler and Cadavid (1990) who demonstrated that application of high levels of inorganic fertilizer leads to an increase in the vegetative growth of cassava.

3.2 Effect of NPK fertilizer on the yield performance of cassava

3.2.1 Number of tubers per plant

The application of NPK fertilizer significantly (P<0.05) increased the numbers of cassava tubers per plant when compared with the control (Table 2). The interaction between NPK fertilizer and cassava varieties was also significant. Numbers of tubers per plant for both cassava varieties significantly (P<0.05) increased with the increase in NPK fertilizer rates up to 400 kg/ha, and thereafter, the numbers of tubers per plant decreased (P<0.05) when NPK rate was increased to 600 kg/ha (Table 2).

These results, therefore, have shown that NPK fertilizer application had a positive effect on the number of tubers for newly developed cassava varieties, particularly NAROCASS 1 and NASE 14. Similar responses of cassava to fertilizer application have been reported by Howeler (2012), Fermont *et al.* (2009) and Issaka, Buri, Asare, Senayah, & Essien (2007). Application of NPK fertilizer increased the available phosphorus (P), which is required for tuber formation in tuberous crops (Issaka *et al.*, 2007). But Howeler (2012) reported that cassava is tolerant to low P concentrations in soil solution due to its

ability to form a symbiotic association with soil fungi called vesicular-arbuscular mycorrhizae that help its roots absorb P and micronutrients.

Conversely, the observed reduction in the number of tubers per plant after increasing NPK levels to 600 kg/ha is likely due to oversupply of nitrogen (N) that resulted in vegetative growth at the expense of tuber development (Howeler, 2002). Howeler (2002) further reported that high N applications can reduce the starch content and increase the hydrogen cyanide content of the tubers.

3.2.2 Lengths of fresh cassava tubers

There were significant differences ($P<0.05$) in the lengths of cassava tubers amongst the treatments (Table 2). But the interaction between NPK fertilizer and cassava varieties was not non-significant. The application of 200 kg/ha of fertilizer significantly ($P<0.05$) increased the tuber lengths for both varieties as compared with the control (Table 2). But the increase in NPK levels from 200 to 600 kg/ha did not ($P>0.05$) cause significant changes in tuber lengths (Table 2). Perhaps, the observed increase in tuber length following fertilizer application could have resulted from increased availability of nutrients required for physiological activities like promoting photosynthetic activity, and tuber formation and development (Hasanuzzaman, Bhuyan, Nahar, Hossain, Mahmud, Hossen, Masud, Moumita, & Fujita, 2018; El-Sharkawy, 2004).

3.2.3 Tuber girth and fresh tuber weight per plant

Significant differences ($P<0.05$) were registered in the tuber girths amongst the treatments for both varieties, as well as in the interaction

between NPK fertilizer and cassava varieties (Table 2). For both cassava varieties, the application of NPK fertilizer significantly ($P<0.05$) increased the tuber girth compared to the control (Table 2). The incremental addition of NPK up to 400 kg/ha significantly ($P<0.05$) increased the tuber girth for NASE 14, but not for NAROCASS 1. But the tuber girth for NASE 14 declined when the NPK application rate was increased to 600 kg/ha (Table 2).

Similarly, the fresh tuber weights for both cassava varieties were significantly ($P<0.05$) increased by fertilizer application when compared with the control (Table 2). But the interaction between the fertilizer and cassava varieties was non-significant. Overall, the variations in fresh tuber weights followed a similar trend as the tuber girths.

Larger tuber girths and weights of the fertilizer-treated cassava plants could be due to increased supply of N, P and K which were used in the overall plant growth, specifically tuber bulking (Howeler, 1998). Increased tuber girths and weights could also be linked to well-developed photosynthetic surfaces and increased physiological activities that resulted in the production and translocation of more assimilates to the tubers (Hasanuzzaman *et al*., 2018; El-Sharkawy, 2006).

Table 2a: Effect of NPK fertilizer on the yield of cassava tubers (Cassava varieties)

NPK levels (kg/ha)	NAROCASS 1				
	TN	TL (cm)	TG (cm)	TW (kg)	TY (MT/ha)
0 (Control)	10.07[a]	19.98[a]	8.63[a]	9.40[a]	23.33[a]
200	25.73[b]	40.03[b]	16.95[b]	12.00[b]	32.92[b]
400	29.20[c]	42.75[b]	20.35[b]	13.40[b]	35.75[b]
600	26.97[b]	41.60[b]	18.67[b]	11.92[b]	33.75[b]
F-Prob.	<.001	<.001	<.001	<.001	<.001
Mean	19.55	34.31	17.13	11.57	30.33
LSD$_{(0.05)}$	1.85	7.10	4.75	1.84	5.47

[abc]=Means within a column having similar superscripts are not significantly (P>0.05) different. TN= Number of tubers per plant, TL= Tuber length, TG = Tuber girth, TW = Tuber weight, TY= Tuber yield

Table 2b: Effect of NPK fertilizer on the yield of cassava tubers (Cassava varieties)

NPK levels (kg/ha)	NASE 14				
	TN	TL (cm)	TG (cm)	TW (kg)	TY (MT/ha)
0 (Control)	9.28[a]	15.27[a]	10.42[a]	8.90[a]	22.25[a]
200	16.73[b]	35.80[b]	17.00[b]	11.03[b]	30.58[b]
400	20.83[c]	41.53[b]	24.13[c]	13.37[c]	34.38[b]
600	17.60[b]	37.53[b]	20.87[bc]	12.53[bc]	33.72[b]
F-Prob.					
Mean					
LSD$_{(0.05)}$					

[abc]=Means within a column having similar superscripts are not significantly (P>0.05) different. TN= Number of tubers per plant, TL= Tuber length, TG = Tuber girth, TW = Tuber weight, TY= Tuber yield

3.2.4 Cassava tuber yields

The NPK fertilizer significantly (P<0.05) increased the fresh cassava tuber yields as compared to the control for both varieties (Table 2). The interaction between the fertilizer and cassava varieties was also significant. However, in both varieties, increasing NPK application rates from 200 to 600 kg/ha did not (P>0.05) affect the cassava tuber yields (Table 2a and b).

The significant increase in the tuber yields is certainly because the fertilizer provided the nutrients, especially N and K for the production of assimilates needed for root formation, and for increasing the photosynthetic capacity of the leaf area which provided photosynthates for tuber bulking. The increase in tuber yield resulting from NPK application could be associated with the significant increases in the number of tubers per plant, tuber length and girth, and tuber weight per plant. Some researchers notably Munyahali *et al*. (2017), Fermont *et al*. (2010b) and Wilson and Ovid (1994) have also reported yield responses of cassava to NPK fertilizer. It has also been observed that when grown under favourable field conditions with high solar radiation and optimum leaf temperature (30–35 ^{o}C), cassava performs equally well as other staple food crops in the tropics, with cassava having the greatest potential for energy production except for sugarcane (El-Sharkawy, 1993). This potential for energy production is attributed to cassava's high net photosynthetic rates that can be as high as 40 - 50 μmol CO_2 m^{-2} s^{-1} under optimal conditions (El-Sharkawy, De Tafur, & Cadavid, 1992; El-Sharkawy and Cock, 1990). Although cassava is typically a C3 plant, it has high capacity to assimilate carbon in near optimum environments that correlates with both biological productivity and tuber yield (El-Sharkawy, 2006). Cassava leaves possess elevated activities of the C4 phosphoenolpyruvate carboxylase that also correlate with leaf net photosynthetic rate in field-grown plants.

However, the observed negative response in tuber yield following high rates of NPK application (600 kg/ha) could be due to diversion of photosynthates to vegetative development than to tuber formation and

bulking. Same reason could be responsible for the decline in almost all the yield components, particularly the number of cassava tubers per plant at high NPK application rate. Similar results were reported by Fermont (2009) and Howeler (2002) who observed increased vegetative growth with consequent reduction in root growth and yield at high fertilizer rates.

4. Conclusions and Recommendations

Whereas there has been a general belief that cassava can perform well on infertile soils, the crop responds highly to fertilizer application. The application of up to 400 kg/ha of NPK (17:17:17) fertilizer to the newly released cassava varieties increases the tuber numbers per plant, tuber length and girth, and consequently the fresh tuber yield. Therefore, to achieve optimum cassava tuber yield potentials of newly developed cassava varieties, farmers will have to integrate soil fertility management through NPK fertilizer application into already existing improved management practices, such as the use of high-quality planting materials of improved varieties and integrated pest, disease and weed management.

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Factors contributing to obesity among in-school adolescents in the urban district of Zanzibar, The United Republic of Tanzania

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Abstract

Excessive body weight notably, overweight and obesity is in itself a non-communicable condition and also associated with several co-morbidities including type 2 diabetes, Coronary Heart Disease, Hypertension, snoring or obstructive sleep apnea, and cancers. It is a worldwide problem that is on the increase in low and middle-income countries (LMICs) particularly in Sub-Sahara African (SSA) countries. There is need to document its magnitude and alert governments and communities to implement prevention and mitigation measures. Hence this study was conducted to measure the prevalence of overweight and obesity, and factors that contribute to obesity among in-school adolescents in the Urban district of Zanzibar, United Republic of Tanzania. A cross sectional descriptive study was conducted among in-school adolescents (13-19) living in the Urban district of Zanzibar. A random sample of 500 (227 male and 273 female) secondary school students was studied using anthropometric measurements of Weight and height of students. Body-Mass-Index (BMI) was then computed as Weight in Kgs divided by square of height in meters (Kg/M^2). The study shows that (210/500) 42% were overweight or obese (BMI 25 and above) and 57/500 (11.4%) were underweight. Factors closely associated with overweight and obesity included high calorie intake including a lot of protein/fat intake, and physical inactivity, and inadequate knowledge about NCDs and their risk factors. Conclusively, Overweight and obesity is a big problem which is on the increase in Zanzibar, Republic of Tanzania. Action is needed now than later. The study recommended that health education targeting behavior change and healthy lifestyles should be conducted early in schools and at community level, physical activity should be

mandatory in schools and integrated in training curriculum, legal framework should be worked out on fast food marketing and feeding school children, and Republic of Tanzania should implement the recommendations of the WHO Commission on Ending Childhood Obesity (2016).

Keywords: In-school adolescents, overweight, obesity, Zanzibar

1. Introduction

Overweight and obesity are some of the commonest non-communicable conditions and at the same time the commonest modifiable risk factors associated with several other non-communicable diseases (NCDs) including type 2 diabetes, Coronary Heart Disease, Hypertension and cancers. Obesity is the commonest non-communicable pandemic that increasing very fast among young people, in Low- and middle-income countries (LMICs) particularly in sub-Sahara Africa (SSA). Close to 41 million (74.5%) of the 55 million global deaths in 2019 were attributed to NCDs annually, and 86% of all premature deaths before age 70 years due to NCDs deaths occur in LMICs (WHO-GHO). Prevalence of obesity among children and adolescents has risen from 4% in 1975 to over 18% in 2016 globally (WHO Factsheet September 2022). Non-communicable diseases are likely to become a major public health problem in SSA as they are predicted to become the leading cause of death in the region by 2030 (Ankita Manghani *et. al*, 2021). Once considered a problem of high-income countries, childhood and adolescent overweight and obesity are on the rise in LMICs particularly in urban settings that are currently faced with physical activity and nutrition transition, which have led to overconsumption of energy-dense foods with reduced

participation in physical activity (Ismail *et. al*, 2016). Previous studies in Tanzania have reported high prevalence rates of excess Body weight (EBW) at 23% among school adolescents in urban areas of Dar es Salaam, Moshi and Arusha (Ismail *et.al*, 2016, Anna Tengia *et. al*, 2020).

Unguja, the main island of Zanzibar is by all definitions an urban community, positioned in the East African Coast, an active arc of trade and tourism. The community is likely to be experiencing all factors of globalization, demographic transition, nutrition transition and therefore epidemic transition characterized by leading NCDs and their risk factors including EBW. However, information regarding EBW phenomenon among adolescents and school age children in Zanzibar, in the recent past decades is scarce. This study was conducted, in July-August 2022 to measure prevalence of overweight and obesity, and factors that contribute to obesity including lack of knowledge about risk factors among in-school adolescents in the Urban district of Zanzibar. The findings serve to alert governments and communities to implement prevention and mitigation measures.

2. Methods

This was a cross-sectional study conducted among secondary school children in the Urban district on Unguja main island of Zanzibar. A random sample of 500 (273 female and 227 male) students from 10 out of 22 secondary schools were studies studied. Both schools and students were selected using lottery simple random sampling method. During the selection, in each class the male and female students were

separated and the selection using lottery method conducted. At the end, both male and female students made up the desired number of 50 students from the school. Ten schools provided the needed sample of 500 participants.

Data collection was done during July-August 2022 when the schools in Zanzibar were open. Before data collection, the researcher visited schools, briefed the school management, and requested their support to get the study done. The students were briefed and given letters to take to their parents to provide informed consent allowing their sons and daughters to participate in the study. Majority of students returned the dully endorsed letters allowing the students to participate in the study.

The study used a self-administered questionnaire which was filled by the selected students. The variables included demographics and health-related life style habits focusing on risks and protective factors for NCDs particularly excess body Weight-Overweight and obesity. The demographic variables included in the analysis were Sex (M/F), age (13, 14, 15, 16, 17, 18, and 19), Education level (S1, S2, S3, and S4); protective factors included consumption of fruits, greens and vegetables/lentils, and physical activity; diet-related risk factors included consumption of meals with excess proteins and fat such as red meat, poultry meat, fish, eating excess sugary meals and sugary drinks. These were quantified in terms of frequency within the past 7 days whereby they were categorized as low if less than 2, high if more than 2. The greater the number of frequencies of the meals, the higher the risk exposure. Level of physical inactivity was defined by "get lifts

to and from the school; watch TV for more than 1 hour daily; use internet for more than 1 hour daily"; whereas, active students were perceived as "walk or ride bicycle to school; do not watch TV or watch it for less than 1 hour daily; do not use internet or use it for less than 1 hour daily"

Finally, nutrition status was assessed using Body Mass Index (BMI). The students' weight was taken using a standard weight-height machine which can be used to capture both weight and height of the subject. The weight and height were converted to BMI (Kg/M^2). The participants were classified as: Underweight, BMI of <18; Normal weight, BMI of 18-24.9; Overweight, BMI of 25-29.9; Obese, BMI 30 and above (WHO-Expert Committee report on BMI 1993). Data was analyzed using Excel spreadsheet and STATA software. The results are presented as absolute and relative frequency displayed with their p-values.

3. Results

3.1. Social-demographic factors

A total of 500 respondents participated in the study, 227 male and 273 female, contributing 45.5% and 54.5% respectively; with an average age of 15 years.

Table 1: Demographic Characteristics of Respondents

Gender	Male n=227(%)	Female n=273 (%)	Total n=500
Age			
13	38(16.7)	62(22.7)	100(20.0)
14	50(22.0)	36(13.2)	86(17.2)
15	37(16.3)	69(25.3)	106(21.2)
16	41(18.1)	61(22.3)	102(20.4)
17	23(10.1)	45(16.5)	68(13.6)
18	35(15.4)	0(0.0)	35(7.0)
19	3(1.3)	0(0.0)	3(0.6)
Education			
S1	44(19.4)	63(23.1)	107(21.4)
S2	76(33.5)	61(22.3)	137(27.4)
S3	35(15.4)	71(26.0)	106(21.2)
S4	72(31.7)	78(28.6)	150(30)

Source: Primary Data, 2022

Overall, 42% had excessive body weight (EBW) 28% overweight and 14% obese, 11.8% of the students were underweight, and 46.2% 41.2% had normal BMI. The females were more obese or overweight (51.3%) compared to male students (31.4%). There were more obese students among those who get lift to and from the school 60.3% (70/116) than those who walk or ride to school 36.5% (140/384) p = 0.001. Students who watch TV daily for more than 1 hour were more obese 50.6% (114/225) compared to those who do not watch TV or watch TV for less than 1 hour 35% (96/275). This result was significant at p =0.001. Similarly, student who reported engaging in internet for more than 1 hour daily were more likely to be overweight 60% (66/110) than students who did not engage in internet or spent less than 1 hour 31% (121/390). This result was significant at p = 0.001. With regard to dietary factors, students who reported eating 3

or more meals a day were more likely to be overweight or obese 43.5% (185/455) compared to those who reported eating 2 or less meals per day 29.6% (21/91). Students who reported eating 2 or more meals servings with red meat/fish/poultry/sausage were more likely to be overweight then those who had less than 2 meals served with red meat/fish/poultry/sausage. Students who reported consuming sugarier meals and drinks were more likely to be overweight or obese 52.7% (117/222) compared to those who reported eating less sugary meals and drinks 33.5% (93/278), drinking tea with sugar 51% (203/416) compared to tea without sugar 8% (7/84). These are summarized in table 2.

Among the 210 students who had excess body weight (BMI $\geq$ 25), 44.3% reported mummy was overweight, 0% daddy was overweight, 25% reported some siblings were overweight, and 12% had no family history of overweight.

Regarding knowledge, about NCDs and risk factors, overall, the study findings shows mixed findings, where by only 49% of the children were able to correctly name NCDs, but 62.8% of the student knew that physical inactivity, excess sugar, excess salt and excess fats are main risk factors of NCDs; 57.0% of the students knew that fast foods, chips, chocolate, cake, sweet are example of unhealthy foods; and 61.6% of the student knew that eating junk foods, physical inactivity, long hours on TV/computer and sugary drinks are associated with obesity.

Table 2: Prevalence of Overweight/Obesity and associated factors

Variable	Total n=500	BMI				P-value
		<18	18-24.9	25-29.9	≥30	
Gender						0.001
Male		32 (14)	124 (54.6)	32 (14)	39 (17.2)	
Female Total		27 (9.8) 59 (11.8)	107 (39.2) 231 46.2)	108 (39.6) 140 (28)	31 (11.4) 70 (14)	
Age						0.001
13	100	12	29	28	31	
14	86	1	36	20	29	
15	106	10	38	53	5	
16	102	18	61	23	0	
17	68	9	47	12	0	
18	35	9	19	2	5	
19	3	0	1	2	0	
Travel to school means						0.001
Walk or ride to school	384(76.8)	45 (11.7)	199 (51.8)	108 (28.1)	32 (8.3)	
Get lift to and fro School	116(23.2)	14 (12)	32 (28)	32 (28)	38 (32.8)	
Time spent on TV						0.001
Don't watch TV	134	21	73	15	25	
< 1 hour	141	27	58	46	10	
1-3 hours	78	6	24	26	22	
>3 hours	147	5	76	53	13	
Time spent on internet						0.000
Not involved in internet	253	42	143	51	17	
Once a week	52	4	17	21	10	
<1 hour daily	85	9	31	12	33	
1-3 hours daily	53	0	36	12	5	
>3 hours daily	57	4	4	44	5	
Type of physical exercise						0.001
Don't play any game	28	4	16	8	0	

Play indoor games	39	0	12	27	0	
Play football/netball	117	30	54	0	33	
Involved in sports	61	0	18	38	5	
Involved in other games	255	25	131	67	32	
Number of meals eaten per day						0.052
≥3 meals	425	46	194	125	60	
2 meals	71	13	37	11	10	
Meals with red meat past 7 days						0.001
≤1	138	27	79	17	15	
2-4 meals	216	24	92	60	40	
≥5 meals	146	8	60	63	15	
Meals with sausages past 7 days						0.001
1-4 meals	377	48	163	101	65	
≥5 meals	123	11	68	39	5	
Number of meals with poultry meat						0.000
1-4 meals	430	49	221	115	45	
≥5 meals	70	10	10	25	25	
Number of meals with fish						0.000
≤4 meals	134	14	58	57	5	
≥5 meals	366	45	173	83	65	
Times consume sugary items						0.000
≤1	21	1	18	2	0	
1-4 meals	257	39	127	54	37	
≥5 meals	222	19	126	84	33	
Type of staple food served						
Rice, posho, millet, sweet potatoes	117	21	51	40	5	
Sorghum, bread, cassava, yams	197	17	87	53	40	
Chapatti pasta, Irish potatoes	107	21	34	32	20	
Pumpkin, carrots, banana, macaroni	79	0	59	15	5	
Commonly served vegetables						0.001
Dodo, spinach, Sukuma wiki	93	12	63	8	10	

Cabbage, beans, peas	227	29	74	72	52	
Lentils, nuts, tembele	143	18	81	39	5	
None served	37	0	13	21	3	
Fruits consumed past 7 days						0.000
Ripe mango, pawpaw	121	16	70	32	3	
Passion fruits, jackfruit, oranges	193	33	96	24	40	
Pineapples, ripe banana	124	10	44	60	10	
Watermelon, apple, grapes	62	0	21	24	17	
Times taken tea/coffee with sugar						0.001
Don't take tea/coffee with sugar	84	14	63	7	0	
1-2 times	375	37	142	126	70	
3-5 times	33	8	18	7	0	
≥6 times	8	0	8	0	0	
Add salt to meals served at table						0.001
Never add	194	8	53	75	58	
Yes, at times	282	51	165	63	3	
Yes, almost always	24	0	13	2	9	

Source: Primary Data, 2022

Table 3: BMI by Family history of overweight/obesity among students

Family relative status	Yes	No	Total
Father has/had excess weight	0	210	210
Mother has/had excess weight	93 (44.3%)	117	210
Some siblings have had excess weight	53 (25.2%)	157	210

Source: Primary Data, 2022

4. Discussion

Excessive body weight manifested as Overweight and obesity is often the result of taking in more calories than the body needs to use. It may be

because of eating too much and failure to spend the energy taken in due to sedentary lifestyle. The body converts surplus energy into body fats.

The body fats are divided into two: essential and non-essential fats. The essential fats are crucial for the normal body function such as providing warmth and carrying out metabolic functions. Essential fats make up 3% and 12% of total body weight in Males and females respectively (Insel and Roth, 2002). Non-essential fats exist within the adipose tissues located below the skin and around major organs like the gut, heart, kidney etc. Adiposity of non-essential fats results from a long-term energy surplus in the body where energy intake exceeds energy expenditure. Excess non-essential fat in the body is what causes overweight and obesity. Various factors lead to accumulation of excess fat including genetic or familial factors, lack of knowledge, environmental factors, medications, and above all dietary and sedentary lifestyles (O'dea, 2003; Armar-Klemesu, et, al.,2000).

The findings show that 500 students had a mean age of 15 years, 55.5% (273) were females and 45.5% (227) were male. Forty-two percent 42% (210/500) had excessive weight, 28% 140/500) were pre-obese or overweight, 14% (70/500) were obese. This rate is similar or slightly higher than findings in studies reported previously in Tanzania (Haji Chombo et. Al, 2019; Anna Tengia-Kessy and Jackline NarcisKilenga, 2020, and Ismail N. Pangani et. al, 2016, Alfa J. Muhihi et al, 2012).

Physical Inactivity

Sedentary lifestyle or inactive lifestyle is a lifestyle with a lot of sitting and lying down, with very little or no exercise. The findings of this study indicate that sedentary life (66.6%) was significantly associated with overweight or obesity among in school adolescents. Students with limited time for physical activities particularly those spending more time watching TV, computer and internet, travelling to and from school using private transport such as family cars and school buses instead of walking or riding bicycles to and from the school were more vulnerable to overweight and obesity. These findings agree with studies conducted elsewhere (Pangrazi 1995, Kai-ming 1998, Mazengo et al,1997). Advanced technology in the world has replaced the active physical activities that children were previously engaging in, instead they engage in computer-based activities and games which make them expend minimal amount of energy while energy consumption level has increased (Ismail N. Pangani et.al, 2016). Involvement in physical activities is very important factor in the balance of the energy intake and expenditure in the body (Position paper of the Council on Physical Education for Children -COPEC, 1998). This means that involvement in simple exercises such as walking or riding bicycles to and from schools or workplace are of great value for better body health of individuals particularly school age adolescents.

Diet lifestyles

The food consumed by the children at their home and schools was found to be another determinant for overweight and obesity among in-school

adolescents. It was found that most of the students ate 3 main meals per day but most of these meals had plenty of oils and fat and protein content, meals with plenty of red meat, sausage, poultry meat, fish and sugary items, as well as sugary items like chocolate, chapati, macaroni, sausage and bread. These were found to be the significant factors associated with overweight and obese among the children. These findings are in agreement with previous studies conducted elsewhere which found that children who were feeding on modern foods including canned and packed foods or diet lacking in fibers and antioxidants, but rich in processed foods loaded with added fats and sugars were more vulnerable to overweight and obesity than those who were receiving healthy diets (Pangrazi, 1995). Regarding the protective aspect of fruits and vegetable, unfortunately, the findings of this study indicate a positive relationship between eating fruits and vegetables and BMI. This might be explained by limitations in data collection and analysis. However, previous studies have also reported a positive relationship between vegetable and fruit consumption and BMI among Zanzabaris (Amelie Keller 2012).

The findings indicate gender difference in with females were more obese or overweight (51.3%) compared to male students (31.4%). These findings agree with previous studies conducted elsewhere in Tanzania (Amellie Keller 2012, Anna Tengia-Kessy and Jackline NarcisKilenga, 2020, and Ismail N. Pangani et. al, 2016, Alfa J. Muhihi et al, 2012). Gender differences may be explained possibly by genetic and environmental and cultural factors, gender disparities due to food consumption preferences with women consuming more sugar laden foods and drinks than men, more

physical inactivity among women than men, and some cultural values that favour larger body sizes among women as a sign of beauty and comfort, fertility and healthfulness. (Rebecca Kanter and Benjamin Caballero, 2012). More research is still needed in this area.

Knowledge of NCDs and Risk factors

Findings revealed that 51% to 62.8% of the children did not have enough knowledge about NCDs and their risk factors. This lack of knowledge further compounded their physical inactivity and poor eating lifestyles which are main factors in the causation of overweight and obesity.

5. Conclusions and Recommendations

The study investigated the prevalence and factors contributing to obesity among in-school adolescents in the Urban district of Zanzibar, Republic of Tanzania. Overall, Overweight and obesity is a big problem in the Urban district of Zanzibar with 42% of the students found to have excessive body weight: 28% overweight and 14% obese. Overweight and Obesity among in-school adolescents is closely linked to physical inactivity, poor or unhealthy diets, and inadequate knowledge about NCDs. Urgent action is needed now than yesterday to mitigate this unhealthy phenomenon.

1. In view of the significant findings of this study, Health education targeting lifestyle behavior change should be conducted early in schools and at community level. This should be coupled with weight management programs in schools and communities to enable families and individuals to check their weights, physical

activities, and health education about healthy diets. This plan will help to reduce intake of junk foods and lower calorie diet.

2. Physical activity should be mandatory and integrated in school curriculum. Legal framework regarding marketing fast foods and feeding school children should be worked out. The Tanzanian policy that removed games and sports in schools should be rescinded, and most importantly, the Republic of Tanzania, and Zanzibar governments in particular should implement the recommendations of "WHO Commission on Ending Childhood obesity (WHO, 2016)"

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Impact of Tax Revenue on Economic Growth in Tanzania: A case study of Zanzibar Island

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Abstract

Most countries including Tanzania depend on tax collection for the country's economic growth usually estimated by Gross Domestic Product. It is not clear how effective tax collection in Tanzania is achieved. This study examined the effect of tax revenue on economic growth in Tanzania, case study Zanzibar Island. The major findings of this study revealed significant relationship between Value Added Tax and GDP growth, significant relationship of Tax buoyancy and GDP growth. It shows that Income Tax and GDP growth are positively correlated. The empirical results revealed that all of the three variables have impact on economic growth in Tanzania. The results are statistically significant at 5% level. From the results, it can be concluded clearly that the tax revenue is very important determinant of economic growth in Tanzania. The government should make sure that the taxes are well collected and utilized in pro-growth expenditures Government should ensure that it limits loss of public funds through fraudulent and unqualified tax personnel

Keywords: Economic growth, GDP, tax revenue, value added tax, Zanzibar

1. Introduction

Economic growth generates more profit for businesses. That gives company's capital to invest and employ more employees in the business. As more employment created causes the incomes to rise. According to that Purchases made by consumers make economic growth to rise (Amadeo, 2018). Similarly, Gross domestic product is the greatest approach that is used to determine economic growth. So, if the country needs to see whether

their economies grow or not should look at Gross domestic product other than any other indicator that is because it takes consideration of the country's entire economic output.

Interestingly, the role of every government is to provide adequate public goods and services that improve the standard of living of its citizens. To fulfill such a responsibility, it depends on the quantum of revenue generated by the government through various means. Taxation is one of the viable sources of revenue generation to provide essential services for the generality of people living in a particular geographical area. Tax as a compulsory payment imposed on individuals, groups, business or corporate bodies and properties are used to defray government expenditures.

Ojongo, Anthony & Arikpo (2016) revealed that taxation generates funds to finance public goods, regulates production and consumption of goods and services, controls adverse economic conditions, protects infant industries and reduces income inequality among others. A tax system is a veritable tool that mobilizes a Nation's internal resources that create enabling environment for the economic to grow.

However, unqualified tax personnel and fraudulent activities of tax collectors pose great challenges to revenue generation as fraudulent tax collectors forge and divert government revenue into personal pockets. Also, the inability of government to reciprocate the sacrifice of tax payment has induced tax payers to explore the loopholes in tax laws to

avoid and evade tax payment, hence the continuous reduction in tax revenue generation.

Before the establishment of Tanzania revenue Authority in 1996, revenue collection was under the Ministry of Finance and come to an end in 1995 under its three revenue departments namely; customs and excise, Income tax and sales tax as well as internal revenue. Through these departments the revenue collection was inefficient leading to increasing government budgetary deficit (Fjeldstad, 2001).

The government initiated a number of researches which aimed at achieving economic stability by increasing revenue collection and control expenditure. Thus, government setup autonomous tax revenue body which operates outside the traditional civil services machinery. This improved the process as a number of process and system have now merged, one stop Centre districts which provide all tax services to tax payer under one roof were established and Income tax and Value Added Tax department were merged to form Domestic revenue department (Chachage, 2003).

The government revenue of United Republic of Tanzania depends more on the tax as source of revenue compared to other revenue sources like non-tax revenue, grants, aids and borrowing loan from another country (Levin 2001). The level of taxation that needs to be paid by the citizens and the items to be taxed in United Republic of Tanzania is determined by government of United Republic of Tanzania.

2. Methods

This study applied the descriptive research design and quantitative and qualitative research approach to achieve the intended objectives. A population of 35 was targeted and a sample of 32 was determined using Krejcie and Morgan Table. The respondents were purposively and randomly selected and participated in the study. Data was collected through questionnaires, interviews, non-participation observation and nominal group discussion.

The researcher used a set of self-administered questionnaires directed toward customers, tax payers and general public. The questionnaire was constructed to obtain information on level of tax compliance of clients, level of family income and tax usage, which formed the independent variables and economic growth.

The interview guide was used to gather information from the tax officers and tax payers to provide information on the impact of tax revenue on the economic growth of Tanzania, Zanzibar Revenue Board. Interviews were preferred because they allowed pursuance of in-depth information around the topic and were useful as follow-ups to certain respondents.

Quantitative data collected through structured closed ended questionnaires was edited, and coded using a five-point Likert response scale and entered into SPSS to generate inferential statistics. On other hand, qualitative data from interviews was categorized, cleaned, interpreted and analyzed under their respective themes. This complemented the findings obtained through

quantitative data analysis.

Further, a logistic regression model was run to best fit generate a line of best fit that explains the potential relationship between independent and dependent variables. In regression analysis, dependent variables are illustrated on the vertical y-axis, while independent variables are illustrated on the horizontal x-axis. These designations formed the equation for the line of best fit, which is determined from the least squares method.

3. Results and Discussion

The study main objective of applying regression analysis was to see how independent variables relate to dependent variable. Table 1 show that independent variables (Value Added Tax and Tax buoyancy) determine the occurrence of dependent variable.

3.1. Regression Analysis

Table 1: Results of Regression Analysis

Regression	***Statistics***
Multiple R	0.925
R Square	0.85672
Adjusted R Square	0.7866
Standard Error	0.15443
Observations	32

Source: Primary Data, 2022

It is indicated that independent variables explain 85.672% and there is a significance result at 5% between Value Added Tax, Tax buoyancy hence P-value < 5%.

3.2. *Effects of Tax Revenue to GDP growth*

From table 2 shows that GDP growth as, dependent variable regressed with the different focusing variables (VAT and Tax buoyancy) at different regression model and with the set of different control variables at the different set of number include 1, 2, 3, 4, 5 and 6.

3.2.1. *Value Added Tax (VAT)*

From the Table 2 by considering the only one component of tax and not take consideration on other component of tax and still control other variable that direct affect GDP growth the results shows that VAT are significant positive impact with GDP growth when increase the VAT make GDP growth to decrease and vice versa when decrease the VAT make GDP growth to increase.

VAT is significant to explain the economic growth because the p-value is less than 5% has 3% and has coefficient of 2.22 means that when VAT increased by 1 unit in millions of Tanzanian shillings GDP growth increased by 2.22 percent. The coefficient of variation (R-squared) is 0.64 which means that the independent variable explains about 64% of all changes influence the dependent variable over the observed years in the Tanzanian economy while the remaining 36% variation is explained by other determinant variables outside the model.

Table 2: Impact of Tax Revenue to GDP growth

VAT	Unit	1	2	3	4	5	6
	Coefficient	2.22	1.94	2.64	2.23	4.34	2.77
	Prob.	0.03	0.07	0.094	0.038	0.11	0.02
	R-squared	0.64	0.59	0.5	0.64	0.42	0.46
	Prob (Fstatistic)	0.0025	0.007	0.03	0.007	0.029	0.018

The regression coefficients of determinant on share price have been estimated and reached to significant level at 5% level (t= 5.74, P < 5%) for the Tax revenues - VAT, impacted to Economic growth performance from 1992 to 2021, on the other hand for the second independent variable which is Tax buoyancy is significant to Economic Growth simply because it is P< 5. The study revealed that for every one-unit of Tanzania shillings increase in Value Added Tax the Economic growth increased by 1056.3054 hence the result is significant at P < 5% and for every one-unit increase in Tax mechanism on Economic growth increased by 32.67234. Based on theoretical review and regression results show that once the country applying the good tax system in a certain period the economic growth increase apparently.

The relationship between VAT and GDP growth is not less than 1.94 percent that means when VAT increased by 1unit millions of Tanzanian shillings GDP growth increased by 1.94 percent and vice versa. These result similarly to the research done by Fjeldstad and Semboja (2000) investigated the impact of taxation revenue on economic growth in OECD countries, using time series secondary data for the period 2000 – 2011. A mathematical multiple regression model was adopted to capture the

linearity correlation between the variables of the study. Tax variables by OECD classification include personal income tax, corporate income tax, social security contribution, property tax, value-added tax and tax on consumption. The World Tax Index classification is only short by social security contribution. While economic growth variables captured in the model include gross domestic product, capital accumulation, human capital and government spending. The regression analysis employed was based on the neoclassical growth model of Mankiw, Romer and Weil (1992), and he found that corporate income tax, personal income tax and social security contribution were harmful for economic growth. The study could not confirm the impact of value-added tax on economic growth, but the property tax had insignificant impact.

4. Conclusions and Recommendations

The study adopted GDP growth as proxy for economic growth and Value Added Tax. There was significant relationship between Value Added Tax and GDP growth as well as significant relationship between Tax buoyancy and GDP growth. It was noted that changes in the level of revenues and structure of the tax system can influence economic activity, but not all tax changes have equivalent, or even positive, effects on long-term of GDP growth.

The study recommended that government should decrease indirect taxes and keep spending constant, or increase spending and keep taxes constant, initiate the strong rule for the people who practice tax avoidance and tax evasion because they cause tax collection to decrease, strengthen the tax

administration system to broaden the tax income, and board on tax education to ensure voluntary tax compliance, and tax authorities should employ qualified tax professionals who should be regularly trained and be retained in the tax administration system for efficient tax administration and collection.

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Revisiting citizen participation in Rwanda through Global Partnership for Social Accountability Approach applied to Performance Contracts (Imihigo) in selected Public Agriculture Project

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Abstract

This paper analyses citizen participation paradigm versus the outcome of the project: 'Empowering Farmers at District Level to improve Performance Contracts (Imihigo) in Rwandan Agriculture'. Implemented in Kayonza and Nyanza Districts, the project's overall goal was to contribute to improving the effectiveness of public agriculture projects at the decentralized level in Rwanda. By using tools related to the Global Partnership for Social Accountability (GPSA) approach, the researcher aimed at understanding how citizen participation was strengthened in the planning, monitoring and evaluation of district performance contracts. Broadly findings reflect a three-fold aim, which was: 1) enhancing the feedback and accountability mechanisms for gathering farmers' priorities and ensuring their integration in Imihigo; 2) strengthening cooperation between Civil Society Organizations (CSOs) and government officials at the district level; and 3) sharing and integrating the lessons learned from pilot districts (Nyanza and Kayonza) into the agricultural sector policy design at the district and national levels.

Keywords: Citizen participation, performance contracts, Social Accountability Tools

1. Introduction

The Project was implemented in a context of performance-based contracts "Imihigo" in the agriculture sector. The Imihigo have a strong focus on results which makes it an important tool for planning, budgeting, monitoring and evaluation processes as well as for accountability. Since 2006, the performance contracts have been used by the districts for setting local priorities, annual targets and defining activities to achieve them. At implementation level, the selected priorities are allocated funds and contracts carried out. At this stage monitoring is done to ensure that the implementation process remains on the right track. At the end of each fiscal year, each Imihigo is evaluated to establish whether the set targets were achieved or not.

Additionally, one of the 2012 National Leadership Retreat resolutions was to include findings of the Citizen Report Card (CRC)[1] as part of Imihigo evaluation criteria, giving it a weight of 10% along with other evaluation criteria. More generally the CRC includes a comprehensive review of Imihigo implementation reports and associated documents, field visits of Imihigo projects sampled from analyzed reports, as well as assessment of action plans across districts. This gives farmers room to participate in evaluating the district performance contracts in general and specifically those related to agriculture.

[1] Rwanda Governance Board (RGB) conducts an annual governance assessment through the citizen report card tool (see https://www.rgb.rw/1/research)

The project was initiated to contribute to bridging the gap of low citizen participation in policy planning, monitoring and evaluation of local and national plans with a focus on agricultural development area in Nyanza and Kayonza Districts. The overall goal of the project has been to contribute to improving the effectiveness of public agriculture projects at the decentralized level in Rwanda by using social accountability tools to strengthen citizen participation in the planning, monitoring and evaluation of district performance contracts.

2. Methods

This paper is typically evaluative and pursued two objectives namely to 1) Document key lessons that encourage learning, scalability and sustainability of achieved outcomes and how they can inform the government of Rwanda in agriculture related policy reforms; and 2) Contribute to learning and accountability by explaining how, if at all, the Global Partnership for social Accountability (GPSA) contributed to results brought about by collaborative social accountability processes, and what the conditions were for this contribution to take place.

For data collection, the research applied a mix-methods approach and used desk review, semi-structured questionnaire, focus group discussions (FGDs) and key informants' interviews (KIIs). FGDs were conducted at the district level involving farmers' cooperatives leaders and farmers. A total of four FGDs with farmers in both districts and 4 FGDs with Leaders of farmers' cooperatives were carried out to collect the data.

As for KIIs, they were organized with relevant national actors such as Ministry of agriculture (MINAGRI), Rwanda Agriculture Board (RAB) and the Ministry of Commerce (MINICOM). They were also conducted with the leaders of implementing partner organizations such as umbrella organizations for farmers (Imbaraga and SDA-Iriba), the GPSA team leader at the World Bank/Rwanda and Transparency International-Rwanda's M&E and Knowledge Management Officer. At local government level, the researcher held KKIs with sector agronomist and the district director of planning.

Figure 1: GPSA Approach illustrated in the Rwandan Agriculture Project

3. Results and discussion

The project relevance was examined in line with major farmers' priority needs that the project came to address and with the alignment of project goals with national governance and agriculture policies and strategies.

Table 1: Key farmers' needs to which the project came to respond

Key needs and priorities	Freq.	Percent
Low agricultural productivity	505	75
Food security issues	494	73.5
Limited consideration of farmers' priorities in national plans	407	61
Limited consideration of farmers' priorities in district Imihigo	381	57
Limited access to market	373	55.5
Limited transport infrastructure for commercialization of agriculture produces	131	19.5
Other	50	7

Source: Field Data, 2022

Prior to the project inception, farmers in both Nyanza and Kayonza districts experienced critical problems associated with their agricultural occupation. The majority of them mentioned issues such as low agricultural productivity (75.1%), food security problems (73.5%), limited consideration of farmers' priorities in national plans and in district Imihigo (60.6% and 56.7% respectively), as well as limited access to market for their produces. Close to 2 in 10 respondents also highlighted a related issue of limited transport infrastructure for commercialization of agriculture produces.

Beside the project relevance for actual farmers' needs, the findings suggest that the project aim is in line with the National Decentralization Policy; the mission of which is "to build a highly effective and accountable Local Government driven by citizen centered governance for local social economic transformation" (Ministry of Local Government, 2021 Annual Report [MINALOC], p. 16). The policy's overall objective is "to deepen and sustain grassroots-based democratic governance and promote

equitable local development by enhancing citizen participation and strengthening local government systems (MINALOC, 2021 Annual Report, p. 16). To achieve this goal, the policy seeks to realize seven specific objectives, two of which include (1) to enhance and sustain inclusive citizens' participation in planning and budgeting processes and decision making; (2) to promote and entrench a culture of Integrity, precision, accountability and transparency in governance and service delivery" (MINALOC, 2021 Annual Report, p. 16).

In a similar vein, the project is in line with the National Strategy for Transformation (NST 1) whose economic transformation pillar objective is to "accelerate inclusive economic growth and development founded on the Private Sector, knowledge and Rwanda's natural resources" (Republic of Rwanda, NST 12017, p.2).

Moreover, the project reflects the aspirations of Rwanda's Strategic Plan for Agriculture Transformation (2018-24). This plan which is the core strategic document on agriculture sector commits to support farmer cooperatives and organizations. In this regard, it is stated that:

> *"Support will focus on the establishment of effective, transparent, and accountable management systems, and building an entrepreneurship culture that encourages market-oriented production. Farmer organizations, including cooperatives, unions, and federations, will be strengthened and trained in management, organizational and business skills while support will be provided to increase member awareness and engagement. Farmer organizations' management capacities will be*

strengthened through training and the provision of temporary contractual management staff" (MINAGRI, p.42).

It is clear from the foregoing that the project – thanks to its goal and the various social accountability mechanisms that it established and facilitated to enhance farmers' participation in the district agriculture Imihigo – fits well in the national policy framework and context.

Table 2: Farmers' views on project most significant changes induced by the project

Change	Frequency	Percent
Increase of farmers' awareness of their rights and confidence to participate in district and national planning	480	71.4
Reduction of social distance between farmers and sector/district leaders	400	59.5
Increased cooperation between farmers and local leaders	347	51.6
Increased cooperation between farmers and CSOs	308	45.8
Increased farmers' capacities to voice their priorities and demand accountability to leaders	279	41.5
Increased farmers' income	265	39.4
Increased quality of agricultural productivity	233	34.7
Improved household food security	227	33.8
Increased quantity of agricultural productivity	206	30.6
Improved community food security	185	27.5
Improved of overall socioeconomic situation of farmers' households	83	12.3

Source: Field data, 2022

As earlier mentioned, the project was designed to contribute to addressing the problem of low citizen participation in the formulation, monitoring and evaluation of district Imihigo with a focus on agriculture Imihigo. To that end, the project established other avenues for farmers and stakeholders' engagement in its activities to foster social accountability and farmers'

participation in district Imihigo. Such avenues include farmers' groups and meetings (at village, cell and sector levels), District Farmers' Network in Kayonza, Media Network for Social Accountability, District Agriculture Forum (Meetings with district stakeholders in the agriculture sector), media awareness campaigns, radio talk shows, agriculture Imihigo week (Icyumweru cy'Imihigo y'Ubuhinzi) among others. These added on existing platforms such as village assemblies and cell assemblies (inteko z'abaturage) and Public Accountability Day.

As per GPSA theory of action it was expected that if the multi-stakeholder compacts use social accountability tools and processes that were agreed upon under the project design to address the felt needs and concerns of the citizens; then the capacity of the citizens to participate in policy planning, implementation, monitoring and evaluation would be increased. This was attained though the following indicators:

- Building capacity for implementing CSOs
- Building capacity for local leaders, farmers' representatives and journalists
- Building farmers' capacity
- Influence of the social accountability mechanisms on farmers' ownership of the district agricultural Imihigo process
- Capacity building for local leaders, farmers' representatives and journalists

The design of the project provided for participatory planning, implementation, monitoring and evaluation of district Imihigo. This

implied that for this approach to be effective, various stakeholders had to comprehensively cooperate, with each category of stakeholders undertaking specific roles. Participants' accounts below substantiate the project contribution in enhancing cooperation between project stakeholders.

We got our members to become involved in the project. The way farmers' needs and priorities were formulated and forwarded for consideration in the district Imihigo; the manner in which feedback was being done through the cooperation chain from district to Sector, then Cell and finally down to farmers was a well-coordinated linkage which strengthened our cooperation with other partners" (Cooperative leader, Kayonza).

4. Conclusions and Recommendations

In conclusion, the study revealed significant increase of farmers' participation in the formulation of agricultural priorities for inclusion in the district Imihigo. Results indicated that farmers were able to identify and communicate their priorities to local leaders and the latter included the majority of those priorities in the district Imihigo. Moreover, the implementation of a more farmers-centered district Imihigo has yielded benefits for farmers in terms of productivity and the resolution of various agriculture-related challenges.

The study recommended that feedback and accountability mechanisms for gathering farmers' priorities should be enhanced, strengthening cooperation between CSOs and government officials at the district level, share and integrate actions from pilot districts (Nyanza and Kayonza) into

the agricultural sector policy to translate commitments into tangible actions.

Acknowledgements

I acknowledge the World Bank financial support, TI-Rwanda and its two-implementing partner CSOs (Imbaraga and SDA-Iriba) established compacts through which farmers and their cooperative leaders, local leaders, relevant national public officials (MINAGRI, RAB and Rwanda Governance Board…) who engaged in regular dialogue.

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Factors influencing the distribution and abundance of birds in Lake Mburo National Park, Uganda

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Abstract

The study determined environment and other factors for the distribution and abundance of birds per habitat type in Lake Mburo National Park. The study employed a survey design using qualitative and quantitative data collection approaches. A total of 202 species including five critically endangered species and two threatened species were recorded. The point count method was used to collect information on abundance and distribution of birds. Data on other habitat types was also gathered using the points. In order to compare the differences in bird abundance between different habitat types, the Shannon-Wiener diversity index (H') was utilized, and the Kruskal-Wallis test was applied. The study established no significance difference in bird abundance between different habitat types or sampling times. In September, diversity indices ranged from 3.224 to 3.865, with Open shrub scoring the highest and wooded scrub scoring the lowest, while in October, diversity scores ranged from 2.84 to 3.419, with wetland/shrub scoring the highest and woodland scoring the lowest. The study concluded that woodland areas can serve as a good habitat for birds, and recommended that Lake Mburo National Park should direct conservation efforts directly towards making types of habitats good for birds.

Keywords: Abundance of birds, endangered species

1. Introduction to the study

Uganda has over 1050 species of birds, of which (1) species is endemic and restricted to the wetlands of eastern Uganda around Lake Bisina and Opeta. At a national level, Critically Endangered (9), Endangered (24), Near-Threatened (12), Data Deficient (28), and Regionally Extinct (2). At a global level we have Critically endangered (4), Endangered (8), Near-Threatened (20), Vulnerable (11), and Data Deficient (2) according to the Redlist of Uganda (Nationally Threatened Species for Uganda, 2016)

Rich in bird species, Lake Mburo National Park is an Important Bird Area with globally threatened species, species with restricted range, and species with restricted biomes. 312 bird species have been recorded in the park, including 19 Afrotropical migratory birds and 30 Palearctic migratory birds. There are 5 specialized forest types, 79 non-specialized forest types, 60 specialized wetland types, and 33 non-specialized wetland types (Miranda-García et al., 2021). 30 species have been identified as particularly important for conservation, including the papyrus warbler and the shoebill. The African Finfoot is locally endemic to Lake Mburo National Park and a major attraction for bird watchers (UWA, 2015).

2. Methods

2.1. Research Design

The survey was utilized the same method used by Ayebare et al. (2018) and Plumptre et al. (2019) for biodiversity surveys and ranges in the Albertine Rift. The point count method was used to survey birds in Lake Mburo NP. Proposed survey points were generated and laid on the map based on habitat types and laid out on a map for use in the field (Fig. 2).

The total Bird count for birds seen or heard at points along the selected habitat types was identified and recorded, and GPS readings was taken. From the observers' point of observation, distance was estimated to where the birds are seen or heard, in categories of 0–10m, 10–20 m, 20–50m, 50–100m, 100–200m, 200–500m for five minutes of species recording at each point.

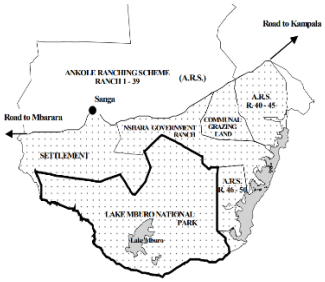

Fig.1: Location of Lake Mburo National Park
Source: Primary Data, 2022

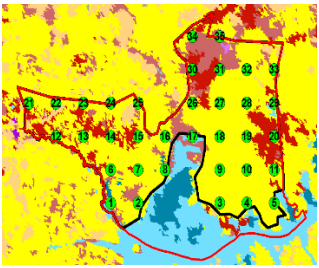

Fig. 2: Survey points
Source: Field Data, 2022

2.2. Study population and Sample size

One sample Kolmnogorous- Smirnov test was applied to test if data were normally distributed. Since they failed to comply, therefore non-parametric tests were employed. A 0.05 level of significance were used to determine level of significance. Species diversity was determined using Shannon-Weiner diversity Index in the Palaeontological Statistics (PAST) program. Shannon-Weiner diversity Index takes into account the number of species richness as well as evenness.

$$H' = -\sum_{i=1}^{S}(p_i \ln p_i)$$

Where;

p_i, the relative abundance of each species, calculated as the proportion of individuals of a given species to the total number of individuals in the community.

$\frac{n_i}{N}$, the value of the index ranges from 1.5 (low species richness and evenness) to 5.0 (high species evenness and richness).

2.3. Data collection methods

Data was collected through mapping, observation and counting of birds. The point count method was used to survey birds in Lake Mburo NP. Proposed survey points have been generated and laid on the map based on habitat types and laid out on a map for use in the field (Fig. 2). The total Bird count for birds seen or heard at points along the selected habitat types was identified and recorded, and GPS readings was taken.

In each habitat, birds were counted within 60 days. And the points were used for both dry and wet seasons. Upon reaching a point, birds were given 2-5 minutes to calm down if disturbed (Bryan et al., 1984). At each point, 5 minutes were spent to count and record all birds observed or heard within a 500m radius. The total Bird count for birds seen or heard at points along the selected habitat types was identified and recorded, and GPS readings taken. From the observers' point of observation, distance was estimated to where the birds are seen or heard, in categories of 0–10m, 10–20 m, 20–

50m, 50–100m, 100–200m, 200–500m for five minutes of species recording at each point (Ayebare et al., 2018) and (Plumptre et al., 2019).

The study was conducted from 6:30 am to 10:30 am. Most of the birds were active during this time. Dates, bird species, numbers, habitat types and elevation were recorded. Birds have been identified at the species level and their taxa have been appropriately classified based on field guides (Prokopová et al., 2019). This study was limited to diurnal birds only due to the lack of dedicated equipment for detecting nocturnal birds.

Materials were included 2 pairs of binoculars, template data sheets for recording, 1 GPS Unit for reading the satellite coordinates, a watch for timing at every point visited, a vehicle, for transportation to and from the survey site.

2.4. Data analysis

The compilation and analysis of the data was done with Microsoft Excel 2013 and the R Package Statistical, the SPSS program was used to create graphics and figures. GIS software (Arc GIS, version 9.3) was utilized for data management, analysis and creation of a simple map (Fig. 1).

a. Bird abundance for each species was calculated by summing up the number of individuals recorded in three different habitat types and in all illustration points.

b. Bird distribution: was calculated using the Shannon Diversity Index (H), where pi is the proportion of species expressed as a proportion of the total individuals of all species and Ln is the

natural logarithm. The data was compiled and tested for normality in order to assign an appropriate test. Correlation was performed to determine the relationship between altitude, habitat types, and bird species composition and diversity.

c. Species uniformity was calculated using Shannon's uniformity formula, which is calculated as; EH = H/LnS, which measures how similar the abundance of different species is in a plot/point or area, the species richness (S) and Shannon Index (H) combined.

watchers (UWA, 2015).

3. Results

3.1. Environmental factors for distribution and abundance of birds per habitat type in Lake Mburo National Park

3.1.1. Distribution

The October results show high species dominance in wooded scrub and woodland, but low in the other three habitats (Table 1). In contrast, the Shannon-Winner Diversity Index was higher in less human-disturbed habitats such as open shrubs, woodlands and wetland/shrub compared to more human-disturbed habitats, wooded shrubs and wetland/shrub (Table 1). Same trend was observed for evenness whereby there is high evenness in Wetland/shrub, woodland and Open shrub than on Woodland and Wooded scrub (Table 1).

Table 1: Structural properties of bird species for five habitats

Diversity measure	Woodland	Wooded scrub	Open shrub	Shrub/ forest	Wetland/ shrub
Dominance (D)	0.049	0.056	0.027	0.026	0.025
Shannon (H′)	3.423	3.224	3.865	3.816	3.778
Evenness (e^H/S)	0.601	0.628	0.795	0.841	0.858

Source: Field Data, 2022

The results for October show a slight change in prevalence from September, with the highest in open shrubs and the lowest in wetland shrubs. (Table 2). Amazingly, bird diversity is relatively reduced across all habitat types compared to September (Table 2) with significant difference (t= 2.132, df=4 and P= 0.01 at α= 0.05) between the sampling period. Despite of the decrease, still forest and woodland fetches relatively higher diversity (Table 2), with the decrease of 9.5% and 15.5% respectively. The least diversity was observed in Open shrub with the decrease of 30.2 % compared to September (Table 2).

3.1.2. Abundance

Evenness was observed due to the high uniformity within the forest, showing the same trend as in September. and woodland compared to the rest of habitats (Table 2). Like other diversity measures, which had shown a decrease in October, evenness also did decrease in forest, woodland, Open shrub, Wooded scrub and Woodland by 3.8%, 12.0%, 35.6%, 6.1% and 8.2% respectively.

Table 2: Structural properties of bird species for five habitats

Diversity measure	Woodland	Wooded scrub	Open shrub	Shrub/forest	Wetland/shrub
Dominance (D)	0.078	0.079	0.138	0.049	0.038
Shannon (H′)	2.84	2.97	2.697	3.225	3.419
Evenness (e^H/S)	0.552	0.59	0.512	0.74	0.825

Source: Primary Data, 2022

3.2. Other factors for the distribution and abundance of birds per habitat in Lake Mburo National Park

3.2.1. Distribution

An increase in bird numbers was observed in October compared to September. The increase was detected in Woodland by 54.5%, Wooded scrub by 7.3% and forest by 4.3%, but a decrease in Open Shrub by 21.8% and Shrub/forest by 8.8% (Tables 1 and 2). This trend was also true for mean abundance, which were highest than most exploited in habitats with increased of human activity. The increase in bird abundance resulted to increase in the number of individuals per m^2 with the highest and the lowest density occurring in the Woodland and wetland/shrub, respectively.

Table 3: Abundance and density of birds within five habitat types in October 2022

Habitat	Number of birds counted (n)	Density (n birds/m^2)	Std. Error
Woodland	675	0.024	5.138
Wooded Scrub	353	0.012	2.420
Open Scrub	357	0.013	4.220
Wetland/Shrub	289	0.010	1.209
Shrub/Forest	263	0.009	1.357

Source: Primary Data, 2022

3.2.2. Abundance

Results show no significant difference in abundance between habitat types in September (Kruskal-Walli's test: $\alpha = 0.05$, $H = 6.81$, $df = 4$ and $p = 0.15$), in October ($H = 8.57$, $df = 4$ and $p = 0.08$) and when the two sampling periods were combined ($H=1.31$, $df = 4$ and $p = 0.86$). However, in September, mean bird abundance per specie count was higher in Woodland and least in Wetland/shrub. In contrast, density, as for the number of birds counted was highest in Open shrub and least in the Wetland/shrub (Table 4).

Table 4: Abundance and density of birds within five habitat types

Habitat	Number of birds counted	Density (N of birds/m^2)	Std. Error
Woodland	437	0.015	1.556
Wooded Scrub	329	0.012	1.473
Open Scrub	457	0.016	0.756
Wetland Shrub	317	0.011	0.528
Shrub/forest	252	0.008	0.385

Source: Primary Data, 2022

4. Discussion

4.1. Environmental factors for the distribution and abundance of birds in Lake Mburo National Park

4.1.1. Distribution

Although there were no significant differences in bird populations between habitat types or between sampling periods, there were small differences in average populations by species number and density. Distances between habitats observed during field visits may be the reason for the lack of observed differences. The trend, however, indicates that bird numbers and densities were higher in areas where human activity was heavily induced,

and decreased towards forests. The results of this study are consistent with the finding that human-disturbed areas provide heterogeneous habitats that attract bird species that are tolerant of humans. Higher abundance per species counts and density in could have been contributed by a few migratory species that coexist with resident species such as Osprey *(Pandion haliaetus),* Semi-colored Flycatcher *(Ficedula semitorquata),* and Northern Wheatear *(Oenanthe oenanthe).* Others included Sand Martin *(Riparia riparia),* Northern House Martin *(Delichon urbicum),* and European Roller *(Coracias garrulus)* White Stork *(Ciconia ciconia).*

It was observed that during October, the Open shrubs had a higher density of birds. This could be associated with greater openness in the habitat that supports shrubs that provides food and cover for different bird species. Wetland/shrub habitat had a few individuals recorded; the least number could be due to forest degradation through tree logging, cutting of building poles, collection of fuel-wood, and charcoal making which affect forest birds. Reduced cover for fleeing enemies and shelter, food supplies, and breeding grounds may reflect increased intra- and inter-species competition, thus reflecting reduced numbers. Bird abundance and density in October, changes were observed with the increase of habitat types i.e., woodland, wooded scrub, and, wetland/shrub. This can be associated with the increase in rainfall during October by 67.5%, from 37mm in September to 191mm in October (Uganda Metolological Agency, 2022; UWA, 2015). According to the study done by George *et al.* (1992) also Sagarin and Gaines, (2002) precipitation had an impact on bird habitats by generating food and cover availability which improve their ability to reproduce and survive hence increasing their abundance. Despite the increase in

abundance observed in woodland and shrubs could be triggered by the temporal and spatial movements of birds according to specific species requirements such as nesting and breeding sites for survival (Hepburn et al., 2021)

4.1.2. Abundance

In September, bird species diversity was found to increase towards less human-activity areas with higher vegetation cover. The lower bird species diversity observed in the Woodland and wooded scrub could be caused by continuing climate change resulting in natural vegetation change as it was observed during field visits. The findings comply with many other studies (Panda et al., 2021) that higher vegetation cover support higher diversity of birds. The highest diversity observed in Open shrub, Shrub/forest and Wetland/shrub was more likely because of well-sufficient vegetation cover than in the Woodland and Wooded scrub that has been affected by land use changes (Fahring *et al.,* 2010). The highest species diversity indicates a complex community in which a high degree of species interaction is possible contrary to higher dominance observed in Woodland and Wooded scrub, which implies that few species predominate the habitats. Though Wooded scrub showed less diversity, higher dominance was due to persistence of native and generalist species like a large number of cattle egret (*Bubulcus ibis*) (Panda et al., 2021). On the other hand, the higher evenness in the Wetland/shrubs is supported by continuation of vegetation that reduces the impact of predation to adult birds, young and eggs. The case is different to highly interfered habitat like Woodland and Wooded scrub (Martin et al., 2021)

A significant decrease in diversity was observed in all habitat types during October. This signifies that bird diversity was impacted by weather conditions (precipitation and temperature) (Waterhouse *et al.,* 2002). According to(Hope, 2016), weather condition determines bird diversity by the spatial temporal shift of the species from one habitat to the other seeking for favorable conditions. The highest diversity shown by wetland/shrub was due to the availability of food, water, breeding sites, breeding material and cover from predators (de Moraes et al., 2020). Interestingly, in October Banded Martin (Neophedina cincta) that were feeding on insects influenced by rainfall contributed higher dominance in Open shrub.

4.2. Other factors for the distribution and abundance of birds in Lake Mburo National Park

In general, Wetland/shrub habitat had higher diversity when the sampling periods were pooled together. The result is in agreement with many studies that conclude that wetland/shrub is the main habitat that harbors large bird species diversity. Therefore, the Wetland/shrub species may disappear if climate change continues to modify this type of habitat.

The studied habitat types recorded 159 bird species that calls for attention to conservation. According to (Smallwood & Trapnell, 2022) the distribution patterns of bird species normally follow the spatial structure of the environment and habitat requirement of the bird species. This corresponds with the results of this study whereby habitat specificity and generalization were observed. For example, African Sedge Warbler (*Acrocephalus schoenobaenus*) and Red-chested Cuckoo (*Cuculus*

solitaries) were recorded in all habitat types. On the contrary, Pale Flycatcher *(Agricola pallidus),* Common Bulbul (*Pycnonotus barbatus*), Spotted Flycatcher *(Muscicapa striata),* Grey-Tit Flycatcher *(Myioparus plumbeus),* Dark-eyed Tit Flycatcher *(Melaniparus leucomelas),* Yellow-breasted Apalis *(Apalis flavida),* and Brown-throated Wattle-eye *(Platysteira cyanea)* were recorded in Woodland.

Although human Woodland areas have mixtures of other micro habitats and green patches, birds use the micro habitats as nesting habitats and for hiding purpose. This is explained by the availability of ecological requirements for the species offered by a mixture of environments. The study also recorded critically endangered species in the entire landscape which were previously recorded by (Ayebare et al., 2018) in the biodiversity survey done in Lake Mburo National The list includes Lappet-faced Vulture *(Torgos tracheliotos)* Rüppell's vulture *(Gyps rueppelli)* White-backed Vulture *(Gyps africanus)* White-headed Vulture *(Trigonoceps occipitalis)* Hooded Vulture *(Necrosyrtes Monachus)*. Among the mentioned.

The species comprise about 3.8% of the whole species observed; critically endangered species were wide spread in the landscape and in all habitat types. Most of the birds recorded in all habitat types are widely distributed in Uganda (Ralph & Wolfe, 2018). The higher species distribution similarities between habitats, which are spatially closer, were expected since these habitat shares some bird species especially the generalist species (Fricke, 2006).

Doggart et al. (2020) asserts that, when the comparison was done between Wetland/shrub and Shrub/forest also observed the similarity observed between Wetland/shrub and Shrub/forest. The least similarity observed in distant habitats was caused by a considerable number of species that were not seen in other habitats due to considerable separation. This highlights that while species may be similar between habitats still, there is a difference in requirement hence it is important to conserve a mosaic of natural habitats.

5. Conclusions and Recommendations

The study also concluded that any activities that change the habitat structure impact birds' distribution and abundance in a habitat. Thus, bird species diversity was higher in the areas with less human activities i.e., wooded scrub, woodland and open shrub than in the Wetland/shrub and open shrub. The higher diversity suggests higher ecological stability compared to human disturbed habitats where few species occur.

The study recommended that Lake Mburo National Park should encourage more tree growing within the buffer zones to enhance bird species diversity, Lake Mburo National Park should create awareness and provide conservation education to the communities around the park for the abundance of the birds, Lake Mburo National Park through village environmental committees should offers an opportunity to improve conservation of birds and their habitats, and collaboration and cooperation among different stakeholders should be enhanced.

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Influence of wind on Food Security in Gogrial West County, South Sudan

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Abstract

The study established the influence of wind on food security in Gogrial West County, South Sudan. The study employed cross-sectional design including qualitative and quantitative data collection approaches. The study targeted 1900 people from who 320 respondents were determined using Yamane formula. Data was collected through focus group discussion, observation, interview and questionnaire which were validated though validity and reliability tests. Quantitative data collected was organized, edited and coded, and entered into SPSS for analysis to generate descriptive statistics. Similarly, qualitative data was transcribed as per the tools, grouped into themes, categorized and analysed using content value analysis. Results indicated that, wind positive effect on food security ($\beta = 0.085$). The study concluded that, wind positively affected food security. The study recommended that, farmers should grow and manage trees as source of food, as well as wind breaks.

Keywords: Food security, wind speed/direction, dry/moist winds

1. Introduction

Strong winds coupled with high waves via water especially in the seas and oceans result into more devastations in regions where they occur. Terry *et al.,* as cited in Lal *et al.,* 2009, p.viii) affirm that, strong winds result into damages to crops, buildings, and death of people. Specifically, strength and speed of winds lead to the emergence of asthma, respiratory illness and stroke, which have an impact the human lives and livelihoods as well as productivity (Lal *et al.,* 2009).

In the developed world, climatic disasters have negatively affected the agricultural sector can be very significant with estimates ranging from US$13.8 million to US$14.2 million loss (Lal *et al.,* 2009). Likewise, the changes in ocean waves may have adverse significant impacts on food security in the global world. Winds further result into economic and infrastructure losses especially those regions situated near the coast, for example local livelihoods of the people living along the cost are under threat (Lal *et al.,* 2009).

In developing countries like Jiji, Akudugu, Dittoh & Mahama (2013) assert that, severity of windstorms impacts negatively on the transit of food and food production to communities. The World Bank, notes that, with expected changes in climate conditions for example by 2050, a one-in-50 years' storm event and associated inundation could impact on 0.6-5.9% of coastal areas producing an estimated annualized economic cost in Fiji of about US$ 3-6 million in a year (World Bank, as cited in Lal *et al.,* 2009, p.27). Further, also the worst-case cyclone and associated events could cause losses in Port Vila of about AU$640 million.

In Botswan for example, strong winds coupled with dry winds frequently affected country especially during the dry months of April to November, peaking in July (Government of Botswana, 2003 as cited in Nemakonde, 2016, p.155). Wingquist & Dahlberg (as cited in Nemakonde, 2016, p.155) add that, the occurrence of such disasters has increased the risks of wind fires both natural and human times. On the other hand, strong winds have been a clear risk to the poverty and high prevalence of HIV/AIDS. The losses have been evident in infrastructure, housing, vegetable and Land

(Nemakonde, 2016). This implies that, agricultural production has been seriously halted by the emergence of strong winds and their associated elements like fire outbreaks as well as displacement of people. This is because these strong winds in association with heavy storms have caused serious damages to the crops, animals and property in various communities in South Sudan.

Evidences show that the warm phase of El Nino includes drier conditions, which lead to delayed onset of agricultural season, worsening haze and forest fires (Krishnamurthy *et al.*, 2015). On the other hand, the La Nina, which is the cold phase of ENSO, is associated with the Westward movement of tropical cyclones and rainfall in Asia, thus, increasing rainfall in China, the Philippines and Malaysia (Krishnamurthy *et al.*, 2015). A study by FAO (as cited in Krishnamurthy *et al.*, 2015, p.15) reports that, the El Nino can affect agriculture differently depending on cropping cycles. This implies that, in areas where crops are planted earlier in the year (China), agricultural stress is higher towards the end of the crop season, whereas in countries where planting occurs in November (Indonesia and Sri Lanka), agriculture stress is high during the whole ENSO cycle (Krishnamurthy *et al.*, 2015).

A study in Tanzania by Warmer *et al.* (2012) indicated that, changes and distribution of the two annual rainfall seasons were influenced by strong winds and high temperature which exacerbated local water shortage (Warmer *et al.*, 2012). Evidences also show that erratic changes in rainfall include, reduced number of rain days for the year and a pattern of early cessation and shortage of growing seasons. Additionally, on 29 October

1999, cyclone hit India with winds of up to 250km per hour battering a 200km stretch of the coast. This lasted for 36 hours accompanied by heavy rains and tidal waves devastated 10,000 people (Care France and UNU, 2012). In addition, the families were left homeless, destroyed infrastructure, over 800,000 livestock were killed and crops worth US$ 23 million were lost. Young *et al.* (2001) add that, although those people could practice other activities like fish and artistry, they could no longer help them to support their livelihoods.

Notably, the emerge of wind and out of climate change in South Sudan has resulted into scarcity of food due to its effects (Ngcamu and Chari, 2020). The late onset of rains, prolonged dry spells coupled erratic deforestation and high temperatures have advanced droughts and its effects to food security (Shamseddin, 2020). Therefore, the study assessed the effect of wind on food security Gogrial West County, South Sudan.

2. Methods

The study employed a cross sectional study design employing both qualitative quantitative data collection approaches. A total 1900 people was targeted from whom a desired sample of 320 was determined using Krejcie and Morgan 1970 sample size table of determination.

Data was collected through interviews which involved semi structured, and in-depth interview to gather data from the participants. Interview was chosen provide to valid and reliable data, which are relevant to research objectives. However, for this study the researcher employed semi-

structured and in-depth interviews for collecting qualitative data from respondents.

The researcher also used a questionnaire to collect information from the sampled respondents. The questionnaire was used as an efficient way to collect responses from a larger sample prior to quantitative data. Using the self-administered, the researcher designed and delivered the questionnaire by hand to the respondents who could read and write as per the specified and agreed time. The questionnaire included both close-ended and open-ended; the close-ended questions were ranked on a five (5) likert scale that is 1-Strongly Disagree, 2-Disagree, 3-Agree, 4-Strongly Agree and 5-Not Sure and the opinions from the respondents were gathered as specified.

Quantitative data collected through the questionnaire was organized, coded and entered into SPSS Software for cleaning and analysis to generate inferential statistics. Whereas qualitative data was transcribed as per the instrument used to collect it from the respondents. Data from the respondents was grouped into subthemes and categories to attach meanings until the final viewpoint was reached.

3. Results and Discussion

3.1. Influence of wind on food security in Gogrial West County

This was based on the second objective of the study, "to investigate the influence of wind on food security in Gogrial West County". Therefore, all these were answered through a series of questions, and these were rated on 5-point Likert scale ranging from Strongly Disagree (SD) =1 to Strongly Agree (SA)=5, and the results are shown in Table 1 below:

Table 3: Effect of wind on food security in Gogrial West County

Statement	N	Min	Max	Mean	Std. Deviation
Wind affects food security	187	1	5	4.81	.668
Speed and strength of wind affects food availability	187	1	5	4.04	.413
Speed and strength of wind affects food access	187	1	5	4.65	.881
Speed and strength of wind affects food utilization	187	3	5	4.18	.396
The direction of wind affects food availability	187	1	5	4.58	1.046
The direction of wind affects food access	187	1	5	4.49	1.161
The direction of wind affects food utilization	187	2	3	2.99	.073
Dry/moist wind affects food availability	187	1	5	4.57	.775
Dry/moist wind affects food access	187	1	5	4.56	.995
Dry/moist wind affects food utilization	187	1	5	2.10	.554
Valid N (listwise)	187				

Source: Primary Data, 2022

When asked, whether wind affects food security, the respondents agreed that wind was affecting food security with a mean of 4.81 and standard deviation of 0.668, in the area. They further asserted that, wind was measured by its speed, direction and dry/moisture content. This implies that, the parameters of wind as an indicator of drought were affecting food security differently. Therefore, results in Table 4.18 above indicated that, the respondents agreed that wind speed and strength affected all the parameters of food security including among others, food availability (Mean=4.04; Stdev=.413), food access (Mean=4.65; Stdev=.881), and food utilization (Mean=4.18; Stdev=.396). More to that, the respondents agreed that, the direction of wind affected both food availability

(Mean=4.58; Stdev=1.046) and food access (Mean=4.49; Stdev=1.161), but when asked whether direction of wind affected food utilization, results shown moderately neutral responses (Mean=2.99; Stdev=.073). In addition, results showed that, the respondents agreed that dry/moist wind affects both food availability (Mean=4.57; Stdev=.775) and food access (Mean=4.56; Stdev=.995). However, the respondents disagreed that, dry/moist wind affected food utilization (Mean=2.10; Stdev=.554) by the households in the study area. This implies that in general the results agreed that wind and its parameters affected all the indicators of food security in Gogrial West County.

Findings indicated that, the respondents agreed that, wind affects food security in the area. This reveals that wind had adverse significant effects on food security. The respondents reported that, the winds received would occur together with the intense rains occasionally. When such winds occur, they affect food crops and animals, which later results into food insecurity. During data collection, it was observed that, bananas had fell down due winds. This did not only affect the bananas but also cassava and maize including both fruit and wood trees. When these trees fell, they affect the crops and animals, which meant that, those food sources are hinged and households too. Thus, households lacked food and incomes, which would have been got from the sale surplus food/yields/products. One of the respondents noted that,

> *I lost all my Musa spp, sorghum, and maize due to winds, which happed with rains in April 2021, the same winds, affected my fruit trees of which the branches fell-off as well as the fruits.*

The findings concur with Mugalavai (2012) who notes that, changes in the patterns of wind negatively affect food severity and livelihoods in countries. Further, the results by Brudere & De-Young (2015 as cited in FAO, 2016, p.27) stipulate that, the changes in the flow of Benguela current resulted into not only change in fish production but also to changes in social-economic patterns.

More so, the respondents agreed that, the speed and strength of wind affects food availability. The results stipulate that, speed and strength affect food availability, this is valid and it has been evident in the areas where it occurred. In this case, when the wind occurs with high speed and at high magnitude, it is dangerous to food crops, trees, animals and households' property. This has been explained by Nemakonde (2016) that, the speed/intensity of wind had resulted into loss of infrastructure, housing, vegetable and Land. It was noted that, when such winds happen at a high magnitude, it could not sustain the existence of bananas, common food crop for the households. Observations made indicated that, food crops were seriously hit by the winds and this later resulted into limited availability of food for the households. This made the households to lack food and they would spend a day without food due to unavailable supplies. The results are clarified by a study carried out in Botswan, which revealed that, strong winds coupled with dry winds frequently affected country especially during the dry months of April to November, peaking in July and affected food availability to people (Government of Botswana, 2003 as cited in Nemakonde, 2016, p.155). Further, Nemakonde (2016) adds that, strong

winds could also be a clear risk to the poverty and high prevalence of HIV/AIDS in a county.

Additionally, the respondents agreed that, the speed and strength of wind affects food access and utilization in the area. The speed and strength had serious effect on food access and utilization; this means that, when strong winds occur, they affect food crops and other plants. This implies that, you cannot expect any access to food and its utilization becomes hard. In a study by Perry and Symons (as cited in Akudu and Alhassan, 2015, p.84). They report that,

> "…*climate change may increase frequency and severity of wind storms which impact negatively on transit air at a sea port terminal as well as damaging infrastructure which may also create delays in food transport thereby creating food accessibility problems.*

Respondents revealed that, they had no access to food because their crops were damaged by the winds, which occurred before, during and after the rain of April 2019. One of the respondents indicated that, the after effects of the strong winds were inaccessibility to food, and poor utilization of the little or no food available. The findings agree with Lal *et al.* (2009) who report that, direct costs to the effect from the winds are experienced during the incidences of strong winds. Further still, due to poor utilization of food, malnutrition increases among the children as well as increased disease-out break. The findings are in agreement with World Bank as cited in Lal *et al.* (2009, p.16) who argues that, strong winds exacerbate into water-borne and

vector-borne diseases increase, following high incidences of precipitations and floods. Further, the report indicated that, speed and intensity of wind results into decreased production of food crops like taro, cassava, sugarcane and other commercial crops like coffee.

The findings agree with Care France, UNU (2012) who asserted that, due to strong winds, the families were left homeless, destroyed infrastructure, over 800,000 livestock were killed, and crops worth US$ 23 million were lost. From this,

> *I note that, those who left with no incomes, housing and food worsened their well-being.*

Thus, people's health and incomes were no more as their property and animals were lost and people had no food for consumption and sale to improve their livelihoods. Thus, the absence of food security elements like availability, accessibility, utilization and stability impacted on health and malnutrition which eventually lead to death especially the women, elderly, and the girl child (Care France and UNU, 2012).

Results further revealed that, the respondents agreed that, the direction of wind affected food availability and access. It was revealed that, the respondents were sure of the direction of wind and its effect on food security. The respondents further stated that, the wind which affected their crops came from a known direction that is, Gogrial West County. Whenever, it would occur, serious damages were experienced. Observations indicated that, Gogrial village was on a higher altitude as

compared to its counterparts. Thus, this was the reference for the respondents understand on the direction of the wind affecting the community. Based on the responses and observations made, the households had no access to food supplies and this limited access to food hence adversely affecting utilization.

> "*I note that, the area had high disease outbreak as evidenced at the Gogrial West Health Center. When one of the health officials was asked why the patients were many the health facilities, he stated that, it was due to poor nutrition due to inadequate availability and access to food. This implied that, people had to be sensitized on proper feeding, but this depends on the amount of food available and accessed by the households.*

In relation to the literature reviewed no evidence found to support the findings, this implies that, the no studies have been previously undertaken focusing on the effect of the direction of wind to food availability and access. Thus, this forms a basis for availing literature for the future researchers in environmental studies, more on drought and food security.

However, when asked whether, "the direction of wind affects food utilization, "the respondents were neutral with a mean of 2.99 and standard deviation of 0.073. This means that, the respondents were unsure to whether the direction of wind affected food security (utilization) or not. Though the respondents indicated that, they were aware of the effect of the direction of wind on food security but they were not sure about its effect on food utilization. Thus, the respondents were unable to reveal that, when

plants are affected by the winds from a clear direction as specified in the previous findings, that when wind come from unclear direction, plants fall and others are damaged. This lowers the ability to provide enough food for use by the households. This implies that, poor feeding is exhibited as people lack enough food, which later resulted into stunted growth among the households.

Captivatingly, the respondents agreed that, dry/moist winds affected food security in terms of food availability and access. The results revealed that, dry/moist winds had adverse effects on food availability and access. This implies that dry/moist winds affect food availability in the area. Therefore, dry winds carry no moisture with them thus, results into no rainfall to favour crop growth. On the other hand, moist winds are moisture laden which influence rainfall and favours crop growth and other economic activities, hence enhance food security. Krishnamurthy et al. (2015) who state that, in Asia specifically Nepal experiences wet and dry season caused by monsoon shifts, support findings. Kattak & Shabbin (as cited in Krishnamurthy *et al.,* 2015, p.8) report that,

> *"though, there is a strong relationship between climate and agricultural production in Asia, an analysis of the historical link between climate variables (like winds, speed, rainfall and humidity) and wheat production in Pakistan showed that, changing climatic conditions had improved wheat production in Punjab and Sindh, but had also resulted into losses in Khyber, Pakhtunklwa and balo clustan."*

This implied that, in cases where moist wind occurred, they influenced rainfall formation. However, when it occurs in excess it affects crop growth and harvests hence lowering food supply and availability. Krishnamurthy *et al.* (2015) add that, warm, moist air/moist winds brought powerful storm-surges, which destroyed the key assets and disrupted livelihood activities, consequently, 70% loss in incomes. This implies that, households, which had agricultural farms, were displaced, food insecurity emerged and livelihoods altered. Therefore, the respondents had no food, meaning not available accessible of food by the households.

Lastly, when the respondents asked whether, "dry/moist winds affect food utilization, the respondents disagreed that dry/moist wind affected food utilization. This implied that, dry/moist had no influence on food security in the area. Respondents indicate that, their area rarely receives moist winds (winds laden with moisture) thus; there influence on food security is unobservable. However,

> *I do not agree with their perceptions, this is because when the winds occur and affect food supply and access, it means that there would be no food for consumption.*

This implied that, the households might lack what to eat since there is no availability and access to food. Thus, this has an influence on the poor utilization, which eventually, results into disease outbreak, stunted growth and reduced disposable income. The results were not supported by any previous findings, as from the literature reviewed, no records in the previous studies. This means that, the current study is to provide a basis for

the upcoming studies, as well as the newness to the existing body of knowledge on dry/moist wind and food security.

4. Conclusions and Recommendations

Results revealed a positive significant relationship between wind and food security with a correlation coefficient of ($r = 0.180$; $p < 0.05$). Results further indicate that, a change in wind by one unit changes food security by only 18.7%.

The study concluded that, planting trees and engaging into green activities should be enhanced, Farmers, district officials and households should integrate more windbreakers (trees) into farmlands and compounds, and Gogrial West County should implement and enforcement environmental regulations as means to regulate natural resource degradation.

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Factors Influencing Malnutrition among Children Under Five Years Old in Byahi Health Center, Rubavu District, Rwanda

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Abstract

The problem of malnutrition is a global matter, and it roots back to specific nation-states and to the families as the foundation of the society. The study assessed factors influencing malnutrition among children under five years in Byahi health center, Rubavu district in Rwanda. The study employed a case study design, targeted 50 households and 44 were determined using Krejcie & Morgan. Data was collected through questionnaires, and interviews. Data was analysed using SPSS to generate descriptive and inferential statistics. Results indicated that place of birth of the child, antenatal care, family planning, immunization routine and deworming, child weight curve and, breastfeeding Times and Age. The study recommended that Rubavu district should enhance awareness on nutrition among the mothers to protect welfare of the children, Ministry of Health should formulate a checklist of children under the age of five in matters concerning their welfare especially nutritional neglect of the parents or the inability cases.

Keywords: Children under five, Malnutrition, nutrition, Rubavu district

1. Introduction

Globally, 50.5 million under-five-year-old were wasted (or low weight for height) in 2017 (UNICEF, 2020; UNDP, 2018 & Narvas *et al*., 2016) and the wasting prevalence in 2017 was estimated at almost 8 percent (UNICEF, 2020). Among children, 52 million under-fives are suffering from wasting, where they have a low weight for height. Malnutrition can

be detected by anthropometric measurements where height/length with age (HAZ), weight with age (WAZ) and weight with height/length (WHZ) is measured against a set of WHO child and growth standards and NCHS/WHO reference ((UNICEF, 2020).

Notably, malnutrition levels are still high in developing countries, around the world, (Stuckler, 2014), an estimated wasting 9.8%, underweight 17.9% and stunting 29.2% (Doormart, 2021), included Indonesia. In Indonesia, malnutrition in children under five years of age during the year 2010 in Indonesia 17.90% are underweight, 35.60% stunted, 13.30% showed wasting, and in West Nusa Tenggara Province 48.30% are stunting, 30.50% are underweight and 14.90% are wasting (Rutolse, 2021).

In 2017, about half of all stunted children under five years of age lived in Asia and over one-third in Africa (Mayom,2021; UNICEF, 2020). In Africa, malnutrition in childhood and pregnancy has many adverse consequences for child survival and long-term well-being. It also has far-reaching consequences for human capital, economic productivity, and national development overall (National Institute of Statics of Rwanda, 2014; Owoaje & Desmennu, 2014; UNICEF, 2020; Tom & Tanjeko, 2021).

Furthermore, Rwanda launched a Stunting Prevention and Reduction Project to support community-based approaches, improve the delivery of high-impact nutrition and health interventions, incentivize frontline community health workers and health personnel, strengthen accountability mechanisms, and promote a learning-by-doing approach to draw lessons on what works and how it can be scaled up (National Institute of Statics of

Rwanda, 2014). Thus, this saw households adopting a pro-poor approach, targeting the poorest children under two years of age during the critical 1,000-day window beyond which stunting is largely irreversible mobilizing parents, mayors, and policymakers to strengthen ownership of the stunting reduction agenda (National Institute of Statics of Rwanda, 2014).

Lastly, Rwanda has a unique opportunity to create a positive virtuous cycle of producing a generation of well-nourished children who grow, thrive, and reach their full potential, contribute to human capital development, and contribute to future economic growth.

2. Methods

The study was carried out from Byahi health Centre in Rubavu district western province, Rubavu District is one of the seven districts of the country district (akarere) in Western Province, Rwanda. Its capital is Gisenyi, it has a large beach resort and border city, the district is composed of 12 administrative sectors, 80 Cells and 525 Villages (Imidugudu), It has a total surface area of 388.3 Km2.

The study adopted a case study design which allowed the researcher to review surveillance studies, cross sectional studies and case reports regarding the factors influencing malnutrition among under five children.

The study targeted 50 households who had mothers with children under five. The researcher accessed 25 mothers in field due to the decentralization and effort put by the government of Rwanda in fighting

against malnutrition. The sample size which informed the study was 25 respondents, a simple random sample was used to select them.

Data was collected through questionnaire and it contained both open ended questions and closed ended questions whose responses were rated on a Likert scale ranging from strongly disagree to strongly agree. Data collected from the questionnaires was keyed into the Statistical Package for Social Sciences (SPSS) for analysis to generate descriptive and inferential statistics interpretation and discussion of the research findings.

3. Results and Discussion

3.1. Factors Influencing Malnutrition among Children Under Five Years in Byahi Health Center

3.1.1. Child Factors (Breastfeeding Times and Age)

Table 1: Child Factors (Breastfeeding Times and Age)

Child Factors (Breastfeeding times & Age)	Freq. (n=24)	Percent
Breastfeed within 30 first minutes of life	21	87
Not breastfeed within 30 first minutes of life	3	13
Exclusive breastfeed up to 6 months	22	92
No exclusive breastfeed	2	8
Complementary breastfed up to 2years	15	63
Continue breastfeeding beyond 2years	0	00

Source: Primary Data, 2021

The table above shows that, in this Group of 24 women, 21 women representing 87%, breastfeed their newborn within first 30 minutes of life, 3women which represent 13% didn't breastfed their babies in first 30minites of life when 22women which represent 92% practice exclusive breastfeeding up to six months, and 15 women or 63% continue

complementary breastfeeding up to 2years. Only 2 women which represent 3% of this population failed to breastfeed their new born in their first 30 minutes of life due to the illness and the two children representing 8% were not properly breastfed because of their mothers who gave birth with their boyfriends without marriage and decided to bring them to their mother in low because of their boyfriends who don't want to help them.

This situation really affected them because they weaned too early and their care givers are also people who are old and in need of care themselves, so it tiers against this that, feeding the young children appropriately must be an is of concern to the direct parents especially the biological father and mother must be engaged and empowered to be able to support their family in general and children in particular with a specific focus on children under the age of five years.

None of the respondents were able to breast feed the children above the age of two years and they surprisingly agreed that good growth, immune system, strength and brain development were gained from good breastfeeding

it is so difficult for these mothers to feed themselves on meals for three times a day, or even two or once especially when are heading alone their household bearing all responsibilities, implying that some families go without getting a day's meal. This kind of way of lifestyle is not by choice but rather circumstantial, and the impact on the wellness of a child under the age of five years and a breast-feeding mother is so enormous that, it deserves being lifted off in the most sustainable way, neither by aid nor compromise as point of emphasis and departure.

3.2. Health Facilities Factors

These factors were place of birth of the child, antenatal care, family planning, immunization routine and deworming, child weight curve as detailed below:

Table 1: Place of birth of the child

Place of birth	**Freq.**	**Percent**
Hospital	Freq.	Percent
Community Health Center	4	17%
Home	18	75%
Total	**2**	**8%**

Source: Primary Data, 2021

As regard practices, majority of 92% of the mothers said that they delivered from the hospital and community health Centre and 0nly 2 women which represent 8% agree that they delivered from home and are conscious that they did wrong but with the effort put in health services by the government of Rwanda we hope that in few days all pregnant mother will be conscious through village health workers sensitization that it is mandatory to deliver from the health facility for their safety and their new born because now Rwanda decentralized every services include health services where every sector has a modern health Centre equipped with doctors, nurses midwives , laboratory , administrators and other personnel for the good service delivery.

Table 2: Number of antenatal care (ANC)

Attendance to antenatal care	Freq	Percent
Once	1	4%
twice	6	25%
Three times	15	63%
Four times	1	4%
More than four times	1	4%
Total	**24**	**100%**

Source: Primary Data, 2021

Although some mothers attended ANC, during pregnancy, the attendance was poor as seen in the table. on average a mother is expected to attend ANC at list (4-8) four times to eight times for proper monitoring of her pregnancy status. As seen in the table, most of mothers which represent 63% only attended ANC three times and 8% only attended more than 3times when 29% attended ANC one to two times only.

The good thing is that every one of this group is aware about importance of ANC routine and accept that they will try to attend more and follow the advices of their village health works, this gives hope that this noble work of community health works will give a great result on safe motherhood, this comes again on the level of education; the more mothers are educated the more they care about their health and wellbeing of whole family

Table 3: Family planning attendance (FPA)

FPA	Freq.	Percent
Yes	18	75%
No	6	25%
Total	**24**	**100%**

Source: Primary Data, 2021

Every mother from this group agree that knows the importance of family planning both on the mother and the baby, but as showed in the table below, only 75% agree that are adherents of different types of family planning when 25% said that they know it through radio sensitization, local government's meeting, village health workers at every last Saturday of each month in national morning of community service (Umuganda) but they don't like it.

This shows that more effort is still needed because even if this majority of 75% are adherents, but they have started lately after giving birth of three to four children which are closely followed and many according to their financial capacity and Saison as said, Dr. Susan Brems, Norton in the conference on the role of family planning in improving maternal health. "Seasonality means there is a time for most things":

In farming there is a time for the rains and a time for the dry season, a time to plant, to weed, and to go to market. This seasonality gives a rhythm to our lives. If we do things out of season– plant too soon or too late – it disturbs the rhythm of our life and causes problems. And so, there is a seasonality to motherhood. There's a time when it is safe and healthy for a woman to become pregnant, and there are times when it's not good. Let us commit here today to respect the seasonality of a woman's body. Our rallying cry should be 'everything in its season: births not too soon, births not too close together, births not too late.

Table 4: Child Immunization Routine and Deworming

Child immunization	Freq. (n=22)	Percent
Never been vaccinated	0	0%
Not completed all vaccines	2	8%
Completed all vaccines	22	92%
Never been dewormed	0	0%
Have been sometimes dewormed	2	8%
Dewormed as planed	22	92%

Source: Primary Data, 2021

Results in table above, majority of 92% of children completed their vaccines and got their anti-parasitic drugs every tree month as planned and only 2hild who represent 8% dint complete all vaccines and dint respect the routine of deworming, this good program of fighting against the intestinal parasites starts at six months when weaning period begin and goes in parallel with vaccines after realizing that when you are feeding a child who has intestinal parasites you are feeding parasites not a child that why we have to prevent these ashamed infection by Hand washing with an antiseptic soap before breastfeeding our babies, before preparing food, eating and after using the toilet, particularly after a bowel movement, is imperative in preventing infections.

Cooking food at high temperatures kills all parasites. Partially cooked meat or raw meat are high risk foods for passing on these parasites. Smoking or freezing does not destroy the parasites or eggs. Washing raw vegetables and fruits with a suitable disinfectant solution that is fit for consumption. Salt water may also be helpful to some extent. Clean running water should be used for rinsing, consuming safe food and water is important to prevent infections.

4. Conclusions and Recommendations

In conclusion, children are left under the care of those care takers who are in experienced and who do not mind so much about the timely quality feeding of the children.

The study recommended that, Rubavu local government should sensitize mothers about nutrition values to the children under five. Ministry of Education should collaborate and coordinate with Ministry of Gender and Family to educate the girl child and department of health at Rubavu district should design a checklist of children under the age of five in matters concerning their welfare especially nutritional neglect of the parents. The district should follow-up the healed malnourished children and support them with nutritional supplements.

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Effect of Moral Desirability on Teachers' Enrollment during Covid-19 Pandemic in Higher Learning Institutions in Kampala, Uganda

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Abstract

*Moral desirability was the original motivation of most teachers in Uganda, where most Chiefs, administrators, and original leaders were either teachers or children of teachers. Teaching profession was a community state of honor, teachers earned respect and fame in every community gathering. The study examined the e*ffect of Moral Desirability on Teachers' Enrollment during the Covid-19 Pandemic Scourge in Higher Learning Institutions in Kampala, Uganda. *Methodology hinged mainly on the cross-sectional approach focusing on descriptive and analytical mode of data finding. A sample of 73 respondents out of 89 were administered on Questionnaire and group focus discussions; where data analytical tool of SPSS Vs 16 was employed. Findings showed that most young people direct entry have developed a negative attitude towards joining teaching as profession in education. Enrollment in most Institutions of higher learning revealed that education as a profession received the least number of students' enrollment. Majority recommended that unless government puts in clear policies on teaching, increase the remunerations and spell out clear motivations, teaching as a profession was badly packaged during Covid-19 and the reason that de-motivated young citizens' desire to join the profession direct from secondary.*

Keywords: Covid-19 pandemic, moral desirability, decision-making

1. Introduction

Survey in Uganda hard scaled teaching and Nursing as one of the best flexible courses that were Clamored for by majority parents and Youths in

early and before 1990s. Missionaries focused on the schools and Hospitals, a concept that promoted teacher and medical education; This early accounted for over 65% of institutional enrollments.

Pandemic period of Covid-19 hit teaching professional systematically to the prefer, and Government failure to immediately address the plight of teachers left most teacher either crippled, lame or half dead. (UNCDF, 2020).

Some of the teachers abandoned teaching profession and joined lower business of boda-boda riding peasantry farming, or casual business. unfortunately, the Chief employer, the Government and MOE in particular were caught un aware, unprepared and hence lost the state of wishes to balance both government teachers and teachers in private industry. This created another book of Lamentations 2021-23 whose yield is now reflected in the teaching enrollment profession especially from the direct entry in institutions of higher learning.

2. Theoretical Review

2.1. A cultural theory

The study was guided by the cultural theory" propounded by Nick Couldry (2022). The theory urges that the main lessons should be about how to cross the pandemic of Covid-19 aftermath. NICK proposed that pandemics shall always exist in the universe but how people or Institutions prepare themselves to see how to adjust in the arena. In Uganda, the most hit area were schools because they were totally closed for two years; This needed

the shift from the traditional cultures of school environment to office management where by both the learners and teachers were to remain in operation without total abandonment and closure' like Kiganda proverb that when white ants change directions, you should also change the hole in order to trap them.

2.2. Theory of Moral Desirability

The second theory of moral desirability and Rational decision (JSTOR) by Christopher Luner (2010) focus on the crucial justifications of rational moral decisions. Moral desirability is done using malt-attribute utility, theory equating and comparing consumer needs in life. This theory helps people in developing decision making of what they would wish to be in life during critical, crisis management.

These two theories have raised gaps as to why the Government and other stakeholders in Education sector failed to motivate their clients particularly those who were in the teaching profession. Teachers made haste decisions by crying out loudly to the public, to the families and to the learners. All these portrayed a negative attitude towards education as a profession, some teachers up to now have never recovered hence still stuck in boda-boda sector. The theory created a conceptual framework that moral desirability will always impact either positively or negatively based on the approaches to the pandemics in life.

3. Methods

As stated, a cross sectional survey design was employed which used both descriptive and analytical data gathering approaches. Institution was selected mainly two public and three private Institutions. The total population in administration targeted 87 but a sample of 73 was achieved. These included Directors, principals, Deans and heads of Departments in various colleges and immunities.

The study population was selected purposively to focus mainly those in administration and registration of students. Data was collected through questionnaires, Interviews and checklists. The validity and reliability were followed up by the cross-checking of the students turn up in the relevant disciplines as a co-funding procedure to ensure validity and reliability. This Data was charmed through SPSS V 16 to give a clear picture on teacher enrollment using frequency tables, Pie-Charts and bar graphs to show how the government and parents supported education, statistical findings reveal that as much as the Government supplied food to the entire population, teachers were not given priority yet they handle the key sector of the preparation of our future tomorrow, Nation. The MOE never considered to Loan or grant teachers any support except those few who were in Government schools. Statistics showed that majority of the teachers are in private sector and therefore never received any motivation, moral support at all.

4. Results and Discussion

5. Effect of Moral Desirability on Teachers' Enrollment during the Covid-19 Pandemic in Higher Learning Institutions in Kampala, Uganda

Results showed that the Board of Governors did little support by providing some food to teachers and providing housing however, this covered only 10% of their needs in the complaints of the teachers, a factor that de-motivated majority of those in the teaching profession

Table 1: Effect of Moral Desirability on Teachers' Enrollment during Covid-19 Pandemic

Moral desire	Government support		Private support	
	Freq.	**Percent**	**Freq.**	**Percent**
Government policy attitude to teachers	25	34.2	19	26.0
Government food supply support	20	27.4	25	34.2
Government financial support	13	17.8	09	12.3
Home teaching support	10	13.7	17	23.3
Board of Governors support	09	12.3	02	2.7
Government Grants to school	06	8.2	00	0.0
Total	**73**	**100**	**73**	**100**

Source: Primary Data, 2022

The findings indicated that government, Board of Governors and parents motivated teaching industry during post Corvid 19 pandemic scourge and

consequently affecting the industry today. Low percentages revealed that government lack clear policies in motivating young direct entrants in universities, government does not plan for teachers who are enrolled in private schools, either they are over whelmed by numbers or she is ignorant or careless. By closing education sector and neglecting private teachers indicated that teaching as a profession is not a key sector. Government allowed boda-bodas and markets to operate showing that government cared more on incomes than life of teachers. Even after the scourge, government did not support private schools and teachers at all as reflected on the table above, some school private investors who had based their constructions on loans sold those schools, all these were being observed by young people hence impacting on their moral decisions on joining teaching profession.

6. Conclusions and Recommendations

In conclusion, the education sector is the key in the life of the nation. It is a task for the government to ensure that disaster preparedness is enhanced in higher learning institutions. This calls for the institutions to develop an emergency plan for education sector to help in the management of pandemics. Both the Government and private sector left teachers "To whom it may concern" and it played a key role in de-motivating our future teachers.

The study recommended that education sector, should always be given priority including but not limited to national budgets. A teacher impacts and influence society, so, government and Institutions of higher learning

should prioritize disaster preparedness and pandemics management in higher learning institute.

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Birth Preparedness and Knowledge among women experiencing first pregnancy attending Egyptian Hospital in Mogadishu, Somalia

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Abstract

The study examined the birth preparedness and knowledge among women of first birth attending the Egyptian hospital in Mogadishu. The study employed a cross-sectional design using both qualitative and quantitative data collection approaches. The study targeted a total 1100 pregnant mothers from whom a sample of 286 was determined using Keish Leslie formula. Data was collected through, interviews, questionnaires, observation and focus group discussion. Quantitative data were captured into MS Excel software cleaned, checked for consistency and then exported to SPSS software version 20 to generate descriptive statistics. Results indicated that 83% of the women were well preparedness for birth while 79% had knowledgeable on danger signs during pregnancy and labour pains. The study concluded that women were found well prepared for birth and were knowledgeable on danger signs during pregnancy. The study recommended that, health workers should intensify health education talks during ANC clinics with special emphasis on the birth preparedness and knowledge on danger signs.

Keywords: Antenatal care, child health, healthcare, maternal health

1. Introduction

Health challenges are a major global concern, and 830 women dying every single day due to the complications of pregnancy and childbirth (WHO, 2017). Birth preparedness is a key component of globally accepted safe motherhood programs, which helps ensure women to reach professional delivery care when labor begins and to reduce delays that occur when

mothers in labor experience obstetric complications (Messay Hailu *et al.*, 2010).

Birth Preparedness and Complication Readiness is among the key interventions that can reduce maternal mortality. Birth is the process of planning for normal birth and anticipating the actions needed in case of an emergency. It is a strategy to promote the timely use of skilled maternal care, especially during childbirth, based on the theory that preparing for childbirth reduces delays in obtaining this care. (Desalegn Markos *et al*. 2014).

Preparedness raises awareness of danger signs thereby improving early problem recognition and reducing the delay in deciding to seek care. Planning for blood donors is also important because women giving birth may need blood transfusions in the event of hemorrhage or cesarean section. However, the practice of individual women identifying blood donors is, however, discouraged in high HIV/AIDS prevalence countries where voluntary donation to centralized blood banks is preferred (Kabakyenga *et al*, 2011).

Emergence obstetric complications that lead to maternal and neonatal mortality include: Hemorrhage which may be antepartum, intrapartum or postpartum; prolonged/obstructed labor; postpartum sepsis; complications of abortion; pre-eclampsia/eclampsia; ectopic pregnancy; and ruptured uterus. The key danger signs of pregnancy and child birth can easily be recognized. They are grouped under three phases of; pregnancy, childbirth and postpartum. The key danger signs during pregnancy include; severe

vaginal bleeding, swollen hands/face and blurred vision while key danger signs during childbirths are; severe vaginal bleeding, prolonged labor (labor lasting more than 12 hours), convulsions and retained placenta. The key danger signs during postpartum include; severe vaginal bleeding, foul-smelling vaginal discharge and high fever.

During, FY 2015/16, the leading causes of maternal death were Obstetric hemorrhage and sepsis accounting for 39% and 20% respectively. Other causes of death were obstructed labor and uterine rupture, pre-eclampsia and eclampsia, complications of un safe abortion each accounting for 9%, other direct causes and indirect causes aggravated by pregnancy. According to the annual health sector performance report 2015/2016, common factors underlying maternal death were delay of the woman seeking help (60%), lack of transport between health facilities (58%), lack of transport from home to health facilities (42%), lack of blood products, supplies & consumables (42%), absence of critical human resource (29%) and other factors.

2. Literature Review

2.1. Birth preparedness

It entails making plans prior to birth to ensure that a pregnant woman is prepared for normal birth and complications (Amano, 2016; Desalegn Markos *et al.*, 2014). The desired steps followed while a woman is pregnant are; identifying a trained birth attendant, identifying a health facility, arranging for transport, identifying a blood donor and saving

money for emergency (Alemu Tamiso, 2015). Taking at least three steps is considered well prepared (Merihun Gebre, 2015).

A birth plan/emergency preparedness plan includes identification of the following elements: the desired place of birth; the preferred birth attendant, the location of the closest appropriate care facility, funds for birth related and emergency expenses, a birth companion, support in looking after the home and children while the woman is away, transport to the health facility for the birth, transport in case of an obstetric emergency and identification of a compatible blood donor.

Birth preparedness is not easy to achieve. Many people in developing countries live on less than 1 USD a day, which is hardly sufficient for them to feed and clothe themselves let alone put aside money for the possibility of an obstetrical emergency. In rural areas the situation is even more complex: even if transportation is available in case of an obstetrical emergency, distance and lack of maintained roads may still cause delays sufficient to put the life of the woman in danger.

Antenatal attendance provides an opportunity to inform and educate pregnant women about pregnancy, childbirth and care of the new born, and therefore enable pregnant women acquire information on danger signs of pregnancy or childbirth. It is anticipated that from antenatal care, women are assisted to develop a birth plan that ensures birth preparedness and readiness in the eventuality of pregnancy or childbirth complications. Such a birth plan is expected to assist women in making choices that would contribute to good pregnancy outcome. (Othman Kakaire *et al.,* 2011)

In a study conducted in Mizan-Tepi University Teaching Hospital, South West Ethiopia among 392 study participants, 200 (51%) identified place for their recent birth while almost half of them 192 (49%) did not identify a place for birth. Majority of respondents 283 (72.2%) identified skilled birth attendant while only 109 (27.8%) of them had not identified a skilled birth attendant for their birth. The least number of respondents saved money and identified blood donors for their birth having 104 (26.5%) and 61 (15.6%) respectively. The study showed that below half of pregnant women 161 (41.1%) were well prepared for birth and obstetric complication (Bayu Begashaw, 2017).

In a study among 707 pregnant women in Southern Ethiopia, majority of the respondents 626 (88.5%) mentioned saving money as a means of preparing for birth and its complications. However, less than a third of them mentioned identifying skilled provider 193(27.3%) as a way of preparing for birth and its complications. Only few mentioned identifying blood donor as a way of preparation for birth and its complications 41(5.8%). Regarding the arrangements made, 502(71.0%) of the pregnant women in the study made some arrangements for birth and its complications. Among the important components considered for birth preparedness and complication readiness, the most common preparation was made for saving money 383(76.3%). Over all, only 212(30%) of the pregnant women were well prepared for birth and its complications and 495(70.0%) of them were not well prepared for birth and its complications (Eshetu Andarge, 2017).

2.2. Knowledge on obstetrical danger signs

In a study conducted in Tanzania by Deogratius Bintabara in 2015, overall, 68.7 %, (294/428) of the respondents were not able to mention obstetric danger signs in any of three phases (Shrestha, 2016). Only 23.6 %, (101/428) of the respondents were able to mention at least a total of five key danger signs in all three phases and considered as knowledgeable on the key danger signs during pregnancy, childbirth/labour and postpartum (Bintabara *et al.*, 2015; Zepre, 2016).

Kabakyenga & Östergren (2011) noted that 64 women, who had delivered within the previous twelve months had attended the minimum recommended four visits of antenatal care and the majority had received education about danger signs (98%), where to go for complications (98%), where to deliver from (98%), identifying a skilled health professional (88%), identifying transport (97%) and saving money (98%). Regarding knowledge of key danger signs, severe vaginal bleeding was the most frequently mentioned complication by women during the following phases; pregnancy (49%), childbirth (64%) and postpartum (57%). Prolonged labor, which is one of the top five major causes of maternal mortality and topmost cause of morbidity in low-income countries, was only reported by 18.3%. The majority of the respondents were able to mention at least one key danger sign in the following phases; during pregnancy (51.8%), childbirth (71.8%) and postpartum (71.6%). However, when the scores were combined for the three periods only 18.7% could mention at least 3 key danger signs in all three periods. (Kabakyenga, 2011). The key danger signs during pregnancy include; severe vaginal

bleeding, swollen hands/face and blurred vision while key danger signs during childbirths are; severe vaginal bleeding, prolonged labor (labor lasting more than 12 hours), convulsions and retained placenta (Messay Hailu et al, 2010).

The key danger signs during postpartum include; severe vaginal bleeding, foul-smelling vaginal discharge and high fever. The question posed to participants to elicit responses on knowledge of key danger signs during the three phases was "In your opinion, what are some serious health problems that can occur during pregnancy/labor and child birth/in the first 2 days after birth that could endanger the life of a woman?" Only spontaneous responses were recorded. Knowledge of at least one key danger sign during any of the three phases (pregnancy, childbirth or postpartum) was coded "Yes" or "No" (Beatrice, 2013)

Regarding knowledge of key danger signs, severe vaginal bleeding was the most frequently mentioned complication by women during the following phases; pregnancy (49%), childbirth (64%) and postpartum (57%). Prolonged labor, which is one of the top five major causes of maternal mortality and topmost cause of morbidity in low-income countries, was only reported by 18.3%. The majority of the respondents were able to mention at least one key danger sign in the following phases; during pregnancy (51.8%), childbirth (71.8%) and postpartum (71.6%). However, when the scores were combined for the three periods only 18.7% could mention at least 3 key danger signs in all three periods (Kabakyenga *et al.*, 2011).

In a study conducted in Lekhnath Municipality, Nepal, only 34.8%,59.0% and 39.7% women had knowledge on at least two danger signs during pregnancy, child birth and postpartum respectively (Raymond A Aborigo, 2014; Markos, 2015). Only one third (33.2%) women had knowledge on all five components of birth preparedness and complication readiness (BPACR). About same proportion (34.2%) women were prepared for all five components of BPACR. But very few proportion (8.4%) women utilized all five prepaid items of BPACR. The study found significant association of BPACR with women's education (p<0.001,Crude OR 38.65,95% CI 9.26---160.68),antenatal care service (p----0.003,Crude OR 11.47,95% CI 1.51---86.73) and awareness on obstetrical danger signs during pregnancy (Crude OR 33.25,95% CI 17.57---68.58),delivery (Crude OR 10.34,95% CI 5.33---20.04),and postpartum (Crude OR 15.38,95% CI 8.61---27.38).The study concluded low level of knowledge, preparedness and utilization of all essential components of BPACR and positive influence of women's education, antenatal care service and awareness on obstetrical danger signs in BPACR (Mulugeta Dile, 2015; Perphle, 2015).

In a study conducted in Mizan-Tepi University Teaching Hospital, South West Ethiopia among 392 participants by Bayu Begashaw in 2017, Majority of pregnant women and their families did not know how to recognize the danger signs of complications. When complications occur, the unprepared family will waste a great deal of time in recognizing the problem, getting organized, getting money, finding transport and reaching the appropriate referral facility. Few mothers encountered serious health

problems in their recent previous pregnancy among the problems hemorrhage comprised 85.7% (Bayu Begashaw, 2017).

In a study conducted by Eshetu Andarge and Aderajew Nigussie among 707 pregnant women in Southern Ethiopia, regarding knowledge of the pregnant women on danger signs, more than a third of pregnant women 256 (36.6%) knew danger signs during pregnancy, a sizeable proportion of 101 (14.3%) knew danger signs during labor and delivery and a third of them 220 (31.3%) knew danger signs during post-partum period (Eshetu Andarge,2017).

3. Methods

The study employed a cross-sectional survey design using both qualitative and quantitative data collection approaches. The study targeted a total of 1100 women experiencing first pregnancy attending Egyptian hospital in Mogadishu Somalia. From this, a sample of 286 was determined using Keish Leslie formula. The respondents were randomly sampled from expectant mothers attending antenatal care at Egyptian Hospital in Somalia. Data was collected through, interviews, questionnaires, observation and focus group discussion. Quantitative data were captured into MS Excel software cleaned, checked for consistency and then exported to SPSS software version 20 and analyzed. Univariate, bivariate and multi variate analyses were done and results are presented in frequency tables, pie charts and graphs. Qualitative data were captured using audio recorder, transcribed and processed in themes, presented and discussed.

4. Results and Discussions

4.1. Birth preparedness

Expectant mothers' level of birth preparedness was assessed by use of a set of seven (07) key items of the birth preparedness plan. A mother was considered to be well prepared if she freely identified a minimum of three items on the list.

Table 1: Birth Preparedness

Variable	Freq.	Percent
Identify a health facility to deliver from	206	72
Identify a skilled birth attendant	114	39.9
Keep funds for birth related and emergency expenses	235	82.2
Pack your birth requirements and for the baby	249	87.1
Having a companion to escort her to the health facility	182	63.6
Identify mode of transport	145	50.7
Knowing your blood group	35	12.2

Source: Primary Data, 2022

Most respondents 249 (87.1) knew that it is important to pack birth requirements for the baby and only 35 (12.2%) knew that it is important to know their blood group in preparation for birth. On these subject most key informants reported that majority of mothers were well prepared for birth because they came to deliver in the health facility with birth companions and with birth requirements for the mother, gloves and baby's clothes. However, majority didn't come with mama kits because they expected to get them freely from the health facilities during delivery. In the words of a maternity in charge;

> "*Most mothers are well prepared because during routine antenatal care, we health educate them about birth preparedness plans and majority mothers come early during labour to deliver in this health facility. However, we get challenged at night to conduct deliveries when supplies like mama kits are out of stock and mothers don't have where to buy them because pharmacies are closed at night.*" (Midwife)

Similarly, most participants in the FGDs agreed that to be well preparedness for birth, one must have attended antenatal care, fed well during pregnancy, prepared clothes and for the baby, bought items like gloves that will be used in giving birth, having transport to the health facility in case of sickness or consultation. They also identified that birth preparedness involves seeking healthcare, delivering from the health facility to avoid complications. For example, in the local language, one mother stressed that; when you deliver at the health facility you rarely get complications and when midwives predict a complication that they can't manage they refer the mother early to where she will get good services. (FGD participant).

Overall, in this study, it was established that majority participants 236(83%) were well preparedness for birth (*See table 4 and figure 2*). This finding is much different and higher than findings in other studies. For instance, in Ethiopia, less than one quarter of study participants were considered well prepared for birth and complication readiness (Bogale, 2014). This may be attributed to frequent ANC visits by these expectant mothers where they are health educated on birth preparedness and danger

signs as reported by respondents that they get knowledge from health facilities.

Majority of respondents 249 (87.1%) had identified packing birth requirements and for the baby followed by keeping funds for birth related expenses 235 (82.2%), followed by identifying a health facility to deliver from 206 (72.0%),followed by identifying a companion to the health facility when labour begins 182 (63.6%),followed by identifying the mode of transport 145 (50.7%),followed by identifying a skilled birth attendant 114(39.9%),and the least was knowing one's own blood group 35 (12.2%).

These findings are similar to findings in other studies (Mihret & Mesganaw, 2007; Merihun et al., 2015; Bogale, 2014; Bintabara *et al*., 2015) where similar elements were identified by more than two-thirds of study participants. Blood and blood products are free in Uganda. Awareness of own blood group is a key element of birth preparedness. Few respondents 35(12.2%) knew their blood group.

Though low, this finding is significantly similar to that by the researcher in Tanzania where seventeen percent of participants identified potential blood donors who would donate blood in case of an obstetrics emergency. However, this finding is also much different from findings in other studies in Ethiopia where less than five percent of participants reported knowing that preparedness for compatible blood donor in case of emergency was necessary (Merihun *et al.,* 2015).

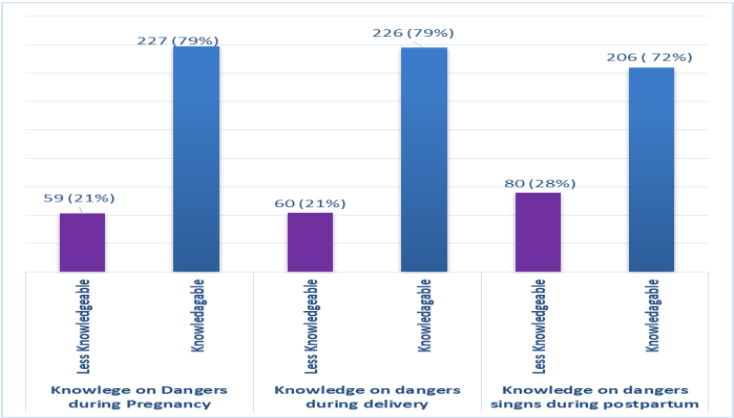

Fig. 1: Knowledge on Danger Signs
Source: Primary Data, 2022

A mother was considered to know danger signs if she correctly spontaneously identified any three of the danger signs in every phase. The above figure indicates that majority of the pregnant women were knowledgeable on the danger signs. Of the respondents, 227 (79%) were knowledgeable on danger signs during pregnancy, 226 (79%) during labour and delivery and 206 (72%) during postpartum period.

This study sought to establish the levels of knowledge of the participants on danger signs during pregnancy, labour and delivery and after delivery. This is because it is the knowledge that is translated into the practice of being well prepared for birth and complications. Hence, participants' knowledge on danger signs was also assessed (*see table 6 and figure 3*). In this study, a participant was considered to be knowledgeable about a danger sign if she correctly identified at least three of the key danger signs out of seven in each phase from during pregnancy to post-partum period.

A mother was assessed to be knowledgeable on danger signs if she correctly identified any three of the danger signs out of seven. It was found that over two thirds of the respondents were knowledgeable on danger signs during pregnancy, during labour and delivery and during postpartum period.

This finding is much different from findings in other studies in north and east Africa (Mihret & Mesganaw, 2007; Bintabara *et al.,* 2015). In Ethiopia, less than ten-percent of participants spontaneously mentioned at least one or two key danger signs and less than one-percent mentioned any three key danger signs. (Mihret & Mesganaw, 2007) whereas in Tanzania, over two thirds of the respondents were not able to mention any obstetric danger signs in any of three phases (Bintabara *et al.,* 2015). This may be attributed to the fact that this study still established that most of the participants reported receiving health information on danger signs from the health facility during ANC while almost ninety percent of respondents in Tanzania reported never being taught about them at all at any stage.

In addition, regarding danger signs during pregnancy, over two thirds of respondents identified bleeding. Over a half of respondents identified severe headache, absent foetal movements, swollen feet or face. Less than a half of respondents mentioned hypertension, pain in upper abdomen and convulsions. Regarding danger signs during labour and delivery, over two thirds mentioned profuse vaginal bleeding and retained placenta. Less than a half of respondents mentioned severe headache, absent foetal movements, prolonged labour, obstructed labour and cessation of labour. Regarding danger signs during postpartum, over two thirds mentioned

profuse vaginal bleeding, high fever, severe headache and fowl smelling vaginal discharge. Less than a half of respondents mentioned swollen feet/face (*see table 6*). These findings are significantly different from findings by other studies in Ethiopia. Less than a quarter of a participants spontaneously mentioned severe vaginal bleeding, prolonged labour, blurred vision, swollen hands/face retained placenta and convulsions as danger signs during labour, high fever, and foul-smelling vaginal discharges (Mihret & Mesganaw, 2007).

5. Conclusions and Recommendations

This study established that majority of mothers were well prepared for birth. Whereas most mothers reported having heard of birth preparedness, less than a half of respondents heard about it from antenatal care clinics. Also, majority mothers didn't know their blood group. The study also established that majority of pregnant women were knowledgeable on the danger signs during pregnancy, labour and delivery and during postpartum period.

The study recommended that Health workers in Health facilities should intensify health education talks during ANC clinics with special emphasis on the birth preparedness and knowledge on danger signs, All mothers should be well prepared for birth and knowledgeable on danger signs during pregnancy, labour and delivery and after delivery so that in case of any impending complication, expectant mothers can seek for interventions early to prevent maternal morbidity and mortality, Medical Director should lobby from implementing partners to fund refresher trainings or capacity

building programs to equip more knowledge and skills to health workers on antenatal care, and Federal government should increase the budget for medicines and supplies like oxytocin, vitamin k, gloves and mama kits.

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Contributions of agricultural-based SACCOs to socioeconomic development of Kajjansi Town Council in Wakiso, Uganda

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Abstract

The study assessed the contribution of SACCOs to the social economic development of Kajjansi town council Wakiso, Uganda. The study applied a correlational descriptive design where qualitative and quantitative ways of both analysis and collection of data were used. Data was collected using questionnaire and interview guide. Both descriptive and inferential statistical techniques of analysis were used. The study revealed and indicated a strong positive correlation between SACCO and social economic development in Kajjansi Town Council. Activities of agriculture-based SACCOs and socioeconomic growth ($r = 0.712^{**}$ and Sig = $0.000 \leq 0.01$). *The study recommends that: government build capacity of SACCOs in leadership and decision-making, management of SACCOs should enhance the control of loan default, improve decision-making, and train in entrepreneurship.*

Keywords: Decision-making, loan default, SACCOs, socioeconomic development

1. Introduction

Despite massive progress in the past few decades, global social economic development in all its different dimensions remains a broad and entrenched problem (Nkurru, 2015). For example, today, more than 700 million people

subsist on extremely low incomes. Every year, five million children under five years die of diseases that often could have been prevented or treated by a handful of proven interventions. Again, a large majority of children in low- and middle-income countries attend primary school, but many of them leave school lacking proficiency in reading, writing and mathematics. How to effectively reduce global social economic development challenges remain one of humankind ‘s most pressing questions (Flynn, 2013). It is also one of the biggest questions facing the discipline of economics since its very inception.

The history of SACCO Societies shows that they were formed initially for the relief of poverty among the poorer economic classes in Europe, United Stated and India, they were not that much promoted in rural area of developing countries (USAID 2006). Co-operatives have played an important role in the development of the economies of Kenya, Uganda and Tanzania and have led to the uplifting of the standards of living of the people. According to Kohls (2002) cited in Nkuru (2015), cooperative societies are legal, practical means by which a group of self-selected, selfish capitalist seek to improve their individual economic positioning a competitive society. Co-operatives have been involved in the provision of credit for the purchase of land, farm inputs, housing, education, medication and development of various business ventures. It is estimated that there are more than 10 million cooperative members in the region (Nkuru 2015).

In Uganda, SACCOs are run and managed by their owners who happen to be the members (Kamulegeya, 2016). SACCOs were introduced through the Uganda Cooperative Alliance (UCA). The main purpose of the

SACCOs was to provide financial services based on self-reliance and to mobilize farmers to manage their financial needs to promote income generating activities to alleviate poverty especially in rural areas (Kayonjo, 2013). The government has been pre-occupied with attempts to increase household incomes among the population. It identified micro finance as a tool in reducing poverty and enhancing economic growth which heightened the formation of SACCOs in Uganda.

Of recent, the government of Uganda launched the Parish Development Model (PDM) on February 26th, 2022, aiming at lifting 39% (about 3.5 million people) of households from the subsistence to money economy. The government plans to send each parish shillings 17 million in the current financial year and later increase to Shillings 100million in the next financial year. The parish revolving money is to be channeled through SACCOs with the help of parish chiefs immediately (Eloisa, Candace, 2022). SACCOs in Uganda are fundamental for social economic development (National Planning Authority [NPA], 2021; Bank of Uganda, 2022). They are conduits for development finance from government and development partners such as development banks, NGOs among others. Notably, SACCOs increase financial inclusion through which many economic activities are financially supported to increase production, generate employment opportunities and tax revenue among others. For instances, through parish development model (PDM fund) championed and pioneered in all local government across the country is believed to employ 75% of our population who are employed in noncommercial and subsistence sector to improve livelihoods of our Ugandan population (NPA, 2021).

SACCOs in Kajjansi have been increasing in number since 2011 and by the end of 2021 had reached a total above 70 and their average profitability stood at 2% and the average liquidity stood at 11% (Wakiso District Commercial Report, 2021). Despite improvements in the number of SACCOs in Kajjansi Town Council, there was limited literature on the contributions of SACCOs towards socioeconomic development of Kajjansi Town Council to support policies and strategies. Notably, the current statistics show that Wakiso is among the poor performing districts as far as SACCOs performance in Ugandan urbanized area is concerned (Hendricks & Chidiac, 2011; Muhumuza, 2022).

2. Methods

The study used a mix of correlational and descriptive research design and collected data using primary sources. The self-administered questionnaires and interview guide were the main data collection instruments. The questionnaire had mainly closed ended questions and a few open-ended questions and the interview guide had only unstructured questions. The sample size of study was 113 respondents and was drawn from a population of 200 elements. The sample design included both probability and non-probability sampling. Simple random sampling and purposive sampling were used for selecting respondents. Data was analyzed using SPSS to generate frequency, percentages, mean, standard deviation, correlations and regression. The response rate for the study was 113 out 132 targeted respondents giving a response rate of 85.6% and a non-response rate of 14.4%.

3. Results and Discussion

3.1. Contribution of agriculture-based SACCOS and socioeconomic growth

The study examined the contribution of activities of agriculture-based SACCOS to the socioeconomic growth of Kajjansi Town Council. Wakiso district. In this section, the descriptive statistics of each variable are presented and responses classified into five levels using a Likert scale on the key: A = Agree, SA=Strongly Agree, NS=Not Sure, D=Disagree while SD=Strongly Disagree as presented as seen in Table 1 below.

Table 1: Contributions of *agricultural-based* SACCOS to socioeconomic growth

Statement	**SD**	**D**	**NS**	**A**	**SA**	Mean	**S.Dev.**
Food security (Poultry keeping) that improved feeding among the population	3.5 %	8.8 %	7.1 %	42.5 %	38.1 %	4.03	1.065
Piggery generates employment that improved house hold incomes	4.4 %	26.5 %	6.2 %	60.2 %	8.0 %	3.39	1.129
Agricultural Exports (Horticulture) that improved country's GDP	3.5 %	13.3 %	15.0 %	60.2 %	8.0 %	3.56	.944
Fish farming and provision of raw material to mushrooming industries	8.0 %	4.4 %	19.5 %	32.7 %	35.4 %	3.83	1.195
Mushroom growing and market for agricultural products that improved turnover/revenues	8.8 %	1.8 %	15.0 %	38.1 %	36.3 %	3.91	1.177
Cattle keeping (Zero grazing) for Research and Training that improved local skills	5.3 %	9.7 %	19.5 %	41.6 %	23.9 %	3.69	1.103
Mean & SD. N = 113						**3.65**	**1.143**

Source: Primary Data, 2022

The table above shows descriptive results in relations to activities of agriculture-based SACCOS and socioeconomic growth. On the statement that activities of agriculture-based SACCOS have improved food security (Poultry keeping) that improved feeding among the population. The majority of respondents agreed with 42.5%and strongly agreed 38.1% totaling 80.6% while 3.5% strongly disagreed and 8.8% disagreed, 7.1%were not sure, this percentage were confirmed by a mean value of 4.03 indicating agreement and a standard deviation of 1.065 indicating divergence of opinions. Those that agreed who were the majority used their firsthand experience of activities of agriculture-based SACCOs to the socioeconomic growth in the area of study to inform this research. More than half of the respondents who answered questionnaires indicated that agriculture-based SACCOs in Kajjansi contributes greatly to the socioeconomic growth as a result of food security that improved feeding among the population. This finding is in support of the assertion of Kayonjo (2013) who found that people who had access to SACCOs had attained positive impacts like improved production. This does not only increase their income but also ensure food security of the families and consequently socioeconomic growth.

On the statement whether cattle keeping (Zero grazing) for Research and Training that improved local skills The majority of respondents agreed with 41.6% and strongly agreed 23.9% totaling 65.5% while 5.3%strongly disagreed and 9.7% disagreed, 19.5% were not sure, this percentage were confirmed by a mean value of 3.69 indicating agreement and a standard deviation of 1.103 indicating divergence of opinions. This implies that

majority of the respondents believe that cattle keeping through Zero grazing for Research and Training improves local skills for socioeconomic growth of Kajjansi Town Council (Wakiso District Commercial Office Report, 2021).

When asked about piggery and employment generated that improved house hold incomes through SACCO funds, majority respondents agreed, with 60.2% and strongly agreed 8.0% totaling 68.2% while 4.4% strongly disagreed and 26.5% disagreed, 6.2% were not sure, this percentage were confirmed by a mean value of 3.39 indicating agreement and a standard deviation of 1.129 indicating divergence of opinions. This means majority feels piggery has great contributed to socioeconomic growth of Kajjansi Town Council. However, there were also a substantial number of respondents who disagreed. It is not clear where the disagreement stems from. However, there is no doubt that piggery generates income the improves households' socioeconomic growth.

When respondents were asked about agricultural exports (Horticulture) that improved country's GDP through agriculture-based SACCOs, the responses were similar to the piggery issue with 60.2% and strongly agreed 8.0% totaling 68.2% while 3.5% strongly disagreed and 13.3% disagreed, 15.0% were not sure, this percentage were confirmed by a mean value of 3.56 indicating agreement and a standard deviation of 0.944 slight convergence of opinions. This majority response above average agreeing means Agricultural Exports (Horticulture) has greatly contributed to the socioeconomic growth of Kajjansi and improved country's GDP for

growth. However, there were also a number of respondents who had no information as indicated by a big percentage of those who are not sure.

According to responses on fish farming and provision of raw material to mushrooming industries, majority respondents as depicted, 32.7% agreed, 35.4% strongly agreed, 4.4% disagreed, 8.0% strongly disagreed and 19.5% were not sure with a mean value of 3.83 indicating majority agreement and standard deviation of 1.195 indicating varying responses on the matter. This means majority confirms that SACCOs fund fish farming that provides raw material to mushrooming industries which greatly contributes to the socioeconomic growth of Kajjansi Town Council. It is important to note that there was quite a big number of those who are not sure indicating lack of information as to whether SACCOs fund fish farming that provides raw materials for mushroom industry and socioeconomic growth.

In addition, whether mushroom growing and market for agricultural products supported by agricultural-based SACCOs really did improve turnover/revenues, people's responses were, 38.1% agreed, 36.3% strongly agreed, 8.8% strongly disagree, 1.8% disagreed and 15.0% were not sure with a mean value of 3.91indicating majority agreement and standard deviation of 1.177 indicating varying responses on the matter. This implies majority respondents witnessed the socioeconomic growth as a result of mushroom growing and market for agricultural products supported by agricultural-based SACCOs in Kajjansi Town Council.

The findings above are in agreement with the assertion of Nuwagaba (2012) who established that value chain mapping proved to be a highly effective platform for engaging farmers, agribusinesses, and a range of financial institutions in creative, collaborative financing efforts to the benefit of all parties. Working within value chains is an active tool in supporting production and marketing provided there is a built-in structure that facilitates moving financing opportunities from paper to reality. This helps farmers realize more income from their farm engagements throughout the value chain.

The above findings are also in agreement with the assertion of the SME Working Group (2017) who found that SACCOS assists farmers with the construction of processing plants. For example, a dairy- based SACCO formed a subsidiary that established a milk processing plant for farmers, who deliver their milk to the factory and are paid through the Sacco. Loans from SACCOs have assisted farmers in other areas as well, such as allowing them to purchase insurance to protect against crop failure or loss of livestock due to drought. These activities of agricultural-based SACCOs aid the socio-economic development of farmers as the generate income that improves farmers' livelihood and standards of living.

3.2. Correlations between activities of agriculture-based SACCOs and socioeconomic growth

The first objective of the study was to examine the contribution of activities of agriculture-based SACCOS to the socioeconomic growth of Kajjansi town council. To test the magnitude of the relationship between activities

of agriculture based SACCOs and socioeconomic growth, a correlation analysis was done and the results are presented in Table 2 below.

Table 2: Correlation between Activities of agriculture-based SACCOs and socioeconomic growth

		Activities of agriculture-based SACCOs	Socioeconomic growth
Activities of agriculture-based SACCOs	Pearson Correlation	1	.712**
	Sig. (2-tailed)		.000
	N	113	113
Socioeconomic growth	Pearson Correlation	.712**	1
	Sig. (2-tailed)	.000	
	N	113	113
**. Correlation is significant at the 0.01 level (2-tailed).			

Source; Primary Data, 2022

Findings from Table 2 revealed a strong positive significant relationship between Activities of agriculture-based SACCOs and socioeconomic growth with a Pearson correlation r = 0.712**and Sig = 0.000≤0.01. The positive relationship means that an increase in activities of agriculture based SACCOs will lead to a corresponding increase in socioeconomic growth in Kajjansi Town Council. Since the relationship is strong and significant, it can be argued that activities of agriculture based SACCOs influences socioeconomic growth of Kajjansi Town Council. This further implies that the variation in the economic situation and socioeconomic growth could partly be explained by availability of agricultural-based SACCO. If the economic situation is to improve further, access to agricultural-based SACCOs should be increased.

The study assessed the contribution of activities of agriculture-based SACCOS to the social economic development of Kajjansi Town Council. Basing on the results obtained, it was found that there is a strong positive significant relationship between Activities of agriculture-based SACCOs and Social economic development with a Pearson correlation r = $0.712^{**}$and Sig = $0.000 \leq 0.01$when tested at 99% confidence level. The regression results revealed that activities of agriculture-based SACCOs contributes by 50.3% in influencing variation in socio economic development in Kajjansi Town Council. In support of the above finding, it was elaborated that funding agriculture-based activities through SACCOs improves socio economic development by reducing poverty and increasing household incomes. This was supported by an average mean of 3.65 that indicated agreement to most of the items in relation to activities of agriculture-based SACCOs.

The findings support of the assertion of Kayonjo (2013) who found that people who had access to SACCOs had attained positive impacts like improved production. This does not only increase their income but also ensure food security of the families and consequently socio-economic development.

Furthermore, the finding above supports the assertion of Muhumuza (2022) who argued that while SACCOs provide employment opportunities to many people, their main impact is visible in terms of their contributions to poverty reduction and the strengthening of economic resilience, both achieved by supporting income-generating activities. SACCO members are engaged in business enterprises across many different sectors of the

economy. These include trade, manufacturing, agriculture, forestry, fishing, transport and storage and all these sectors contribute to socio economic development.

4. Conclusions and Recommendations

The study concluded that there is a positive significant relationship between activities of agriculture-based SACCOS and Social economic development. If the socio-economic situation is to improve further, access to agricultural-based SACCOs funding should be increased. Access to agriculture-based activities of SACCOs are often hampered by risk involve in agriculture in Uganda. The null hypothesis stated as "the agriculture-based activities financed by the SACCOs have no significant impact on the social economic development of Kajjansi town council. Wakiso, Uganda" is therefore rejected.

The study concluded that there is a positive significant relationship between activities of manufacturing-based SACCOs and Socio-Economic Development. If the economic situation and is to improve further, access to manufacturing-based SACCOs should be increased. Focus has been on the big manufacturers, however, there is need for the small manufacturers like the brick layers, bakers, salons to also access finance for improved socio-economic development. The null hypothesis stated as "the manufacturing-based activities financed by the SACCOs have no significant impact on social economic development of Kajjansi town council. Wakiso, Uganda" is therefore rejected.

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