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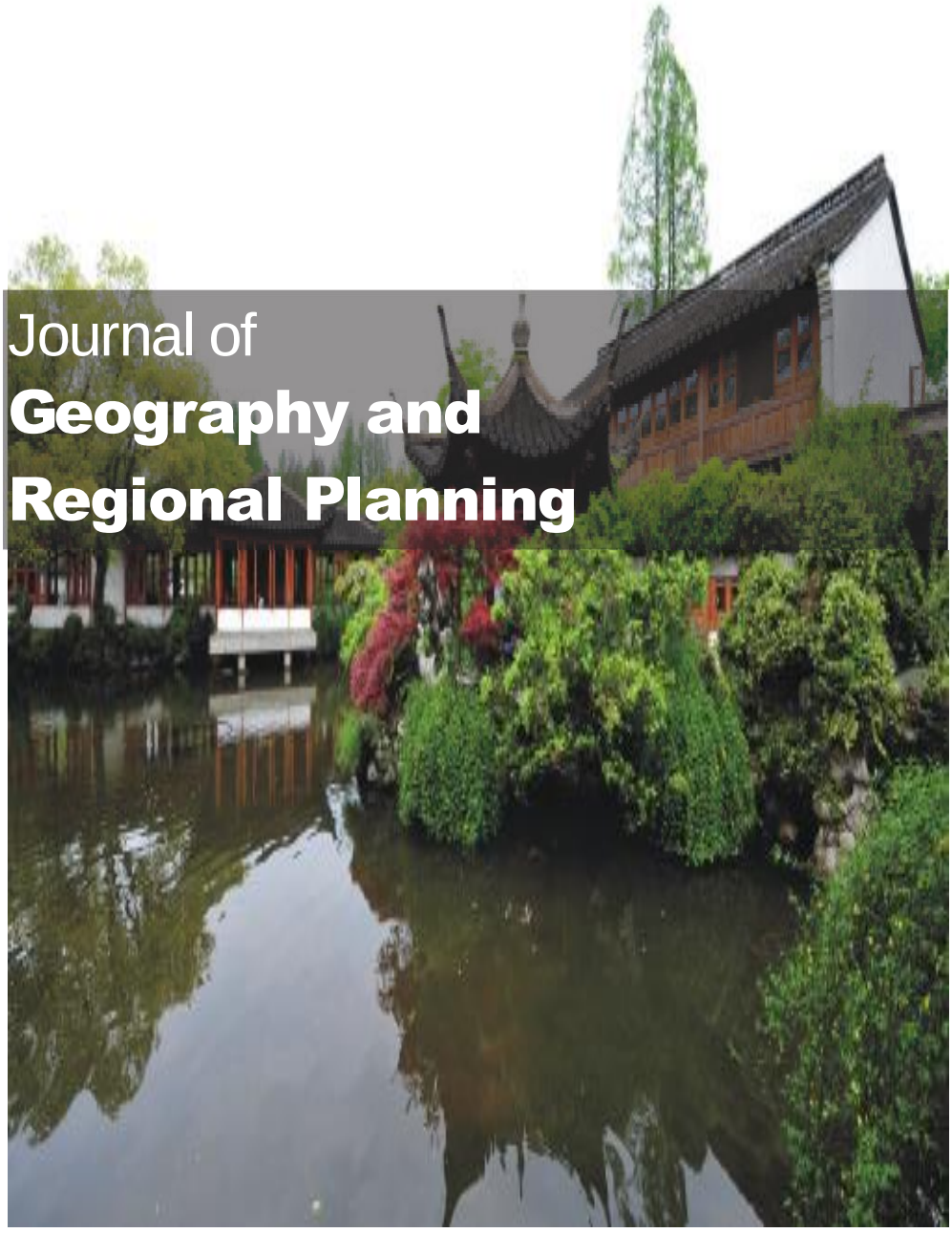

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Full Length Research Paper

Analysis of the effects of climate variability on maize yields in Tano North District, Ahafo Region, Ghana

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This study focuses on the effects of climate variability on maize yields in Tano North District for a 20-year period spanning 1995 to 2015. The Department for International Development model, the "Livelihood Sustainable Framework" was used to drive the tenets of the study which was informed by the Action Theory of Adaptation. Three farming communities namely; Duayaw Nkwanta, Yamfo and Tanoso were purposively selected for the study. A cross sectional study design, mixed method and pragmatic research approaches were used for the study whilst the probability and non-probability sampling methods were applied for the selection of the sample. The quantitative data were analyzed using descriptive statistical tools like frequency using percentages and charts to present the final results. The thematic analyses were used for qualitative data based on common themes in the different responses and direct quotations were used to support the themes to address the research questions. Maize farmers observed that declining rainfall and increasing temperature had a significant negative influence on maize yields which means climate variability has had negative effects on maize yields. Coping and adaptation strategies to address the effects of climate variability on maize yields include on-farm adaptation strategies like application of agro chemicals, crop diversification, change in farm location, irrigation and off-farm adaptation strategies like migration, trading, poultry and livestock rearing. The findings have justified the Action Theory of Adaptation and the conceptual framework of the DFID's Livelihood Sustainable Framework.

Key words: Climate variability, maize farmers, coping strategies, adaptation strategies, Tano North District (TND), and cross sectional study design.

INTRODUCTION

Climate variability is a relevant issue influencing the livelihood and food security in both developing and developed countries. The Food and Agricultural Organization (FAO, 2011) argues that many countries worldwide are experiencing food crisis because of droughts and floods linked to climate variability. Although climate variability is one of the largest threats to the world, the poor regions, especially in Africa, have been suffering the most because these areas are least equipped to cope with climate variability effects

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(Mahmood and Jia, 2018). In addition, the situation is expected to become severe in the coming few decades with the changes associated with extreme climatic events. “Climate Variability” refers to a change in the state of climate that can be identified by changes in the mean and/or the variability of its properties which persist for an extended period, typically over decades (IPCC, 2014). It is manifested through: (i) rising temperature (ii) unpredictable rainfall pattern and increased variability (iii) rise in sea level and (iv) high incidence of extreme weather and disasters (IPCC, 2014).

The IPCC (2013) states that Africa is one of the continents mostly influenced by climate variability due to 1°C increase in average annual temperature in the last 30 years (1970 – 2000). Egyir et al. (2015) estimated that temperature will continue to rise, whereas rainfall is also forecasted to decrease in all agro-ecological zones in the country. Studies have revealed that most countries in Sub-Saharan Africa (SSA) are largely dependent on agricultural production (Apata et al., 2011; Alvaro et al*.,* 2009; Burke et al., 2009). These studies revealed that about 17% of Gross Domestic Product (GDP) was derived from agriculture sector in sub-Saharan African countries between the years 2005-2008. It is expected that variability in climate will have serious environmental, economic and social effects on Ghana particularly among rural farmers whose livelihoods depend largely on rainfall.

Agriculture, primarily subsistence is the most important sector of Ghana’s economy, with the sub–humid agro-ecological zone being one of the major food producing areas (World Bank, 2018). Agriculture accounts for nearly one quarter of GDP and employs more than half of the workforce, mainly small holders (Ghana Fact Sheet, 2014). There is however, little knowledge on whether farmers perceive climate variability and have observed the effects of climate variability on maize yields as well as adopted coping and adaptation strategies to climate variability in the Tano North District of the Brong-Ahafo Region now split into Bono, Bono East and Ahafo Regions.

Climate stimuli such as erratic and irregular patterns of rainfall and uncertain temperature directly affect agricultural productivity, and influence farmers’ response to the effects of climate variability on agriculture. Both male and female maize farmers in developing countries in Africa experience different levels of vulnerability to climate variability on agricultural systems (Macharia and Raude, 2017). The study examined the effects of climate variability on maize yields and maize farmers’ adaptation strategies to climate variability in the Tano North District, Ghana.

Farmers have observed changes in rainfall and temperature which they associate with variability in the climate. The farmers’ perception is based on the fact that elsewhere, rainfall trend has been increasing over the past three decades (1980 - 2010). Other regions portray decreasing rainfall trend over the same period whilst temperature trend in all the regions shows increase for the past 30 years (Peprah, 2014). This understanding is supported by the effects of occurrence of extreme weather events, for instance, occurrence of unpredictable rainfall, uncertain temperature and long dry spells over a long period of time on livelihoods of a locality.

The study adopted the DFID’s “Livelihood Sustainable Framework” model to drive the tenets of the study which was informed by the Action Theory of Adaptation (Eisenack et al*.,* 2012) to examine farmers’ coping and adaptation strategies to climate variability.

The core concepts in the Eisenack et al*.* (2012) Action Theory of Climate Variability include the stimulus, exposure, and impact concepts etc. A stimulus (rainfall and temperature patterns) is a change of meteorological factors resulting from climate variability. A stimulus (rainfall and temperature patterns) influences an exposure unit (social, technical or non-human systems) actors that depend on climatic conditions such as rainfall and temperature which may result in low crop yield, stunted growth and/or crop failure in the study area. The theory focuses precisely on individuals and collective actors built around established concepts. It posits on the fact that actions require actors and must be supported by intentions. These intentions are geared towards the effects of stumuli-climate variability (Eisenack and Stecker, 2010). Moreover, adaptation requires the use of resources as means to achieve the intended ends. The action theory on adaptation is hereby regarded as an appropriate body of knowledge to put the study into a broad theoretical perspective within research and academic discourse (Figure 1`).

The DFID (1999) “Livelihood Sustainable Framework” was adapted and modified to form a new model known as “Climate variability and livelihood adaptation strategies” which was specifically concerned with the shocks of climate variability and use of assets as livelihood strategies to address the menace.

The vulnerability context encompasses the external conditions within the environment which affect the people (maize farmers). Crucial trends coupled with trauma and their reoccurrence, over which people have little or no power, have a high influence on people’s livelihoods and on the wider presence of assets. Not all of the trends and their reoccurrence must be considered as negative. Vulnerability is evident in the TND when maize farmers are faced with harsh conditions such as threat or shock of climate variability with insufficient capacity to respond appropriately. It is crucial in assessing the causes of poverty by determining risk and vulnerability of maize farmers as a result of the effects of climate vulnerability in TND. From Figure 2, in this context, risk refers to the possibility of events (external) of trauma, distresses, worries and their likely austerity, whereas vulnerability is the stage of disclosure to risk (hazard, shock) and doubt, and the ability of individuals or households (maize farmers) to prevent, minimize or cope with the risk due to

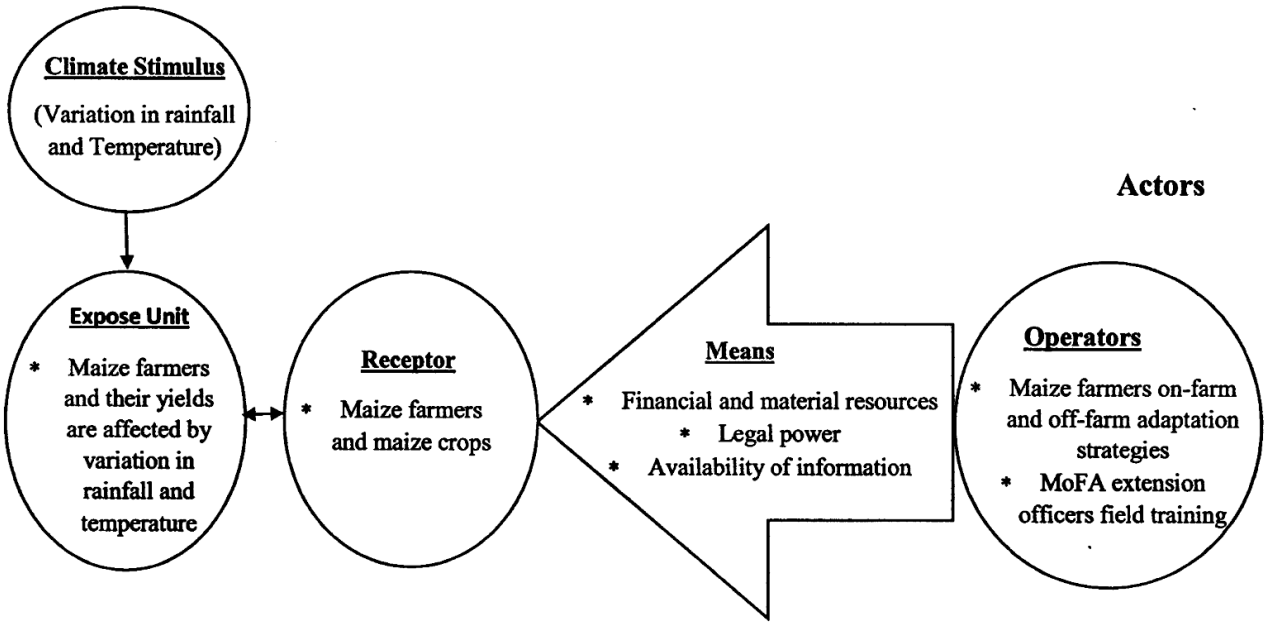

Figure 1. Schematic representation of some core concepts of the Action Theory of Adaptation.
Source: Eisenack and Stecker (2010).

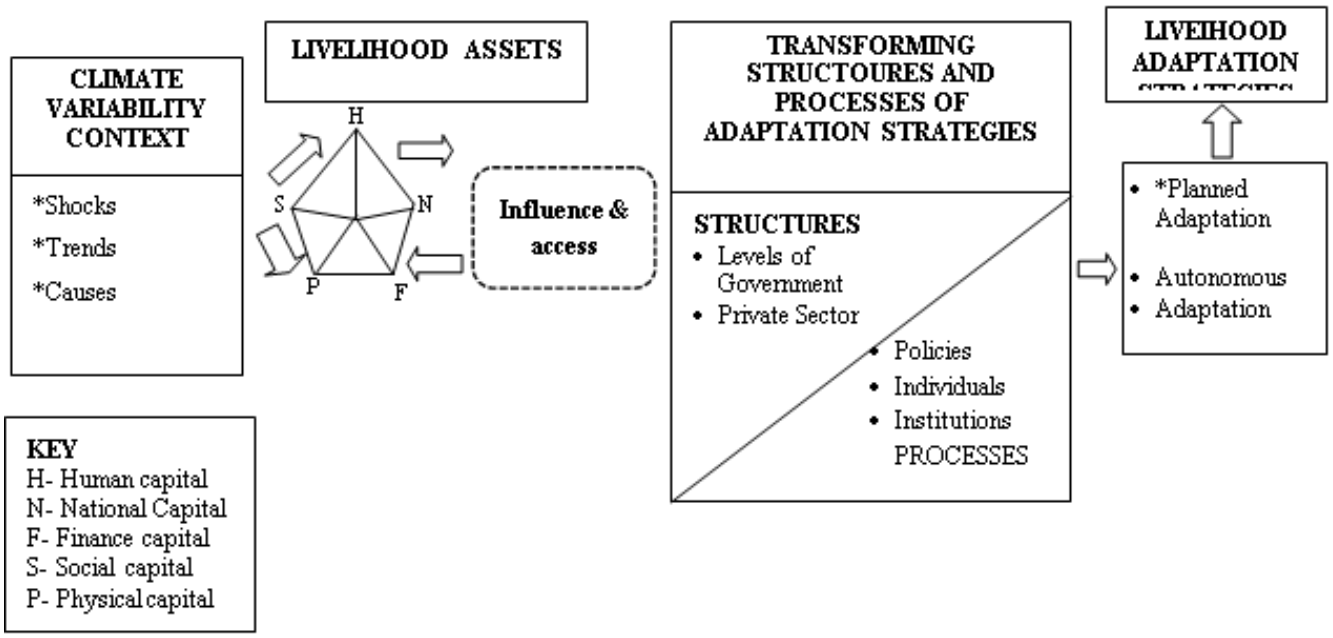

Figure 2. Climate variability and livelihood adaptation strategies.
Source: Authors Construct (Adapted and modified from DFID, 1999).

the prevalence of climate vulnerability in TND.

The livelihood approach covers first of all the well-being of the people (maize farmers); it focuses on getting precise and pragmatic understanding of maize farmers' strengths (here called "assets"). It is critical to examine how maize farmers try to transform these assets into positive livelihood outcomes. The approach is premised on the assumption that most people need several assets to obtain positive livelihood outcomes. Therefore, the SLF recognizes five types of assets or capitals of farmers

upon which livelihoods are assembled, these are; human capital, social capital, natural capital, physical capital and financial capital.

In addition, the availability of motorable roads, access to weather information and reliable energy/power support farmers' ability to produce maize yields in TND. Financial capital is the existence of Farmer Cooperatives Unions, Micro Finance Institutions, Rural Banks (Tano Rural Bank) and remittances from relatives of farmers which enable them to raise enough funds to cultivate maize on large tracts of land. Moreover, most farmers gain capacity from such financial sources to adapt to climate variability in times of low crop yield or crop failure in the District. The justification for the use of DFID's approach to agriculture sought to examine and identify shocks, trends, and causes of climate variability and the need to emphasize the farmers' livelihood assets as prerequisite for making on-farm and off-farm adaptation policies and subsequent implementation of the policies at the farm level to bring about the needed modification in the agriculture sector.

Maize production is isolated for study since it is a key staple food in Ghana and essentially in the study area. Besides, it is a commercial crop which is a source of livelihood for many farmers in Ghana and the study area in particular. Various reports by the Intergovernmental Panel on Climate Change (IPCC) (2013, 2014) have indicated that Africa is one of the most exposed continents to a lot of destruction due to effects of climate variability, because, it often lacks proper adaptation strategies. The threat of climate variability to national development in Ghana is acknowledged with commitments and efforts put in place to address the concerns by agriculturalists and Ghana Trade Unions (Otoo and Asafu-Adjaye, 2014). Matters concerning climate variability and agriculture have attracted the attention of a number of researchers and research institutions globally (IPCC, 2014; Manyeruke et al*.,* 2013). This therefore affirms the existence of climate variability as a serious problem of concern for a developing country like Ghana since agricultural activities are dependent largely on climatic variables like rainfall and temperature, hence more research work must be conducted.

The study area, TND is importantly noted for the production of maize which is basically rain-fed (MoFA, 2013; GSS, 2014). Since agricultural (food crop cultivation) practices in the locality depend largely on rainfall, food security at the district level becomes threatened if the district is adversely affected by uncertainties in rainfall and temperature patterns, and other significant weather events. Also, climate variability poses a great threat to decreasing crop yields and/or crop failure, contributing to increased hunger due lack of food security. Indigenous farmers are not only enthusiastic bystanders of climate variability but are also actively trying to adapt to the changing conditions.

Moreover, literature has focused on either using qualitative methods alone or purely quantitative methods to look at climate variability and crop production. However, the use of mixed method to study maize farmers' observed effects of variability in climate on crop yield is ill-explored. This study used the mixed method strategy.

Several studies have been conducted in Ghana on effects of climate variability on crop yield by researchers including Codjoe et al*. (*2013), Barimah et al*.* (2014), and Fosu-Mensah et al*.* (2012). These studies gave attention to the broad effects of climate variability on agriculture but not on maize farmers' observed effects of climate variability on maize yields. Also, a study conducted by Acheampong (2015), in Tano North District focused on the assessment of rainfed maize production but did not focus on maize farmers' observed effects of climate variability on maize yields. Therefore, from a reconnaissance survey, it was realised that in the study area, little work has been done on maize farmers' observed effects of climate variability on maize yields and the need for adoption of coping and adaptation strategies to climate variability. The need to beef up literature by gathering information required on maize farmers' observed effects of climate variability on maize yields and the adopted coping and adaptation strategies on and off the farm in Ghana, and the study site in particular, was thus necessary.

The objectives of the study were to

(1) Analyze the effects of climate variability on maize yields in the Tano North District.
(2) Examine the coping and adaptation strategies to improve maize production in the Tano North District.

MATERIALS AND METHODS

The district covers a total land area of 837.4 km^2 and constitutes about 1.8% of the total land area of the Brong-Ahafo Region (Ghana Statistical Service, 2014a). In relative terms, the Tano North District is located south east of the Brong-Ahafo Region of Ghana. The total population in TND is about 79,973 with 50.5% females and 49.5% males (Ghana Statistical Service, 2014b). Although the district has both rural and urban settlements, the rural settlements account for 55.4% whilst urban settlements account for 44.6%. The implication here is that the district has majority of the people in the district in the rural areas (Tano North Profile, 2010). The agricultural sector is the most important sector that provides employment opportunities for half of the district's working force. The dominant economic activities of the people in the district are primary economic activities such as agriculture, forestry, fishing etc. It employs about 62.5% of the labour force in agriculture, forestry and fishing (Tano North Profile, 2010).

Agriculture can be used as a focus for economic growth to result in decline in poverty rate in the district. Maize is seen as a major staple crop in the study area and is therefore cultivated by many farmers. Some maize farmers in the district have formed farmers' association to cater for the welfare of members especially during hard times (Tano North Profile, 2010).

The dominant soil type of the area is forest ochrosols, generally considered to be fertile and appropriate for growing a wide range of

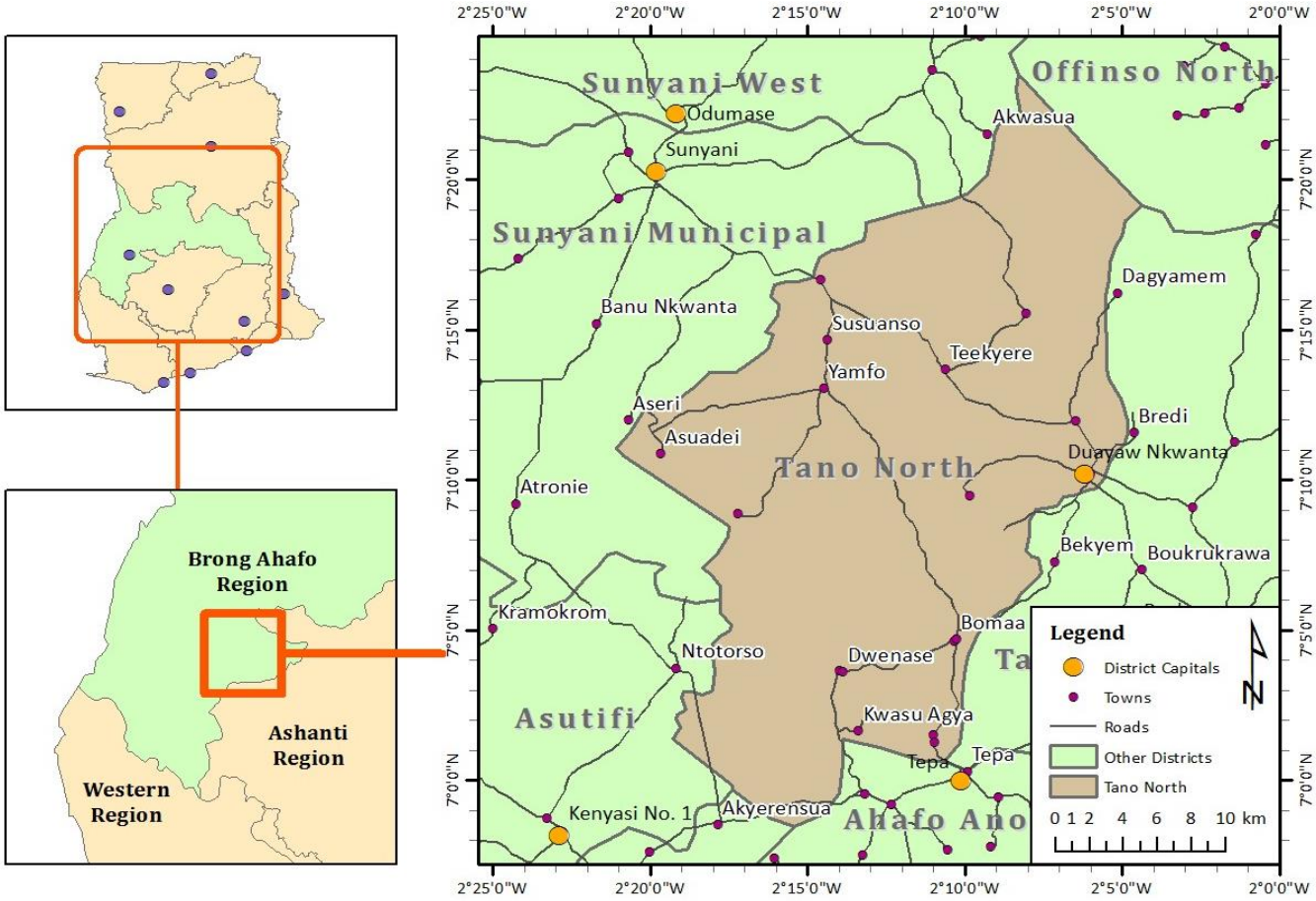

Figure 3. Tano North District map.
Source: Ghana Statistical Service (2014).

arable crops such as maize. The prevalence of climate variability has resulted in loss of some amount of soil moisture affecting crop yield including maize. The prevalence of climate variability in the study area threatens to transform natural ecosystems and disrupt human, social and economic systems that rely on them, perhaps to an unprecedented degree and within a relatively short and long time period respectively.

The area is dissected by Tano River and its tributaries including Subriso, Kwasu and Mankran etc. Rivers in the district are in the closed forest. The water bodies increase in volume in the rainy season due to heavy rainfall and erratic rainfall in the course of the year. The relatively high temperature results in drastic decline in the water volume in rivers and streams during the dry season. Some parts of the district are well drained especially where the place is noted for well-developed loamy soils that support the cultivation of arable crops whereas other parts are poorly drained due to the fact that the bedrock is an impermeable one and clayey soils (Ghana Statistical Service, 2014b). The Tano North District map is shown in Figure 3.

Sampling design and data collection

A pragmatic research philosophy was used for the study, which is a paradigm for social science research that advocates the use of mixed method and serves as a basis for supporting both quantitative and qualitative approaches. The use of pragmatism in the past decades as a research method has become a novelty (Givón, 2014). This paper adopted the mixed method approach and cross sectional design which enabled the researcher collects quantitative data once from the respondents using the questionnaire instrument and interview whereas the qualitative method such as focus group discussion and observation helped the researcher to get in-depth understanding of the issues.

Multi-stage cluster sampling was used to cluster communities in the TND into urban areas, semi-urban and rural areas. Three communities within the study area were purposively selected. These were; Duayaw Nkwanta (urban area), Yamfo (peri-urban area) and Tanoso (rural area) in the Tano North District based on the intensity of agricultural activities, demographic characteristics, spatial location and climatic features of respective areas relevant to the study. Most of the households in the selected communities were predominantly engaged in maize farming in the TND.

A total of 135 maize farmers (45 from each community) were used for the study. The sample was selected from a total of 204 maize farmers secured from the office of the Ministry of Food and Agriculture (MOFA) at Duayaw Nkwanta. The distribution is indicated in Table 1.

The farmers from each community were screened to purposively select 45 respondents who had lived in the community for a minimum of 20 years. They served as eligible respondents for the survey. The selection of respondents in the study communities was

Table 1. Sample allocation.

Study community	Sample frame	Sample size	Males	Females	%
Duayaw Nkwanta	78	45	37	8	33.33
Yamfo	67	45	30	15	33.33
Tanoso	59	45	20	25	33.33
Total	**204**	**135**	**87**	**48**	**100**

Source: Author, 2018

conducted as follows; in the case of Duayaw Nkwanta, 45 eligible respondents were selected from the sample frame of 78 respondents through random sampling with preliminary questions to ascertain their suitability for the survey. To ensure uniformity in the sample size for all study communities, random sampling with preliminary questions were used to select 45 eligible respondents each from the sample frame at Yamfo (67) and Tanoso (59) respectively, thereafter the process was discontinued. Some initially showed little interest but were later convinced to participate in the survey. They were assured of confidentiality of response, avoidance of bias, ethical consideration and respectful treatment. Also, farmers were informed about the social value of the study which sought to bring modification in agriculture in the district to improve crop yield. Therefore, the respondents agreed to participate and gave informed consent.

Thereafter, all respondents agreed to participate in the survey. Two (2) other stakeholders each were purposively selected as key informants from the Ministry of Food and Agriculture (MoFA), and Ghana Meteorological Authority (GMA) to collect primary and secondary data respectively. The basis for the choice of the sample size was due to convenience in using the sampling method to make inference from the target population as well as generalization in relation to the adapted concepts and theories for the study.

The quantitative data was gathered through interview of respondents administered questionnaire in the field of study. The quantitative data collected were carefully examined, summarized, processed, coded using the Statistical Package for Social Sciences (IBM SPSS software version 18) and statistically analyzed using descriptive statistical tools like frequency with percentages and charts to present the final results. The researcher sought respondents' opinions and views using focus group discussions and by observing participants through their responses on effects of climate variability on maize found on maize yield. The qualitative data collected were analyzed thematically based on common themes in the different responses and direct quotations were used to support the themes to address the research questions. The purposive samplings of 15 respondents in a group were employed in selecting participants for a focus group discussion in each of the study communities. Data collection was done in September 2018.

RESULTS AND DISCUSSION

Demographic characteristics of respondents

Data on demographic characteristics of the respondents are indicated in Table 2. The study gathered demographic data from the respondents (maize farmers) who engaged in the cultivation of maize in the district. The results revealed that maize cultivation in the district was practised by both men and women. The majority 87(64.4%) of the respondents involved in this study within the study communities were male farmers who served as heads due to culturally defined roles while 48 respondents representing (35.56%) were females who were spouses of household heads. This confirms the report by the Ghana Statistical Service (2014a) that more males are engaged in agriculture than females in the Tano North District. Both male and female respondents engaged in maize cultivation in the district. This is in line with observation by Ragasa et al. (2013), that maize is cultivated by men and women. However, the district's maize farming is dominated by males. Domestic obligations limit women and possibly cause gender disparity among maize farmers.

Age distribution in the study area revealed that 90(66.7%) respondents were within age group of 36 and 60 years, followed by 24(17.8%) respondents between 20 and 35 years and the minority of the maize farmers who were above 60 years were 21(15.6%). Since majority of the maize farmers were within the age group of 36 and 60 years, followed by age group of 20-35 years, the implication is that the farming population is economically active and has a relatively greater potential for sustainable maize production because they were strong and energetic. The relatively small number of farmers is above 60 years. This supports the assertion made by Bellon et al. (2011) that the age of the farmer would have a positive effect on technical incompetence in agriculture. The study area had high human capital for agriculture since, majority of the respondents were actively involved in periodic farm training by extension officers of MoFA, NGO's among others.

The results showed that 27(20%) of respondents had no formal education whereas 108(80%) of the respondents completed various levels of education such as Primary School, 19(14.1%); Junior High School/Middle School, 60(44.4%); Senior High School/Secondary School, 24(17.8%); and Tertiary/College/University, 5(3.7%). Education is very important to the success of farm practices such as storing and marketing maize, keeping records, making purchases of relevant farm inputs and helping with long term planning on farm management. However, low level of education is generally observed amongst farmers and this could affect their adaptation to climate variability. This is consistent with the assertion by Wamsler et al. (2012) in El Salvador and Brazil that low level of education was generally observed

Table 2. Demographic characteristics of respondents.

Socio-demographic characteristics	Frequency	Percentage
Sex		
Male	87	64.4
Female	48	35.6
Age (years)		
20 - 35	24	17.8
36 - 60	90	66.7
Above 60	21	15.6
Level of education		
None	27	20
Primary	19	14.1
Middle/JHS	60	44.4
Secondary/SHS	24	17.8
Tertiary	5	3.7
Farm size (acre)		
1 - 3	61	45.2
4 - 6	31	23.0
7 - 9	19	14.1
10 - 15	9	6.7
16 - 20	9	6.7
20 - 25	1	0.7
Over 25	5	3.7

Source: Author (2018).

amongst farmers and this could affect their comprehension of causes of climate variability and adaptation to climate variability. This situation may pose challenges to some farmers' ability to utilize the physical capital (the challenge of using modern farm equipments such as sprinkler machine, irrigation pumps, tractors, and combined harvesters) and ensure that high maize yields are produced by farmers in the District.

Lastly, it was realised that, majority of the respondents, 61(45.2%) had farm sizes between 1-3 acres of land; 31(23.0%) respondents had farm sizes of 4-6 acres of land; 13(28.9%) and 19(14.7%) respondents had farm size of 7–9 acres of land; and 24(17.8%) respondents had farm size above 10 acres of land respectively. There was disparity in the use of land across the study communities due to their demographic characteristics such as urban (Duayaw Nkwanta), peri-urban (Yamfo) and rural (Tanoso). It was realised that, though some farming activities occurred at urban (Duayaw Nkwanta), a larger portion of the land had been used for settlement development and commercial activities.

However, in rural (Tanoso) and peri-urban (Yamfo), most farmers had farmland between 1-7 acres, because the farmlands were located at a far distance coupled with little funds to secure the farmlands for crop cultivation. This finding shows that greater proportion of the farmers had enough farmland for maize production; hence, access to land is not seen as a major obstacle to their farm work. This is in line with the report of MoFA (2010) that most of the farmers in Tano North district have farm sizes of not more than 10 acres.

The presence of natural capital such as suitable arable land for farming across the study communities enabled the smallholder maize farmers to produce maize yields for use all year round and further processing into its assorted goods through farming activities in the district.

Observation on rainfall and temperature patterns

Out of the total number of respondents (135) that were interviewed, 24 representing (17.7%) were between 20-35 years, 90 respondents (66.7%) were between 36-60 years, whilst 21 respondents representing (15.6%) were above 60 years old. It was realised from the total respondents of the study that, about (53%), (34%), and (14%) respondents noticed a reduced amount of rainfall, a reduction in the length of rainfall and erratic rainfall respectively, whilst 19 respondents cited increased length of rainfall season (Table 3). Specifically, across the age

Table 3. Respondents' observation of the manifestation of rainfall variation.

Age	Increased amount of rainfall	Reduced amount of rainfall	Increased length of rainfall	Reduced length of rainfall	Erratic rainfall	Total
			Frequency (%)			
20-35	2(13.3)	10(28.6)	3(15.9)	6(17.6)	3(21.4)	24(17.7)
36-60	10(66.7)	36(68.0)	12(63.2)	23(67.6)	9(64.3)	90(66.7)
Above 60	3(20.0)	7(13.2)	4(21.1)	5(14.7)	2(14.3)	21(15.6)
Total	**15(100)**	**53(100)**	**19(100)**	**34(100)**	**14(100)**	**135(100)**

Source: Field Survey (2018).

Table 4. Respondents' observation of the manifestation of rainfall variation on maize yields.

Study community	Increased crop yield	Reduced crop yield	Stability in crop yield	Stunted growth	Total
			Frequency (%)		
Tanoso	12(37.5)	18(32.1)	9(31.0)	6(33.3)	45(33.33)
Yamfo	10(31.3)	20(35.7)	10(34.5)	5(27.8)	45(33.33)
Duayaw Nkwanta	10(31.3)	18(32.1)	10(34.5)	7(38.9)	45(33.33)
Total	**32(23.7)**	**56(41.5)**	**29(21.5)**	**18(13.3)**	**135(100)**

Source: Field Survey (2018).

groups, majority, 36(68%) of the respondents between the ages of 36-60, 10(28.6%) between the ages of 20-35, and 7(13.2%) above 60 years had observed a reduced amount of rainfall season. This implies that the unstable, unpredictable, limited rainfall and irregular pattern of rainfall resulted in prolonged rainfall season. For instance, as a consequence of more years of experience, it is obvious, as anticipated that respondents within the ages of 31-60 years may have noticed a reduction in the amount of rainfall than respondents between the ages of 25-30 years. This report from the respondents is in line with the district's climatic data on rainfall trends. A key informant from GMA stated:

"Variations in the rainfall pattern have existed over the past years, and the rain does not come on time as expected" (In-depth interview with GMA Officer, 2018).

A female respondent in Duayaw Nkwanta, pointed out in a focus group discussion that:

"The rains are not forthcoming of late; therefore I always get worried on when to start sowing seeds at my farm". (Focus Group Discussion, 2018).

Observation on changes in maize yields due to climate variability

With regard to farmers' observation of manifestation of rainfall variation on maize yield, majority, 56 (41.5%) of the respondents across three communities noticed that variation in rainfall has resulted in reduced crop yield in the 20-year period whilst 32 (23.7%) respondents noticed increase in crop yield. Out of the 56 (41.5%) respondents, 20(35.7%) were from Yamfo while Tanoso and Duayaw Nkwanta were represented by 18(32.1%) each. About 32 (23.7%) of the respondents reported that variation in rainfall has resulted in increased crop yield from Tanoso, Yamfo and Duayaw Nkwanta. About 29(21.5%) of the respondents reported stability in growth and 18(13.3%) of the respondents reported stunted growth (Table 4). This outcome indicates that, variations in rainfall have resulted in reduced crop yield over the past 20-year period. Also, it was realised that, respondents in Yamfo had perceived a variation in rainfall more than respondents in both Tanoso and Duayaw Nkwanta respectively. The variation in rainfall is observed when the amount of rainfall received varies across the area over time. Rainfall is a major determinant of crop yield within a given growing season.

With regard to this, a key informant from GMA narrated:

"Variations in the rainfall pattern have existed over the past years, and the rain does not come on time as expected" (In-depth interview with GMA Officer, 2018).

This was supported by a male farmer in Yamfo who pointed out in a focus group discussion that:

"So many years ago, boreholes, wells, streams and rivers had enough water during the wet season which helped us to store water for use in the dry season, but nowadays

Table 5. Respondents' observation of the manifestation of temperature variation.

Age	Increased rate of temperature	Decreased rate of temperature	Temperature fluctuations	Stable temperature	Do not know	Total
			Frequency (%)			
20-35	10(19.6)	3(15.0)	8(21.6)	1(9.1)	2(12.5)	24(17.7)
36-60	32(62.7)	15(75.0)	24(64.9)	8(72.7)	11(68.7)	90(66.7)
Above 60	9(17.6)	2(10.0)	5(13.5)	2(18.2)	3(18.8)	21(15.6)
Total	**51(100)**	**20(100)**	**37(100)**	**11(100)**	**16(100)**	**135(100)**

Source: Field Survey (2018).

Table 6. Respondents' observations on the temperature variation and maize yields.

Study community	Increased maize yield	Reduced maize yield	Stunted growth	Crop failure	Total
			Frequency (%)		
Tanoso	3(37.5)	18(33.3)	13(30.3)	11(36.7)	45(33.33)
Yamfo	2(25.0)	18(33.3)	15(34.9)	10(33.3)	45(33.33)
Duayaw Nkwanta	3(37.5)	18(33.3)	15(34.9	9(30.3)	45(33.33)
Total	**8(5.9)**	**54(40.0)**	**43(31.9)**	**30(22.22)**	**135(100)**

Source: Field Survey (2018).

there isn't much rains. This is because the amount of rain over the years has reduced drastically. The rains are no longer reliable for supply of water to the crops" (Male discussant, Focus Group Discussion, 2018).

Out of the total number of 135 respondents across all ages, it was gathered that, about 51 and 37 respondents observed an increased rate of temperature and temperature fluctuation respectively (Table 5); 32(62.7%) of respondents between 36 and 60 years indicated an increased rate of temperature; whilst 9(17.6%) respondents above 60 years indicated increased rate of temperature. Also, 24(64.9%) respondents between 36-60 years observed temperature fluctuation; and 8(21.6%) respondents between 20-35 years and 5(13.5%) respondents similarly noticed temperature fluctuations respectively (Table 5). The results imply that, climate variability over the past 20 years causes variations with temperature by increasing temperature within the various study communities making these communities hot. This finding is consistent with assertion by IPCC (2013) which states that Africa is one of the continents mostly influenced by climate variability due to 1°C increase in average annual temperature in the last 30 years (1970 – 2000). The causes of the increasing temperature trend in the district were reinforced by the assertion made by one of the meteorological attendants who stated that:

"*The result of increased rate of destruction to forest resources in this area is responsible for the high temperature we are experiencing nowadays. If we continue to fell down trees, the temperature will increase more than what we are experiencing today*. *My worry is uncertain nature of the temperature"* (In-depth interview, 2018).

Again, this was supported by a report by a male farmer who narrated in a focus group discussion that:

"The release of harmful gases into the atmosphere has contributed to intense heat felt during the day. This has negative effect on the farmers' health from day to day" (Focus Group Discussion, 2018).

With regard to farmers' observation of manifestation of temperature variation on maize yield, out of the total number of 135 respondents interviewed, majority, 54 (40.0%) of the respondents were of the view that variation in temperature has resulted in reduced crop yield in the past 20 years; about 43 (31.45%) of the respondents cited stunted growth (Table 6); while 30 (22.2%) respondents cited crop failure. This is in line with the assertion made by Peprah (2014) that temperature trend in all the regions shows increase in the past 30 years. This result implies that variation in temperature has caused a reduction in crop yield. This buttresses the observation in Table 6 that increase in temperature is a function of climate variability which makes it difficult for maize farmers to realize maximum crop yield.

The causes of the increasing temperature trend in the district were reinforced by the assertion made by one of the weather station attendants who retorted:

Table 7. On-farm adaptation strategies to climate variability by gender of maize farmers.

Gender	Application of agro chemical	Crop diversification	Changes in farm location	Irrigation of crop	Mixed cropping	Change in planting date	Changes in crop varieties	Total
	Frequency (%)							
Males	39(44.8)	22(70.97)	12(63.16)	6(66.67)	4(44.45)	0(0.0)	4(80.00)	87(64.44)
Females	22(45.8)	9 (29.03)	7(36.84)	3(33.33)	5(55.55)	1(100)	1(20.00)	48(35.56)
Total	**61(45.2)**	**31(23.0)**	**19(14.1)**	**9(6.7)**	**9(6.7)**	**1(0.7)**	**5(3.7)**	**135(100.0)**

Source: Field Survey (2018).

"*The result of increased rate of destruction to forest resources in this area is responsible for the high temperature we are experiencing nowadays. If we continue to fell down trees, the temperature will increase more than what we are experiencing today*. *My worry is uncertain nature of the temperature will affect crop yield"* (In-depth interview with GMA officer, 2018).

In line with this, a male discussant in a focus group discussion at Tanoso said:

"The amount of maize yields obtained at the end of the farm season has reduced drastically over the past years. This could be as a result of high temperature coupled with unpredictable rainfall pattern for some years. For some years, there is high rainfall, uninterrupted by a long period of drought; we are losing our means of livelihood. We cannot save to build assets for our future" (Male discussant, Focus Group Discussion, 2018).

Based on the local perception of respondents' observation of climate variability and its effects on maize yields, the study revealed a decreasing trend with significant variation in the rainfall pattern and increased rate of temperature pattern. Therefore, the study area has experienced variability in climate and significant climatic events in the past 20 years (1995 - 2015). This finding confirms the estimation by Egyir et al. (2015) that temperature will continue to rise, whereas rainfall is also forecasted to decrease in all agro-ecological zones in the country. This buttresses the observation that climate variability affects the rate of temperature increase making it difficult for maize farmers to harvest adequate crop. However, the finding of the study shows that majority of the respondents in Yamfo observed the manifestation of climate variability on maize followed by Duayaw Nkwanta and Tanoso respectively.

These fulfil findings of the Action theory of the study which explains that the exposure of farmers to variability in climate is an indication of their vulnerability to variability in climate hence, the need for adaptation strategies to variability in climate. As such, it is important that strategies for adaptation should be encouraged. This seeks to relate the conceptual framework of the study "Livelihood Adaptation Strategies to variability in Climate". The responses from the respondents revealed that rainfall and temperature had a significant influence on maize production which is a means of livelihood. Thus, maize production in the district is mainly dependent on rainfall and temperature.

On-farm and off-farm adaptation strategies to climate variability by gender of maize farmers

The distribution of respondents using on-farm adaptation strategies to reduce the shocks of climate variability by gender and distribution by sex of respondents is indicated in Table 7.

With regards to the application of agro chemicals on farm adaptation strategy (Table 7), the results indicate that, 61 respondents (45.1%) employed application of agro chemicals as a strategy in TND to minimize shock of climate variability. The results further revealed that 39(44.8%) male respondents had cited application of agro chemicals as a strategy, whilst 22(45.8%) female respondents cited application of agro chemicals as a strategy including the use of chemical products such as fertilizers, pesticides, fungicides and herbicides on the farm so as to ensure improved yield. It was revealed that male respondents served as the head of the family, who had the financial strength to purchase agro chemicals as well as possess the muscular energy required to apply agro chemicals throughout the farm with ease, whereas few female respondents employed application of agro chemicals as a strategy due to overburdening with domestic roles at home. These include child bearing and house chores like caring for kids, cooking, washing, sweeping, among others. The inability of most female farmers to secure agro chemicals for crops due to financial constraints was confirmed by Egyir et al. (2014) who asserted that adoption of modern on-farm adaptation strategies such as the use of agro-chemicals by farmers who had access to capital was higher than those who lack access.

This was evident during the Focus Group Discussion in Tanoso when a female respondent narrated that:

"The application of pesticides is expensive everywhere in the town; however, without applying it, the maize yields

will be small at the end of the farm season" (Female discussant, Focus Group Discussion, 2018).

With emphasis on use of crop diversification as the on-farm adaptation strategy (Table 7), the results show that, 31(44.8%) respondents affirmed it as a measure employed to reduce the shocks of climate variability. The results indicate that, 22(25.3%) male farmers selected crop diversification as strategy whilst 9(18.8%) female farmers selected crop diversification as a strategy to climate variability. This indicates that, gender influences the choice of adaptation strategy selected by maize farmers. Majority 22(25.3%) of the respondents were male farmers because of their roles performed on the farm during pre-harvest farm operations such as land acquisition, land clearing, ridging, planting, operation of farm inputs, high labour contribution among others which have equipped them to diversify cultivation of crops. This finding is consistent with the view of Uddin et al. (2014) who observed that male famers adopt crop diversification to reduce the overall farm risk and expand opportunities for farm profit, which generally boosts their average incomes. The statement below was cited in support of the assertion above during the focus group discussion at Tanoso:

"Menial job I did during the off-farm season has enabled me to get substantial amount of money to cultivate food crops such as yam, potatoes, cocoyam, and vegetables such as okro, tomatoes, pepper etc" (Female discussant, Focus Group Discussion, 2018).

For the use of change in farm location as an on-farm adaptation strategy (Table 7), the results show that 19(14.1%) female respondents affirmed change in farm location. The results by gender indicate that 12(13.8%) male farmers selected change in farm location as a strategy whilst 7(14.6%) female farmers selected change in farm location activities as adaptation strategy. It was realised that female respondents owned a lot of farmlands than male respondents who acquired most of their farm lands on lease. This could be attributed to the reason why female respondents change farm location than male respondents.

This finding supports the view of the studies of Onoh et al. (2014), Obayelu et al. (2014) and Uddin et al. (2014) that change in farm location was among the least preferred on-farm adaptation strategies.

A male discussant at Duayaw Nkwanta during a focus group discussion stated:

"Change in farm location is a very important strategy when faced with the effects of climate variability but the cost involved in securing another plot of land for farm activities is very huge" (Male discussant, Focus Group Discussion, 2018).

With respect to the use of irrigation as on-farm adaptation strategy (Table 7), the results show that 9(6.7%) respondents affirmed the use of irrigation. The results by gender show that 6 (6.9%) male farmers cited irrigation of crop as a strategy whilst 3(6.3%) female farmers cited irrigation of crop activities as a strategy in response to climate variability especially during long periods of drought. Those who had easy access to water sources used irrigation equipment such as knapsack sprayer, sprinklers etc. which result confirms various reports by the IPCC (2013, 2014) that Africa is one of the most exposed continents to a lot of destruction due to effects of the climate variability, because, it often lacks proper adaptation strategies. This was evident during the Focus Group Discussion at Tanoso when a male respondent narrated:

*"Supply of water to maize plant is very important for their survival, but most of the water sources are not available; therefore, I rely on carrying water from streams far away to my farm for the crops" (*Male discussant, Group Discussion, 2018).

With emphasis on the use of mixed cropping as on-farm adaptation strategy, the results show that 9 (6.7%) respondents affirmed the use of mixed cropping (Table 7). About 4(4.6%) male farmers cited mixed cropping as a strategy whilst 5(10.4%) female farmers cited mixed cropping as a strategy. Thus, female farmers employed mixed cropping strategy more than male farmers in response to climatic variability in TND. The maize farmers that cited mixed cropping as an adaptation strategy confirmed that the measure was effective. This observation is consistent with the studies of Obayelu et al. (2014), Onoh et al. (2014), Ndamani and Watanabe (2015), Ifeanyi-Obi and Nnadi (2014), and Uddin et al. (2014) that mixed cropping was an effective adaptation strategy employed by farmers.

In a focus group discussion, a male respondent at Duayaw Nkwanta said:

"*Mixed cropping such as growing vegetables like okro, garden eggs, tomatoes, pepper, at Duayaw Nkwanta relieve farmers from the effects of climate stimulus. However, I am in need of a hybrid variety of these vegetables which can withstand variability of the climate*" (Male Respondent, Focus Group Discussion, 2018).

On the issue of change in planting date as on-farm adaptation strategy, the results show that 1 (2.1%) female farmer cited change in planting date across the study communities (Table 7). It was realised that change in planting date as adaptation strategy was least preferred by farmers because of their inability to access adequate information on weather from the district's weather station. Due to this situation, the respondents were not certain of the onset of rains at the beginning of the main season as well as the minor season for planting of maize. This supports the view of Cook et al., (2013)

Table 8. Off-farm adaptation strategies to climate variability by gender of maize farmers.

Gender	Migration	Trading	Poultry and livestock rearing	Transport business (Tricycle)	Total
			Frequency (%)		
Males	23(26.4)	22(25.3%)	25(86.20)	17(94.45)	87(64.44)
Females	9(18.8)	34(60.71)	4(13. 80)	1(5.55)	48(35.56)
Total	**32(32.7)**	**56(41.5)**	**29(21.5)**	**18(13.3)**	**135(100)**

Source: Field Survey (2018).

who observed that variation in the onset of rains and seasonal rainfall and temperature variations can exacerbate water available for crop production.

This affirms what the officer at the weather station said as follows:

"*The weather station is not solely meant for delivery of weather information to the maize farmers in the District but for all other stakeholders. The officers at the weather station are not always compelled to provide maize farmers with weather information. But I am of the view that, provision of weather information enables them to adapt well to climate variability by either planting maize early or at a late date among others*" (Officer, GMA).

With regard to change in crop variety as an on-farm adaptation strategy (Table 7), the results indicate that 5(3.7%) farmers cited change in crop variety as a strategy to minimize the prevalence of climate variability. Thus, it was among the least preferred adaptation strategies by respondents in the district. The results show that, 4(4.6%) male respondents and a single female respondent 1(20.0%) cited change in crop variety as adaptation strategy. This could be attributed to the low level of knowledge among most of the respondents about the benefits of hybrid varieties of maize such as 'Dorke SR' and 'Dodzie' in the study area. Also, it was realised that, most buyers in the market request for the traditional variety such as 'Aburotia' than the hybrid variety. This finding is contrary to studies by AGRA (2014), who observed that improved crop varieties lessen farmers' vulnerability in that they mature much faster and are hence less likely to be adversely affected by climate change compared with the traditional varieties.

In a focus group discussion at Tanoso, a male discussant said:

"I usually plant early local varieties of maize like 'Aburotia', which most often provide high yield. Therefore, I am not ready to try any hybrid variety of maize on my farm any time soon" (Male Respondent, Focus Group Discussion, 2018).

The distribution of respondents using off-farm adaptation strategies to minimize the menace of climate variability by gender and distribution by sex of respondents is indicated in Table 8.

According to the use of migration as an off-farm adaptation strategy (Table 8), the results show that, 32(23.7%) respondents employed the use of migration as a strategy to reduce the menace of climate variability. The results further indicate that 23(26.4%) male farmers and 9(18.8%) respondents were female farmers. This is evident that the male farmers employed migration as an off-farm adaptation strategy more than female farmer in response to climate variability in the TND. The finding supports the view of Gbegeh and Akubuilo (2013 cited in Oremo, 2013) that the socio-demographic characteristics of a respondent may influence the decision to adopt a particular adaptation strategy.

A male respondent at Tanoso during FGD sessions had this to say:

*"I travelled to the city of Kumasi for casual work such as waiter, head porter, house help etc. during the dry season. This casual works were very beneficial because it enabled me to raise funds to cater for farm activities in the next farm season" (*Male discussant, Focus Group Discussion, 2018).

With regard to trading as an off-farm adaptation strategy (Table 8), the results indicate that 56(41.5%) respondents engaged in trading as an adaptation strategy, and that trading was the most preferred off-farm adaptation strategy by respondents in the district. Table 8 shows that, the female respondents employed trading as their off-farm adaptation strategy more than the male respondents in response to variability in climate.

This narrative by female discussants in Duayaw Nkwanta supported the assertion above during FGD session that:

"The sale of provisions is good for me due to increase in prices of goods on the market at the lean season. The income from trade is used for securing farm needs including fertilizer, and pesticides" (Female discussant, Focus Group Discussion, 2018).

With emphasis on the use of poultry and livestock rearing as an off-farm adaptation strategy to reduce the menace of climate variability (Table 8), the results show that 29 (21.5%) respondents employed poultry and livestock rearing as adaptation strategy; 25(28.7%) male

respondents and 4(8.3%) female respondents cited the use of poultry and livestock as adaptation strategy in the district. Similarly, livelihood activities, for instance, rearing of poultry birds like chicken, ducks, guinea fowls and livestock like goats, sheep, pigs, and cattle are mostly reared on free range in the study area. Therefore, such labour intensive jobs such as rearing of livestock are presumed to be done by more males than females. This attests to the fact that, male respondents gained much income to better adapt to climate variability than female respondents.

A male farmer at Yamfo during a focus group discussion narrated that:

"Rearing farm animals provides me with many economic benefits. Also, livestock like goats and sheep reared at home, help to provide meat needs of the family. In addition, I use the faeces of the farm animals as organic manure on the farm" (Male discussant, Focus Group Discussion, 2018).

According to the use of transport business as an off-farm adaptation strategy (Table 8), the results show that, 18(13.3%) respondents employed the use of transport business as an off-farm adaptation strategy in the district. The result shows that 17(19.5%) male respondents and 1(2.1%) female respondent in the district employed the transport business as a strategy. This implies that, transport was among the least preferred adaptation strategy, as male respondents employed transport business as adaptation strategy more than female respondents. This suggests that male respondents are more likely to engage in transport business as an alternative livelihood activity than female respondents.

A male discussant at Duayaw Nkwanta reiterated the importance of transport business during a Focus Group Discussion that:

"I am a farmer and driver at the same time; so during off farming season, I join the booming transport business to transport people and goods from one area to another across the town" (Male discussant, Focus Group Discussion, 2018).

Conclusion

The study sought to determine respondents' observation of the effects of climate variability on maize yields and analyze the coping and adaptation strategies to improve maize production. This outcome establishes that, variations in rainfall have resulted in reduced crop yield in the 20-year period (1995 - 2015). Besides, the variation in temperature has caused a reduction in crop yield. This buttresses the observation that climate variability makes it difficult for maize farmers to harvest abundant crops. The finding of the study shows that majority of the respondents in the study area have observed the manifestation of climate variability on maize. Also, the findings of the study revealed that both male and female respondents employed coping and adaptation strategies. It was realised that male respondents employed majority of the most preferred on-farm adaptation strategies such as application of agro chemicals, crop diversification, change in farm location, irrigation and off-farm adaptation strategies like migration, trading, poultry and livestock rearing than the female respondents interviewed in the study area.

The findings of the study revealed that, male respondents employed majority of the preferred on-farm adaptation strategies and off-farm adaptation strategies compared to female respondents interviewed in the study area. This implies that, the male respondents were more successful in employing most of the on-farm and off-farm adaptation strategies than the female respondents in the study area. Thus, the proposition that gender is a determinant of maize farmers' success of adaptation strategies to climate variability is vindicated. This implies that, the male respondents were successful in employing most of the on-farm and on-farm adaptation strategies than the female respondents in the study area. The mixed method design has also been amply justified and used to bring clarity to the issue investigated.

To address climate related challenges with national food production, there is a need for stakeholders such as GMA and MoFA through their field officers and extension services to translate the available knowledge and experiences to farmers on adaptation to climate variability through the design and implementation of evidence-based interventions. These include assisting the maize farmers with vital weather information, requisite skills and training to adapt well to the shocks of climate variability. Also, the extension officers of MoFA, must monitor the maize farmers with low literacy skills in the study area to provide them with training on farm management skills for effective adaptation to climate variability. The study further recommends that there must be improvement of existing farm facilities and provision of agricultural infrastructure such as irrigation facilities in the Tano North District. The Government and Non-Governmental Organizations must set up a support scheme for maize farmers to secure their farms and crop yields in times of crop failure. Also, the funds given to them could be used to secure hybrid and drought resistant varieties, fertilizer, and farm inputs to enable maize farmers equip them with the needed materials for producing high crop yield.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

Author Contribution

Both authors contributed substantially to the completion and success of the study.

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Land injustices are a global phenomenon but more vivid in developing countries, especially in Africa, where colonial hangover and the neo-liberal economic policies have been known to contribute into the plight of the urban poor including urban farmers. This paper examines the land injustices of urban farmers by taking Mbweni-Mpiji, a sub-urban area in the city of Dar es Salaam as a case study. The study used a qualitative approach to gather explanations, perceptions and feelings of the farmers regarding the issue of land injustices in the study area. From the findings, farmers in the study area are in constant pressure due to land insecurity and inferior land rights, the use of informality ways in accessing land, stiff competition from other land users and degrading land quality and constant decrease in size of agricultural land. In general terms, these factors are negatively affecting the day to day livelihood (in terms of food security, social status and income) of the people who entirely depend on urban farming. In order to overcome these challenges, this study recommends a dialogue between farmers and the city administrators as a short-term solution and inclusion of urban farming in the future master or strategic plans as a long term strategy.

Key words: Land justice, urban agriculture, land development projects, compulsory land acquisition, plot delivery project.

INTRODUCTION

Land injustices resulting from land acquisition and allocation are of major concern in the urban areas worldwide (Nijman and Wei, 2020; Soja, 2010; Fainstein, 2010; Harvey, 2010). This is most common in Africa (Home, 2020; Kironde, 2009; Kombe, 2010; Martin, 2010, Makupa, 2018), where the governments have more controlling powers in the process. In Tanzania, land acquisition has a long history from colonial times, through socialism to present mixed economy.

The transformation of political and economical systems in Tanzania has an impact on land resource distribution and utilization which requires special attention. Sequentially, each step in the transformation cycle has contributed to the formation of the current land management system and land injustices within the country and mainly in the cities. The study main objective

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is to assess the impact of land development projects on agriculture in Mbweni-Mpiji area and to suggest ways in harmonizing land uses in urban areas for sustainability. The data reported in this paper were gathered in two ways; firstly, various documents archived at the National Archive and secondly, libraries were revised (archival review). These were essential in gathering the situation which existed during colonial times and earlier years after the independence. Data for present day situation were gathered using interviews and participants observations. Hence, in the following sub-sections fundamental characteristics of each of these political and economic systems and their contribution to existing land injustices are highlighted.

Land acquisition: Pre and during colonial periods in Dar es Salaam city

In the 19th Century, the local Zaramo tribe seized the reign of power in Dar es Salaam city after the death of the Arab Sultan who established the city in the 18th century (Brennan and Burton, 2007). The Zaramo owned the land under their traditions and customs. Each tribal member had opportunity to own land provided he/she had the ability to live in it. These systems are similar to free-hold in which a person obtains a piece of land forever without paying any dues. The tribal family heads acquired lands enough to cater for their existing needs. People with huge families, which are mainly wives and children would own more land than those with small families due to the fact that people were the major source of labour. Land hoarding was unheard off. Boundary demarcation was normally by a huge tree, or special herbs which had a tendency of regenerating quickly (these are still popular in some rural areas in Tanzania). Native communities were able to define land ownership on those terms. On the issues with the Zaramo, land ownership system was tribal-based discrimination. Only Zaramo people with their spouses had an opportunity to own and use land. Immigrants were not allowed to use land except with the permission from *Jumbe* (the local leader).

The Zaramo system of land ownership ceased when Germany and British colonial powers came to the city. The two colonial powers disregarded the traditional land ownership system and replaced it. Both used land alienation laws to acquire any favourable land from the locals. The locals were forced to live in designated residential areas (*Uswahilini literary meaning for Swahili natives*) to enable the colonial government control and monitor their movements (Brennan and Burton, 2007). The Germans used the Imperial Decree regarding creation, acquisition and conveyance of Crown Land of 1895 to acquire land from the natives. The lands were acquired in the form of alienation mainly for plantation, administration or other purposes. The 1895 Decree declared that, all land was a Crown Land, vested in the German Empire (URT, 1995). This law was indeed, the beginning of land alienation in the city and in other places in the country. It was estimated that a total of 1.3 million acres of land were expropriated for administrative and commercial farming purposes. Under this tenure system, individuals started to own large tracts of lands for commercial agriculture and other purposes. The land ownership right started to be authenticated by a piece of paper called a ‘certificate of title’. The person who wanted to own land was required to apply the same to the Chancellor. Land was taken from people and vested to a supreme power which had the responsibility to allocate it at its discretion to its subject. This is the source of open un-equal sharing of land.

The British also used land laws to control the locals in the city. They ruled the country from 1917 until 1961 when Tanzania became independent. Also, the rulers made Dar es Salaam its main commercial and administrative city. The British used a different approach in controlling land; they abolished land alienation which was the common practice during German colonial rule and introduced public land ownership. Under the British land law, all land was public whether occupied or unoccupied, and this land was vested under the Governor to be held for use and common benefit of the people (Land Ordinance, 1923). The new law gave more power to the Governor in allocating land for various land uses. As expected, the Governor favoured the British and other settlers more than the locals in land allocation and use. After independence, the British land laws were largely adopted by the independent government. The government kept the Land Ordinance, 1923 up to 1999 when it was repealed through the Land Act No. 4, 1999 for general land and the Land Act No. 5, 1999 for Village Land. Although, the new land laws have similarities with the British land laws whereas land is public and the President is the custodian of land (URT, 1995). The Land Act, No. 4 of 1999 identifies the existence of customary right of occupancy or long standing occupancy as a legal means of owning land.

Land acquisition: During the socialism period in Dar es Salaam city

Towards the second half of the 1960s, Tanzania became more socialist guided by Africa communism (*known as Ujamaa*). According to the then President, Mwalimu Nyerere, there was a need for all Tanzanians to have dignity and equality (Nyerere, 1977). Bold actions were taken against private companies and private commercial banks through nationalisation under the Arusha Declaration of 1967. The Declaration state that all land and sources of wealth are to be owned by the public. Private land ownership was forbidden and all leaders were prohibited from investing in land and/or real estate business. Land owned by foreign and local private

companies was nationalized and declared public property.

In its effort to promote agricultural development, Tanzania formulated a villagisation policy in 1973. During villagisation, small clan villages were abolished to form bigger villages. Village land was vested to village governments and the villages were surveyed and their boundaries demarcated. These villages were issued with certificate of land ownership. All people who had an intention to use land for agricultural purposes or construction of a house were required to apply the same through village government. The land holders or users in the villages were not given any document as an authenticity for their land ownership.

In Dar es Salaam City, communal villages were formed in the sub-urban areas, and people from the city centre (mainly immigrants from other regions) were forced to form new villages. An example is Mbweni-Mpiji village which was formed in 1974 and became agricultural village until 2000s when the 20,000 plot delivery project acquired majority of its land. Since people had ancestral roots and attached meaning to their native clan lands, it was harder for them to move into new meaningless places, and many people escaped from the communal villages back to the city.

During the Socialism period, land became a 'free good' distributed freely to Dar Es Salaam through land allocation committees. These committees had powers to allocate a few surveyed lands to people in need who were supposed to apply based on the provisions of the Land Ordinance, 1923. This system was inherited with the Land Act, No. 4, 1999. The increase in population and change of economic system had pushed the horizons of land demand further into the areas which were earlier-on allocated to village governments and individual land owners under various circumstances as discussed above. Land was again given to the people, local people had an opportunity to easily access and own land.

Land acquisition: During neo-liberalism in Dar es Salaam city

Since the beginning of the 1990's, the country changed its fundamental economic and political stance. The ruling party and the government adopt liberalisation and privatisation of the economic base. One of the major shifts was the shelving of the Arusha Declaration of 1967 by the Zanzibar declaration of the 1992. In the later declaration, government leaders were allowed to own landed properties; this coupled with the increase in population (through natural means and urbanisation) caused an influx in demand for land and related infrastructure. Land was needed for residential, industrial, commercial, institutional and other uses. During neo-liberalism, the city has expanded both physically (horizontal expansion) and in-terms of economic base (private investments and foreign trade).What is vivid is also, the promotion of private property and economy.

Policies which are intended to promote private and foreign investment have resulted into more new sources of wealth especially land resource. More land is needed for residential and industrial land use, expansion of infrastructure facility such as: road-networks, railways, ports, airports and institutional land use. For the government to be able to acquire land to cater for the above needs, it uses a Land Acquisition Act (LAA), 1967 and some provision of the Land Act, No. 4, 1999. The economic and political situation has changed (closed to open market system and socialism to neo-liberalism), and the provision of LAA has remained the same. LAA of 1967 was designed during socialism and it was intended to reduce foreign and local private investments on land and give the government the power of eminent domain. This is in contrast with the aim of promoting private and foreign investments. It is a fundamental tenet of neo-liberalism. Similarly, the Land Act, No. 4 and Village Land Act, No. 5 of 1999 and Land Policy, 1995 appear to be influenced by the colonial land laws mentioned earlier-on. The two land laws have elaborate provisions on land acquisition. According to these Acts, all land is public and vested under President as a trustee (URT, 1999). This is not different from the British land law which provided that 'all land was public land and was vested to governor or emperor'.

In the current laws the president has the powers to decide on land allocation and change of use for the so called "*public interest.* The philosophy behind this 'public-interest' principle is that the interest of the community or majority of the citizenry is more important than that of the individuals'. For example a project that proposes for development or expansion of a hospital will be beneficial to the whole society including the person using the land at that time. This has been the major source of land use conflicts between the government and the people in the process of compulsory land acquisition in the city (Makupa, 2018). While the government sees the land acquisition as beneficial to the whole public, right holders consider it to be a 'designed economical sabotage and land right infringement'. In the city of Dar es Salaam, for example, the government had acquired land from the farmers for private and publicly initiated projects (Bushesha, 2018; Kironde, 2009; Martin, 2010; Kombe, 2010). It is estimated by the UNHABITAT in 2010 that the city demanded for over 76,635 Ha of land for its expansion projects for the period 2000-2020. These amounts of land are expected to be acquired from most urban poor farmers in the city's peripheries (UN-HABITAT, 2010).

THE STUDY APPROACH

The study was conducted in Mbweni-Mpiji suburb, which

is found in Kinondoni Municipality within the city of Dar es salaam, Tanzania. Qualitative approaches were used during the data collection and analysis. Data were gathered using interviews and focused group discussions (FGD) with sixteen farmers and (9) local government leaders; also archival review was used. Un-structured interviews, group discussions and semi structured interviews were conducted with four (4) officials from the Ministry of Lands and Human Settlements Development, (5) Agricultural Officers from Kinondoni Municipality and (3) Ward leaders in their respective offices within Dar es Salaam City. It was also necessary to interview project leaders of the 20,000 PDP. The interview with the former manager of the 20,000 PDP was conducted. Observation was one of the methods used; the observed issues were captured in still photos (Plate 1 and 2). Government documents regarding urban farming, valuation details and maps were also reviewed. Some of the records were collected during interviews with the key informants while maps were obtained from the surveying and mapping division. Data were analysed using a thematic analysis method and the analysis was useful in interpreting and identifying the overarching themes as suggested by King and Horrocks (2010). Although textual data were transcribed and translated from Swahili to English, the themes were identified from the transcribed data to form codes that were used to present the results in this study.

CONCEPTUAL FRAMEWORK

The term land justice has been used by many scholars and activists around the world. However, none of these groups have been able to define land justice clearly. In West Africa and Tanzania, the topic of land justice has been used recently to address the issue of land grabbing by foreign investors. For example in 2013, universities, embassies and other organizations in Tanzania jointly organized a conference on land justice for sustainable development. The most important message from the conference was to advise the Tanzania government to resolve conflicts between foreign large investors in the land, for local farmers, to harmonize the conflicting land laws, and to prevent future land conflicts in the country.

Land justice has also been used by scholars, in writing on native land rights issues in Australia (Weir, 2009; Pearce, 2012). In this context the term land justice has been used to describe the legal procedures used to facilitate or deny land rights to native Australians. In Hong Kong, the Land Justice League was formed by young activist scholars who were determined to create a balance between urban development and preserving the city's natural environment for the betterment of all of its residents.

In this paper, land justice is defined as the quality of being fair and reasonable in land matters. The central point in land justice is the righteousness, fairness, and respect for other people regarding land resources. This means the right to own, use, or transfer land without any interference from others, whether individuals, a wider community or the state. In order to assess land justice in any country it is important to evaluate its land tenure system, because land tenure involves the relationship, whether legally or customarily defined, between individuals or between groups with respect to land (FAO, 2002). Through this relationship, individuals have various rights to land. In the case of Tanzania, the level of land security is low because land is public and individuals are not allowed to own land. Although land can be used by everyone, according to the law, the president has power to acquire any land at any time for the public interest. This means that farmland could be transformed into a hospital, a housing estate or a road, depending on what the president considers more important for the public. In this case, land was needed by the middle income people for residential purposes; hence, farmers who are considered as the poor were pushed out of the way to allow new residential projects. This process of injustice is persistent as the situation is produced and reproduced in Dar es Salaam city. Various scholars have also acknowledged the concept of distributional injustices in the cities (Harvey, 2010; Heynen, 2006; Heynen et al., 2006; Keil, 2003; 2005; Fainstein, 2010). According to Harvey (2010), injustices occur when there is imbalance in the need, contribution to common good and merit. A just society can be attained if the basic structure of a society allows the less fortunate to be empowered and considered in a decision making process (Fainstein, 2010; Harvey, 2010).

THE 20,000 PLOT DELIVERY PROJECT (PDP)

The 20,000 PDP was initiated by the Ministry of Lands Housing and Human Settlement Development (MLHHSD) in 2002. This project aimed at reducing unplanned settlements (it is estimated that 70% of the houses in the city are in unplanned areas) in Dar es Salaam city by providing surveyed plots to the people. These plots were designed for residential, commercial and communal use. According to the project plans, the surveyed plots were expected to have a well-planned infrastructure and services such as: water, electricity, and roads. The project is the largest residential project in the city to-date with a capital requirement of 21 million USD. The total land acquired from various farmlands within the city was 76 km^2. Mbweni-Mpiji was highly affected because the project produced about 1200 plots from the village. This was 60% of the total land that was acquired in Mbweni ward, making it the most affected area in the city.

The 20,000 PDP was one of the important land development projects for the city which had blessings and support of the government. The project implementation followed the laid down procedures and

Plate 1. Property development at the farms.

the laws. Also, the major legislations which were used are the Land Acquisition Act 1967 and Land Act 1999. According to these two legislations, compulsory land acquisition is allowed in all projects that are important and beneficial to the public. The 20,000 PDP compensated farmers for their loss of land, housing and crops. However, it did not plan for resettlement package and future livelihood activities of the affected farmers. This is one of the major downfalls of the project; because most of the affected farmers expected to get an alternative land to continue with their farming activities. Other problems related to the project were unprofessional conduct, low compensation rates, delay in payment of compensations, and a total exclusion of the affected farmers in the project planning and implementation process (Martin, 2010).

LAND INJUSTICES IN MBWENI-MPIJI

Land problems are very common to farmers in the cities (Kyessi, 1998; Foeken et al., 2004; Nsangu and Redwood, 2009). Although urban farming is tolerated in Dar es Salaam city, there is a limited effort including the activity in the city future plans (Mkwela, 2013). The proposed city's Master Plan has included urban farming in the peripheries of the city, where there is no supporting infrastructure. Furthermore, the current Land Laws and regulations, regards urban farming to be an activity that does not fit into the city and when practiced should not obstruct any other development activities (URT, 1995; 1999). Hence, it will not take long before the land reserved for urban farming in the peripheries of the city will be used for other city expansion activities.

Land injustices resulting from the 20,000 PDP in Mbweni-Mpiji village are categorized into five major issues. (i) Inferior land rights, (ii) Informality in land access, (iii) Land in-security (iv) Competition from other land uses and land degradation (v) Decrease in land size. These are further discussed in the following sections:

Inferior land rights

The Land Act No. 4 of 1999, which is one of the two instruments governing land management in Tanzania states that, land is publicly owned but vested to the president as a trustee for all citizens. This means people do not own land but have use rights over it (Kironde, 2009). Land in Tanzania can be held via three ways. In the first, the right to use land is formally granted through the right of occupancy. This right is granted for the maximum period of 99 years; it can also be allocated for shorter periods of 33 and 66 years (URT, 1995). The granted right of occupancy is authenticated by a grant of certificate of title. This title confers to the holder a right to use land and it stipulates the allowable land use over the subject land; it can be renewed after the expiry of the term at the discretion of the governing authority. The second approach is related to the derivative of the granted right of occupancy and is held by foreigners using land in Tanzania for investment purposes. It has similar conditions with the above with the exception that the land is held over the term period minus one day (URT, 1999). Another way to hold and use land is via customary (deemed) right of occupancy emanating from long term occupation of the piece of land. Nevertheless, land obtained via customary right system tends to be less

secure than the granted right of occupancy and its derivative (URT, 1999).

In the interviews and the group discussions held by the researchers with the farmers and local leaders in Mbweni-Mpiji. It was evident that all of the farmers are holding and using land via customary right of occupancy. This inferior land right has exposed farmers to challenges associated with malpractices by some of the unscrupulous land officials who are sub-dividing and allocating land to people developing residential houses (Plate 1). These developers are issued by the certificate of titles which grant them more right and security than the farmers.

Informality in land access

Land access is one of the major issues for the farmers (Nuhu, 2019; Kironde, 1995; Sawio, 1998. Farmers' access to land is very limited in the study area. This is because both the local and central governments have not set enough land for farming (Kyessi, 1998; Mkwela and Banyani, 2008; Dongus, 2000; Sawio, 1998; Jacobi et al., 1999). The study realized that, farmers are accessing farming land through renting, grabbing, using their friends' land and some, through inheritance (Jacobi, 2000; Dongus, 2000). These farmers believe they have rights over the parcels of land they occupy. The farmers who accessed land through inheritance, regard their land as being more secure compared to land grabbers; they normally sub-divide their land and rent a section of it to other farmers on monthly basis. The rent for a parcel of land could range between 15,000/- to 30,000/- Tanzania shillings a month. This depends on the size and negotiation skills of the farmer. Also, the relationship between the farmer and the land lord may determine the amount of rent. Long standing tenancy may be considered to pay lower than incoming new farmers. Land grabbing occurs when a farmer intentionally encroaches or invades into a land which is either set aside for utilities, right of way, buffer zone or un-developed parcel of land allocated to individuals or institutional developers (Jacobi, 2000, Mireri et al., 2006). These farmers are involved in farming a short cycle crops (Mkwela and Banyani, 2008; Dongus, 2000). This type of land holding seizes when the project intended for the subject land is implemented or the government institutes the cleaning-up campaigns on the utilities reserves (Dongus, 2000).

Land insecurity

Agricultural land in the peri urban areas is the target for the continuous major land development projects in Dar Es Salaam city (Mkwela and Banyani, 2008; Kironde, 2009; Kombe, 2010). There are a number of development projects in the pipe-line at the moment (Kombe, 2010). These projects are for example, the Millennium City Project which is executed in the Kigamboni Peninsular in Temeke Municipality; there are also Satellite City Project, expansion of a national hospital and expansion of the Tanzania Twiga Cement Company all in Kinondoni Municipality. Earlier on, the government had implemented the 20,000 PDP also in Kinondoni and other Municipalities in the city. The targeting of the peri-urban land is purposely done to avoid huge compensations if the projects were to be implemented in the built up areas. The compensation paid to land held under customary right is far less compared to that paid to the land under the granted right of occupancy (Sackey, 2010). Due to insecurity farmers have been constantly exposed to eviction from road reserves and other areas set for alternative development (Mubvami and Mushamba, 2006; Mkwela and Banyani, 2008; Magigi, 2008; Martin, 2010). Farmers in the study area explained, "Farming is what we have been doing for years since Villagization in the 1970's, and why are denied land for doing the big projects?"

Competition with other land uses and land degradation

Competing land uses have an impact on the farmers' activities (Kidunga and Shomari, 2017; Nsangu and Redwood, 2009; Kyessi, 1998; Sawio, 1998, Msangi, 2011). Apart from the common competing land uses in the cities, farmers in Mbweni-Mpiji are particularly in day to day confrontation with the sand miners. Interviews, group discussion and observations have shown that, farmers in Mbweni-Mpiji are struggling with sand miners and property developers (Plate 1 and 2). The increase in construction activities in Dar es Salaam city has contributed to an increase in sand mining activities. According to the Ministry of Natural Resources and Tourism, sand mining activities in beaches are highly prohibited in Tanzania leaving the river banks to be the only available sand mining sites. Similarly, some of the building developers have been allocated land in areas which were formerly used for urban farming (Plate 1). According to the farmers these two land uses are constantly threatening the existence of their activities in Mbweni-Mpiji. Furthermore, sand mining is the major cause of land degradation which has reduced the fertility of the land. The sand miners have been removing the upper fertile agricultural land in order to reach the suitable engineering soils. It is evident that, sand mining activities are destroying and reducing the arable land in the study area. The photographs taken from the site have shown existence of gullies as a result of the sand mining activities (Plate 2).

Decreasing land size

Historically, residents of Mbweni-Mpiji were farmers. Up

Plate 2. Poor land quality in Mbweni-Mpiji.

to the beginning of the 2000s, farmers were able to access and held huge land for farming purpose (Kironde, 2000; Foeken et al., 2004). During interviews, farmers had estimated their farming land at over 20 acres in early 2000s; by 2014 the total farming area was about 12 acres. The decrease of the land size is due to other competing land use and land degradation (Mhache and Lyamuya, 2019; Kironde, 2000). Majority of the farmers in Dar es Salaam are using about ¼ acre and a few have 2 acres of land (Mkwela and Banyani, 2008). It is evident from the study area that, the available size of land may be reduced further if sand mining and illegal allocation of land to property developers will not be contained.

CONCLUSION

Land injustices described in this article are a clear underground and unnoticed struggle of poor urban farmers in the city of Dar es salaam. The initiative to promote sustainability of urban farming and its challenges should come from the farmers. Farmers have to be pro-active and act to safeguard their livelihood, and interest. This can be done by stepping out and forming strong farmers' groups that will represent them in various decision making process within the city. The silence of urban farmers in Mbweni Mpiji today does not help their desire to be recognized, protected, or favoured by the current liberal economy and the law.

RECOMMENDED SOLUTIONS

There is no single solution to land injustice issue in Dar es Salaam city. This paper suggests the following:

Linking the parts involved in farming-a two way traffic dialogue

In the immediate situation, farmers in Mbweni-Mpiji, local (Municipal level) and central (Ministerial level) government are to initiate and engage in a dialogue intended to safeguard the existing land used by the farmers in the study area. Farmers should become active and stop being passive when issues affecting their livelihood arise. Farmers should form committees and request assistance from experts such as lawyers, environmentalists and humanitarians who will be involved in the lobbying and advocacy over their land rights. The negotiation should intend to create a substantive right over the land and curtail the continuous degradation and reduction of the land size. The process should ensure that, farmers organise themselves in co-operatives which are registered with legal mandate to sue or being sued, to borrow and transact in agro-business in the small and medium scale. The use of committees will give farmers a platform for the negotiation of their rights against any impending land users. The success of this kind of organisations may sensitize the government and lure the planners into considering urban farming in their future plans.

The power of voice to the voice-less

The government should pro-actively include urban farming in their development projects. This has to be performed in a very systematic manner. The government has to analyse and understand the number of evictees involved in the urban farming as a full time employment endeavour. This requires the government to carry-out the

job-task analysis of the people affected by any development project. Also, after the analysis the government should set aside a certain amount of land, and this will ensure security in terms of land rights and ownership to urban farmers. The inclusion of the urban farming in the urban plans will ensure land security, boost farmers' self-esteem, increase possibilities for securing financial assistance or loans and increase food security and good market to the farmers.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Determinants of rural outmigration of children and youth in a rapidly urbanizing nation: The case of Ethiopia

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Young people have continued to flock out of densely populated rural areas of Ethiopia. The overriding objective of this study was to assess the causes for the departure of children and youth out of rural areas and the protagonists involved in the migration decision. Primary data were gathered through a survey that covered 300 migrant-sending households; and from in-depth interviews. The findings revealed that the major causes of outmigration were limited access to land and livestock resources, dissatisfaction with village life and the search for employment, the need to pay off parental debts, lack of income diversification, expansion in rural education, practice of early arranged marriage, peer influence and the lure of urban centers, and positive attitudes towards the migration of a family member. The results from Poisson regression analysis revealed that family size, educational status, sex and age of the migrant-sending household heads at initial departure of the migrant and distance of the nearest urban center to the household's premises were found to be significant in explaining the variation in the number of children and youth migrating out of a rural household. From the results, it could be concluded that numerous economic and social motives are intermingled with demographic and environmental situations to generate outmigration.

Key words: Children, youth, rural-outmigration, migrant-sending household, causes of migration, poisson regression, Ethiopia.

INTRODUCTION

Human migration has been an old and inevitable phenomenon undertaken for living and adjusting; though it has been proceeding in recent times at an accelerated rate because of improvements in transportation and communication technology (Oberai, 1993; Woldie et al., 2010; Eshetu and Beshir, 2017). The causes of rural outmigration of children and youth are numerous where there exists interplay between the economic, sociocultural, demographic, political, environmental and technological factors. Rural outmigration of young people could be triggered by numerous factors such as intensifying population pressure and the associated scarcity, fragmentation and degradation of farmland (Caldwell, 1969; Oberai and Singh, 1983; Tesfaye, 2004; Beneberu and Mesfin, 2017); and limited non-agricultural employment opportunities (Lynch, 2005; Ayalew, 2010;

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Seid, 2016). Impoverished rural life and unfavorable working conditions and the resultant dissatisfaction of rural youth with rural life styles also generate rural outmigration (Bilsborrow, 1987; Oberai 1993; Aina 1995; Eshetu and Beshir, 2017). Natural calamities such as drought, flooding, and landslide (Markos and G/Egiziabher, 1999; Assefa and Aynalem, 2011; Atsede and Penker, 2016; Seid, 2016; SADC, 2017; Beneberu and Mesfin, 2017) are pronounced causes of rural out migration. Lack of socio economic and infrastructural facilities in the rural areas of origin (IOM, 2005; Erulkar et al., 2006; Asham, 2010; Ayalew, 2010); and the development of manufacturing industry and expansion in construction and services in urban areas (Oberai, 1993; Woldie et al., 2010; Eshetu and Beshir, 2017; SADC, 2017) generate migration.

Migration is considered as a coping mechanism to escape poverty and improve one's living and working condition and to learn new skills (IOM, 2005; Beneberu and Mesfin, 2017). It stimulates land and labour markets, helps in the transfer of new technologies and harmonization of human-environment relationships (Tesfaye, 2004; Beneberu and Mesfin, 2017). On the other hand, the continued drift of young, educated, skilled and energetic agricultural labour force into urban areas, if uncontrolled, is likely to weaken the rural economy (Seid, 2016), and increase work burden on family members left behind, and leads to family disintegration (Bilsborrow, 1987; Nehme, 2004).

This study is guided by the new economics of labor migration and social network theories of migration that look into migration decision as an individual as well as familial and communal venture (De Haas, 2010). This is crucial in understanding the socioeconomic fabrics of migration. The push-pull conditions in the areas of origin and destination, as well as perceptions and expectations of young migrants about destination areas are important theoretical underpinnings that are given due consideration in the study.

In Ethiopia where the level of urbanization is only around 20%, and where rural-urban and regional socioeconomic disparities are enormous, the perpetual exodus of people from rural areas is not only inevitable but it is also likely to intensify over time. It should also be recognized that failure to have a comprehensive understanding of human mobility will result in an insufficient understanding of why people migrate, what they do to make a living and how policy can help them to maximize the benefits of spatial livelihood strategies. Likewise, every geographic region is unique in terms of its socioeconomic and physical characteristics generating differential impacts on migration. Similarly, the role of government and societal attitudes to outmigration, and availability as well as use of information are all important ingredients in the study of rural outmigration. Therefore, from the foregoing discussions, it clearly appears that a study on migration determinants should be considerate of the spatiotemporal contexts which could not be determined a priority. The principal objective of this study is, therefore, to assess the major migratory push factors of rural children and youth in the origin areas and attractions of destination areas from rural areas of Gojjam and Wolayta of Ethiopia.

METHODOLOGY

The study was conducted in *Mecha* District of West *Gojjam* Zone in the Amhara National Regional State and *Sodo Zuria District* of *Wolayta* Zone in the Southern Nations, Nationalities and Peoples Region (SNNPR hereafter) of Ethiopia that have pronounced young people rural outmigration (Figure 1). *Mecha* district is a predominantly rural area with only 7.7 level of urbanization; having youthful population, where 54.6% of the population is in the age group of 10-29 years. The population density is about 1.8 times the density of the region and 2.8 times the density at the country level. *Mecha* District has basically a subsistence-based cereal-dominated mixed agricultural economy. The second study area, *Sodo Zuria* District is located in south central Ethiopia. It has population density of about 6 times greater than the density of the country and about three times than that of the region. The economy of the district is characterized by a subsistence mixed farming system where *enset (false banana)* farming is intermingled with the production of cereals, root crops and coffee in a regime of intensive cultivation. It is characterized by diminutive landholdings, whereby an overwhelming majority of the farming households /hhs/ (78.21%) have less than half hectare of cultivated land (CSA, 2013).

This study employed a hybrid of exploratory and concurrent triangulation mixed methods designs. In a two-phase mixed methods exploratory design, the results of the qualitative method were used in the development of a survey instrument; while in the validating quantitative data model of the triangulation variant mixed methods design, attempt was made to include open-ended qualitative questions with the quantitative survey instrument. Cross-sectional design was employed as it is best suited to studies aimed at finding out the prevalence of a phenomenon. Household heads provided information about the out-migrant family members and reasons they move out.

In order to identify the target sample households, a multi-stage sampling technique was employed. At the first stage, two '*districts'* were selected purposively, one from West *Gojjam* Zone and the other one from *Wolayta* Zone being considerate of the intensity of youth outmigration affirmed from literature and through observation in the zonal, regional and national capitals; and the socioeconomic condition of the districts. Second, out of the selected '*districts'* four *kebeles* (the smallest administrative unit in the administrative hierarchy in rural Ethiopia*)* were selected in every direction off the *district* capital purposively again in accordance to migration intensity and proximity to the *district* capitals (two *kebeles* within 10 km distance from the *district* capital and two farthest *kebeles* that are more than 10 km distance away from the *district* capitals) for better representation.

Once the smallest geographic study units were selected, however, the selection of the migrant-sending households was made on the basis of probability sampling techniques for ensuring representativeness. Since the number of migration affected households in the study *kebeles* was unknown, a sampling frame was created through house-to-house survey to identify households with and without migrant members. The migrant-sending household population identified through house- to- house survey was 1942. As the number of households identified for the study from the eight *kebeles* (the sampling frame) was too many, the desired sample size for the study was obtained using the Agrawal (2006) statistical formula:

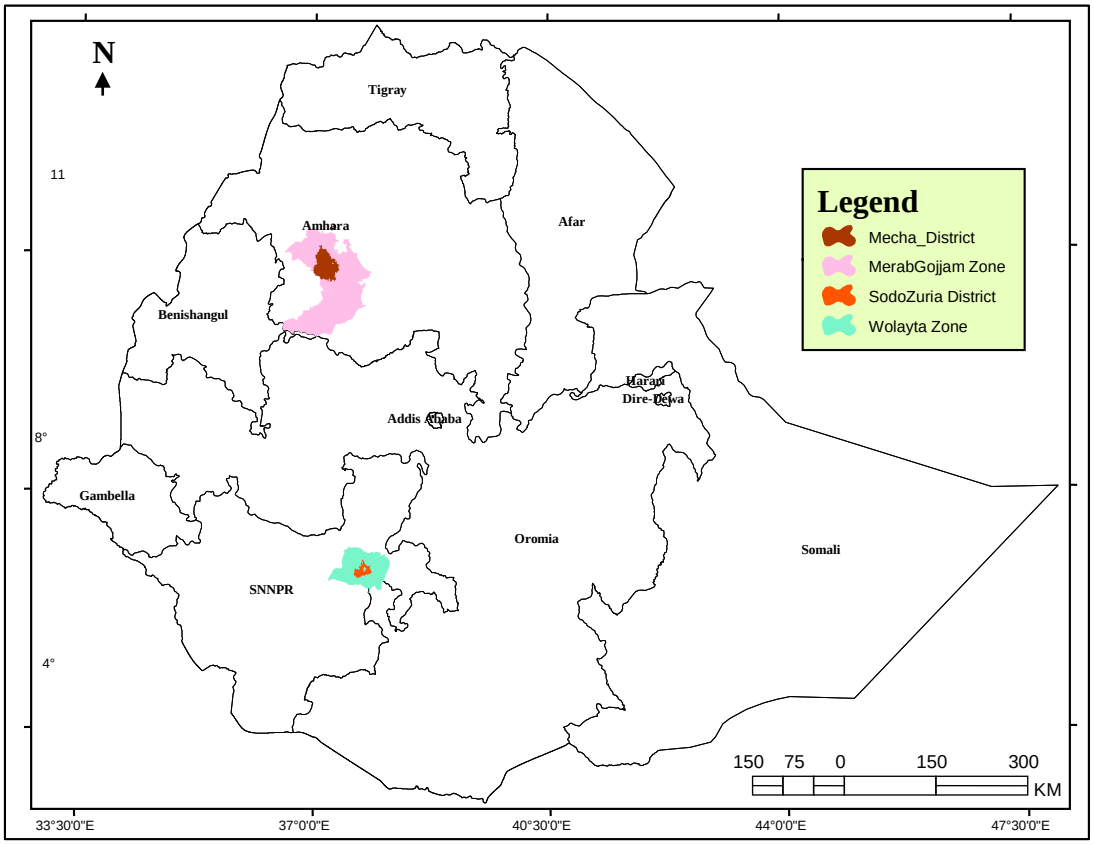

Figure 1. Map of the study districts in the national setting, Ethiopia.

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where; n= is sample size
N= is the population from which the sample is drawn
e =is the error which is supposed to be 0.05

Application of the aforementioned formula yielded a representative sample of about 331. However, for ease of treatment and as it does not put representation into question, data from 300 migrant-sending households was collected. For simplicity of comparison between the two migrant-sending districts, 150 migrant-sending households were taken from each *district*, keeping proportional allocation from the selected *kebeles*.

There are no specialized migration surveys in Ethiopia and because migration data at a '*district'* level that could be used for analysis were lacking, the researcher depended on generating primary data from the migrant sending households in the selected 'districts' for analyzing the determinants of migration. Both primary and secondary sources of data have been utilized. The primary data were obtained through a questionnaire survey distributed to sampled migrant sending household heads whose family member aged 10-29 at the time of first departure, at least one, had moved out within the last ten years from selected rural villages. In addition, in-depth interviews were made with selected migrant-sending households, community leaders, local administrators, as well as potential and actual migrants. The secondary data were gathered from various sources including official documents, published and unpublished reports from various organizations.

Analytical operations on the determinants of migration of children and youth becomes complex if analysis is made for all the permanent movers. Therefore, the analysis of data was based on information collected as regards to the first migrant who left the household within the ten years reference time period. In a situation where two migrants departed from the household at the same time (four cases were encountered), within the reference period, information of the elder migrant was collected and analyzed for the sake of convenience. The proportion of households with a sole migrant member was very high, making analysis on one member alone justifiable. Descriptive statistics such as percentages, means, variance and ratios, and poisson regression model were used to make analysis of the determinants of the outmigration of rural children and youth from the migrant sending households in the selected districts. The qualitative data was used in discussions to embellish survey findings.

RESULTS AND DISCUSSION

The reasons for the departure of children and youth out of their rural domiciles could be related with economic, administrative, sociocultural, demographic and environmental situations of both sending and receiving regions. Rural children and youth decide to depart, either because of the dissatisfaction with the existing conditions in the areas of origin or as a result of the curiosity to find congenial conditions elsewhere. As presented hereunder, the reasons for the outmigration of children and youth

Table 1. Characteristics of rural out migrant children and youth at the time of initial departure.

	Migrant sending households' location				Total hhs	
	Mecha District		*Sodo Zuria* District			
Migrant's situation	**No of hhs**	**% of hhs**	**No of hhs**	**% of hhs**	**No of hhs**	**% of hhs**
Age						
14-Oct	22	14.7	13	8.7	35	11.7
15-19	74	49.3	73	48.7	147	49
20-24	52	34.7	48	32	100	33.3
25-29	2	1.3	16	10.7	18	6
Total	150	100	150	100	300	100
Sex						
Male	107	71.3	116	77.3	223	74.3
Female	43	28.7	34	22.7	77	25.7
Total	150	100	150	100	300	100
Birth order						
1	44	29.3	71	47.3	115	38.3
2	52	34.7	36	24	88	29.3
3	30	20	29	19.3	59	19.7
4	10	6.7	7	4.7	17	5.7
5	6	4	6	4	12	4
6 and above	8	5.3	1	0.7	9	3
Total	150	100	150	100	300	100
Education						
Unable to read and write	31	20.7	1	0.7	32	10.7
Primary (grades 1-8)	84	56	89	59.3	173	57.6
Secondary (grades9-12)	28	18.6	50	33.3	78	26
Tertiary	7	4.7	10	6.7	17	5.7
Total	150	100	150	100	300	100
Relationship to hhh						
Child	141	94	146	97.3	287	95.7
Step- child	9	6	4	2.7	13	4.3
Total	150	100	150	100	300	100

from rural areas are treated pursuant to the individual migrant characteristics, the status of the family, changing communal attitudes, and the driving factors in the area of origin and pull factors related to the destination.

Attributes of migrants and migrant-sending households and rural outmigration

A glance at the socioeconomic and demographic attributes of migrant-sending households and the actual migrants is vital to develop a clear picture of the differentials and determinants of migration from rural areas. Various personal demographic and socioeconomic characteristics such as one's age, sex, marital status, health status, level of education and ethnicity exert profound influence on the individual's decision to migrate.

The findings of this study corroborate previous studies which pointed out that young adults predominate at initial migration. The average age of children and youth at the time of initial migration was 18.71 years. This study divulged that a large proportion of rural out-migrant children and youth (74.3%) were males (Table 1); contrary to the long established view and scenario that indicates dominance of females in the rural – urban migration streams in Ethiopia. Though previous studies affirm that there is a tendency for the eldest son or daughter to be less migratory, this study brought to light that most children and youth rural out-migrants (67.6%) were in the first and second order births among the siblings (Table 1).

The study further disclosed that most migrants have attained a primary level of education (57.7%). Most migrants are single (79%)) adults who have more freedom to move and have limited social ties to the family or community; and who more often move for job and marriage. In addition, although there is the view that neglect and stressing treatment of step-children and youth by stepparents is a huge migratory push leading to a sheer flight from home, it appears that most children migrating from rural areas (95.7%) originated from their biological parents and intact families where the husband and the wife live together.

As regards the demographic and socioeconomic characteristics of the parents' of migrant children and youth, the study unveiled that most migrants departed from household heads who were in their middle ages; the average age being 46.8 years (Table 2). Though there is literature which indicates that children from female-headed households are more prone to migrate, most migrants in this particular study migrated from male-headed households. The average number of children that the migrant sending households have at the departure of the initial migrant from the household was 4.98. Most migrant sending households (55.3%) have one family member departing from the household. The majority of the migrant sending households (93.7%) had large families having three to eight siblings (Table 2), where the competition for limited household resources, especially land, is intense. More than half of the parents of the migrant children and youth (58%) cannot read and write. Slightly more than three-fourth of the migrant sending household heads (76%) were married at departure of the primary migrant.

Whether a rural household is considered better-off or poor has to do mainly with possession of land and livestock and to some extent on income obtained from non-agricultural activities. Migrant sending households in *Mecha* and *Sodo Zuria* Districts possessed an average of 2.14 and 0.52 hectares of farmland when their first migrant member departed from home respectively. The status of landholding size over the past ten years for most migrant sending households has either remained constant or declined; and agricultural production has stagnated due to land fragmentation, impoverished soil conditions and inability to use either chemical and/or organic fertilizers, lack of draught animals, inability to use modern farming tools, inability to use pesticides and insecticides as well as lack of extension services. Inability to access land in an agrarian society leaves the landless with few alternatives to migration. Per capita livestock possession of the migrant sending households was not only small but it has declined over the last ten years as a result of the sale of livestock, shortage of grazing land, lack of proper livestock management, and death of livestock. Therefore, scarcity of farmland and dwindling livestock resources, declining agricultural production, and lack of non-farm income generating activities could be regarded as some of the leading factors driving rural youth out of their domiciles.

As presented in Table 3, increasing household size, diminution of landholdings and lack of farmland was reported by 33 % of the migrant sending households as a cause for the departure of young people out of rural areas. The average size of the migrant sending households at the time of departure of the first migrant was found to be 7.3 members. Within the last ten years the landholding size of the migrant sending households was reported to have declined. The average farmland size was 1.32 hectares some ten years ago while it has dwindled to 1.16 hectares in the survey period. The tendency of declining of farm holdings of the older households could be attributed to land inherited by children or fractioned among the grownups. The amount of land available to parents was also found to go down as farmland used to be rendered useless due to degradation. Some migrant sending households reported a decline in farmland because a part of it was used for the production of eucalyptus tree. The migrant sending households and the potential migrants alike disclosed that the youth are virtually becoming landless unless they inherit some land from their parents, rent land to farm, engage in non-farm activities or migrate to secure their livelihoods. Interview with officials indicate that the government has also abandoned the idea of undertaking rural land redistributions claiming that it will exacerbate land fragmentation and resource degradation which leads to diminishing agricultural productivity. Farming house-holds reported that many farmers are underemployed since they do not have sufficient farmland and they resort to both seasonal and temporary migration to supplement the family income.

A rural household necessitates cash income and may be in debt for the payment of taxes, to cover medical bills and educational expenses, to satisfy food needs, to buy clothes, for purchase of highly valued household goods and ornaments, house construction or improvement, death of pertinent livestock such as oxen and horses and the need to replace it, to buy agricultural inputs such as fertilizers and insecticides, landlessness and rent of land, for funeral and memorial feasts, marriage expenses and payment of bride prices, holiday celebrations and festivities and so forth. When a household especially with small amounts of land and livestock resources incurs a large debt, it is likely that the household sends some of its family members to work elsewhere to earn money to pay off the loans. Similarly, constant and often wasteful land utilization fueled by population pressure inevitably led to soil erosion and degradation. The need for intensification makes fertilizer application indispensable, though its price is soaring. This is likely to increase rural households' indebtedness and initiate migratory moves for repaying back debts. Farmers are allowed to access

Table 2. Attributes of migrant-sending household heads at departure of first migrant.

Attribute of hhhs	Location				Total hhs	
	Mecha District		*Sodo Zuria* District			
	No of hhs	% of hhs	No of hhs	% of hhs	No of hhs	% of hhs
Age						
30-39	36	24	38	25.3	74	24.7
40-49	60	40	59	39.3	119	39.7
50-59	39	26	42	28	81	27
60-69	13	8.7	9	6	22	7.3
70 and above	2	1.3	2	1.3	4	1.3
Total	150	100	150	100	300	100
Sex						
Male	112	74.7	111	74	223	74.3
Female	38	25.3	39	26	77	25.7
Total	150	100	150	100	300	100
Number of migrant members						
1	103	68.7	63	42	166	55.3
2	37	24.7	40	26.7	77	25.7
3	9	6	22	14.7	31	10.3
4 and above	1	0.7	25	16.6	26	8.7
Total	150	100	150	100	300	100
Number of siblings						
2-Jan	8	5.3	11	7.3	19	6.3
4-Mar	50	33.3	54	36	104	34.6
6-May	55	36.7	61	40.7	116	38.7
8-Jul	32	21.4	24	16	56	18.7
9 and above	5	3.3	-	-	5	1.7
Total	150	100	150	100	300	100
Education						
Literate	64	42.7	62	41.3	126	42
Illiterate	86	57.3	88	58.7	174	58
Total	150	100	150	100	300	100
Size of farmland (hectares) at departure of initial migrant						
0- 1.0						
1.1- 2.0	16	10.7	142	94.7	158	52.7
2.1- 3.0	75	50	8	5.3	83	27.7
Above three	51	34	-	-	51	17
Total	8	5.3	-	-	8	2.6
	150	100	150	100	300	100
Number of heads of livestock*						
0	2	1.3	11	7.7	13	4.3
5-Jan	43	28.7	119	79.3	162	54
10-Jun	39	26	17	11.3	56	18.7
15-Nov	40	26.7	3	2	43	14.3
16 and above	26	17.3	-	-	26	8.7
Total	150	100	150	100	300	100

*livestock include cattle, pack animals, sheep, and goats, other than poultry.

Table 3. Family conditions and child upbringing related causes of migration (part of multiple responses).

Causes of migration	Migrant sending households' location				Total hhs	
	Mecha District		*Sodo Zuria* District			
	No of hhs	% of hhs	No of hhs	% of hhs	No of hhs	% of hhs
Increased household size and lack of farmland	43	28.7	56	37.3	99	33.0
Declining soil fertility and loss of productivity	33	22.0	21	14.0	54	18.0
Parental indebtedness and inability to pay off debts	31	20.7.7	14	9.3	45	15.0

Table 4. The rural push and the quest for better conditions elsewhere as a determinant of rural outmigration (part of multiple responses).

Causes of migration	Migrant sending households' location				Total hhs	
	Mecha District		*Sodo Zuria* District			
	No of hhs	% of hhs	No of hhs	% of hhs	No of hhs	% of hhs
Searching for job and supplementing family income	119	79.3	148	98.7	267	89.0
Poor rural living and working conditions, low social status to be a farmer	89	59.3	93	62.0	182	60.7
Presence of better amenities and entertainment in town	43	28.7	48	32.0	91	30.3
Lack of non/off-farm employment opportunities	55	36.7	33	22.0	88	29.3
Lack of rural credit to start business	23	15.3	15	10.0	38	12.7
Drought and rainfall unreliability	28	18.7	9	6.0	37	12.3
Low market price and uncertainty of agricultural products	11	7.3	5	3.3	16	5.3

fertilizer on credit basis from governmental fertilizer distributors; to reimburse debts with interest during next year's harvest time when prices of agricultural produce are lower. Farmers also borrow money from private money lenders with higher interest rates that sometimes reaches 10% per month. They also borrow money from micro-finance institutions such as the Amhara Credit and Saving Institution (ACSI) in the Amhara Region and Omo Micro Finance in the SNNPRS for starting income generating small-scale investment projects such as cattle fattening, and sheep breeding and other non-farm activities. Though it appears pleading as regards to enhancement of the wellbeing and livelihoods of the farmers, the advice and follow-up given to the borrowers is so minimal that the money borrowed is used to satisfy the households' food and other immediate needs with almost nothing used in productive investment. The household, therefore, has to pay back the debt often by selling from the meager food crops available to the household, selling existing capital resources and livestock; or some members should depart to fetch cash income for the sake of debt repayment. Therefore, farmers and their children alike migrate either temporarily or permanently to obtain cash to pay back their debts. Parental indebtedness and inability to pay back debts is reported by 15% of the migrant sending households as a cause for the departure of children and youth out of rural areas.

Agricultural inefficiency, lack of income diversification, and rural outmigration

Ethiopia finds itself in a complex, broad and deep poverty. The United Nations Development Program's Human Development Report for 2019 ranked Ethiopia 173th out of 189 countries with Human Development Index (HDI) of 0.470. Therefore, it could be assumed that the widespread rural poverty as a result of internal and external influences is a major push factor for children and youth out migrantion.

The proportion of migrant sending households indicating lack of non-farm/off-farm income generating source as an important factor for the outmigration of children and youth was 29.3% (Table 4). In addition, lack of rural credit to farming households and rural youth to start business, rainfall unreliability, fluctuating agricultural prices and household resource scarcity as a result of increasing family size and land shortage as well as limited agricultural productivity could be recognized as important determinants of rural out migration of children and youth.

This study divulged that the basic reason for the migration of children and youth to urban areas is rural household's resource scarcity. Actual migrant respondents indicated that their parents are poor and are unable to provide them with their basic necessities. Household resource-scarcity coupled with large family

size makes it difficult to satisfy basic needs of children let alone providing them with the platform for their future development. Dissatisfaction with village life is an important motivation for rural out migration of children and youth. Urban areas of Ethiopia are relatively better endowed and privileged than rural areas in terms of infrastructural and socioeconomic facilities. There appears to be a socioeconomic complaint amongst rural children and youth with their increasing awareness about opportunities in urban areas. The grievances that children and youth develop on rural areas include landlessness and diminishing land size, deteriorating soil fertility, crop failure, livestock death, lack of employment specially for school leavers, less rewarding and laborious nature of rural work; lack of amenities such as health, education, potable water, electricity, telephone; lack of entertainment facilities; and other social restrictions.

Another factor for the migration of children and youth is the availability of wage employment opportunities in urban areas and commercial farms elsewhere. The labour intensive booming construction sector of expanding housing and urban infrastructure, the ever increasing demand for daily labour and housekeeping, as well as the diverse informal urban activities such as shoe shinning, lottery vending, road side petty trading, carrying goods and luggage, cart pulling, messenger services, scrap collection, bus assistantship, prostitution, becoming waitress/waiter, being guard, babysitting are major attractions of rural children and youth to the urban areas. The expansion of commercial farms has also been an important attraction of rural youth out of the subsistence farming villages. As one can decipher from Table 4, the search for employment, which is a manifestation of rural poverty and underemployment, is identified as a crucial cause for the out-migration of children and youth from rural areas by an overwhelming majority (89.0%) of the migrant sending households in both study Districts. The living and working conditions in rural areas are without exaggeration full of hardships. Young people in rural areas have to endure monotony and overwork both on the farm and at home. The lists of activities that are demanded from rural children and youth adding to their misery are so inexhaustible. The time taking and backbreaking domestic works and field activities that could be performed day after day in the scorching sun, the chilly weather and drenching rains include: plowing, digging and ditching, weeding, harvesting, threshing, looking after livestock, collecting firewood, fetching water either carrying or using animal power, milking, performing messenger services, conducting household chores such as cooking, and taking care of younger siblings among others. As data presented in Table 4 show, poor rural living and working conditions and the concomitant low social status attached to be a farmer was indicated by areas.

The glamour and excitement of towns is a major motivation in rural-urban children and youth migration. Migrants consider the town as the center of civilization in that its modern amenities like electric lighting, water supply, medical and health facilities, educational facilities, better shopping and marketing facilities, cinemas, bars and restaurants, roads and better transport facilities, buildings, and statues as well as non-material aspects of the town's cultural landscape such as the music, urban slang/dialect and communication, degree of anonymity, the ways in which people are dressed and other personal habits all have stronger appeal for the rural youth outmigration.

Improvements in rural education and infrastructure, family disintegration and rural outmigration

Expansion of schools and promotion of schooling in rural areas stimulates outmigration of rural children and youth for further improvement of their education or skills. Urban oriented education prepares rural children and youth to take up urban activities, thereby initiating them to depart. In an attempt to ensure equitable and universal access to primary education, schools are established almost in every rural areas of Ethiopia. However, the dreams of pursuing further education appears to be thwarted because of the great distance that they have to traverse to find junior and senior secondary schools. For a poor child from the poverty stricken rural households, detaching oneself completely from farm activities and attending school is a daunting mission. After completing their primary education in a school located within their own *kebele* (combining work and schooling and assisting their parents) children are often required to travel longer distances away from home to attend secondary schools mainly in rented houses in towns. Therefore, youth are caught in a dilemma between dropping out of school to engage in farming and going to school or leaving the rural area altogether. There are also cases where children and youth migrate to further their education.

Asaminew is a 17-year old boy who came to Addis Ababa two years ago together with his friend. He recounted his motivation to migrate and his encounters in Addis Ababa as follows:

I came here from Mecha District of West Gojjam Administrative Zone because my father was unable to sponsor my study for a junior secondary school which is about 15 km from home. I repeatedly asked him to buy me school uniform and stationeries so that I could pursue my schooling, but he turned down my request. He wanted me to assist him in the farm. Most of my colleagues pursued their education. You know, my cousin became a teacher after he completed his education but my father wanted me to be a farmer, oh! That was unpalatable. I just ran away. Father didn't know my whereabouts:

Table 5. Rural social services inadequacy and societal malfunctioning related causes of outmigration (part of multiple responses).

Causes of migration	Migrant sending households' location				Total hhs	
	Mecha District		*Sodo Zuria* District			
	No. of hhs	% of hhs	No. of hhs	% of hhs	No. of hhs	% of hhs
Search for further education	24	16.0	43	28.7	67	22.3
Marriage	8	5.3	20	13.3	28	9.3
Conflict with family, domestic violence/ill-treatment	14	9.3	5	3.3	19	6.3
Seeking health facilities	21	14.0	2	1.3	23	7.7
Family separation and presence of step-parent	13	8.7	2	1.3	15	5.0
Early marriage and marital breakdown	7	4.7	5	3.3	12	4.0
Death of mother or father and presence of a step-parent	10	6.7	1	0.7	11	3.7
Conflict with neighbours and community members	9	6.0	1	0.7	10	3.3

perhaps he might be mad at me… maybe he cursed me …maybe he regretted for thwarting my ambition for further education... I just don't know. When I came to Addis Ababa things were not as I expected. I neither got a job readily nor pursued my education. I almost finished the money that I brought from home and became a derelict. Then, I did everything that I found for survival. Now, I am getting used to life here, I live with three countrymen who are slightly older than me at a place called Kara Kore in Addis Ababa sharing accommodation expense. I work as a daily labourer in a construction and get fairly sufficient income for my subsistence. Next year, I am planning to continue my education in the evening program at a government school near my residence to fulfill my dreams of becoming a skilled house builder.

Another mechanism by which youth with some form of formal education are hugely tempted to leave the rural areas is when they are unable to be promoted from one grade level to another and repeat grades. Such children and youth are ridiculed by the community for their inability to pass from one grade level to another and therefore flee out of the village to an unknown destination, usually to urban areas.

Expansion of education in rural areas stimulates out-migration by providing children, with education and awareness of the socioeconomic opportunities available elsewhere. Rural children and youth who have attended formal education entail changing tastes for rural life styles and dream of urban ways of doing things as they become dissatisfied with the prospects of rural life. Children and youth who have acquired skills are more likely than those not so equipped to try their fortune in the towns. As shown in Table 5, nearly 20% of the migrant sending households indicated that the search for further education, its urban orientation and changing taste of lifestyle was indicated as a factor for the migration of children and youth from rural areas. A migrant sending household head denotes the perpetual exodus of young people out of rural areas in recent times associated with the impact of the widespread education in rural areas as follows:

Ato (Mr.) Andargachew is a 58 years old man. He was born and has been living in *Enashenifalen kebele* all his life. He told that in earlier days, migration out of this *kebele* used to be a little known. Villagers had plenty of land and lots of livestock, and people ate to their full and there were no problems. Children were engaged in different forms of farm activity and the demand for their labour was immense. We pursued our parents' ways of life and we wanted our children to follow the rural traditions and usual ways of doing things, he added. Schools were not found nearby; and we were not even aware of the advantages for our young people to spend their time in schooling. Sometimes we were forced by the *kebele* administrators to send children to school. We created all sorts of lame excuses for not sending children and youth to school. We considered the time children and youth spend in schools as a waste of time; as they could have been engaged in productive agricultural activities. There were very few students who were resilient to pursue their schooling despite all the communal disincentives and disapproval for their education. These pioneers after completing their education became better clothed and were able to secure urban jobs and others were assigned to nearby elementary schools and started to influence people on the good virtues of education. This, I think, is a turning point in the perpetual outmigration of our young people from the village. Now, rural schools are found at shorter distances and more and more students are going to school. People's attitudes for education are changed favorably. Students, who complete schooling in the rural areas, neither do get jobs in the village nor do they want to stay on the farm. Children and youth are on the brink of flocking out of the villages.

Improvements in transportation and communication have tremendous impact on human mobility. Transportation and communication improvements not

only reduce the cost of migration but also lessen the psychological and cultural gap between the origin and destination areas, thus making migration easier. People also become more migratory and more informed about distant places as a result of improvements in transportation and communication technology. The average distance of the nearest urban center to the villages, where distance of the individual homesteads were reported by the migrant sending households, in the study districts was 16.4 km (standard deviation was 12.9). Migrant sending households stated the ease of access to transportation and information compared to situations sometime in the past. Therefore, the relative accessibility of the rural households either to an urban center or the existence of a vehicular road that traverses the study area could be recognized as a favourable ground that facilitates and hastens the exodus of children and youth out of the villages.

In a country such as Ethiopia, where family norms and values are of high importance and priority, marital breakdown is not only socially unacceptable but also scourged. Remarriages yield the presence of step-parents who often have negative connotation attached with them. There is an Amharic adage that notifies the age-old dissatisfaction and hatred step –parents have to their step-children which runs as "*yesew lij kemasadeg ye wusha lij masadeg yishalal*' (It is better to keep a dog than to raise somebody else's child), and *Yalweledkut lij ababa bileggn afen daba daba alegn'* (I don't feel comfortable when a child I have not fathered calls me daddy). Similarly, young people do not find it comfortable to live with step- parents regardless of the humility that they display. '*Yenjera enat yasarirish ende jimat*' (Oh, stepmother, may you be charred like a wick) is an Amharic saying that usually comes out of children who are brought up by a step-mother to express one's grievance. Marital instability is found to be an important cause of out migration. Frequent exposure of children to heavy workload at home and feeling of helplessness motivate children and youth to migrate.

Step parents often cruelly treat their step-children. Yidnekachew is a 22 years old young migrant in Addis Ababa who came from *Amarit Wenz Kebele* of *Mecha* District six years ago and currently engaged in daily labour. He has stories to tell in connection with the mistreatment he received from his step-father during his formative childhood years. He narrates parental mistreatment as the causes of migration as follows:

My step-father was so cruel that he made my childhood years a living-hell. Hardly a day passed when he had never brutally beaten me for all sorts of lame reasons. He was even unhappy while he saw me taking a meal for survival. Once up on a time, perhaps at about the age of 10, I urinated where I slept. That was a terrible time. He tied a cord around my genital organ to stop my bed wetting and made me suffer a serious pain. My mother begged him to untie me. It took him perhaps more than an hour to do so. The pain lasted for weeks. There were times when I was also burnt. Now I am away from him, I do not want to look back. Glory to the Almighty God, he can't inflict harm on me anymore.

The practice of parental arranged early marriage, where the bride and groom are not known to each other or have never met before has been common in rural areas of Ethiopia. This often times leads to marriage instability and is also a contributory factor to the outmigration of children and youth from rural areas. Parental arranged early marriages have been the norm particularly in rural *Gojjam* of North West Ethiopia. Children who get married at a very young age are less prepared psychologically and immature physically to shoulder family responsibilities. Marriage of unequal partners where the husband is often older (*Yalacha gabicha)* exposes particularly very young females to a miserable life at times leading to severe health risks such as obstetric fistula. This in turn pushes young females to move out of their original domiciles as runaways. Girls who are supposed to be given to husbands without their consent tend to flee from the rural areas. On the other hand, there is an age old tradition that urban residents particularly of rural origin get married to women who are supposed to be cultured from rural areas; which therefore, is a cause for the out migration of grownup girls.

The presence of pioneering migrants, peer influence, changing community attitudes and rural out-migration

Outmigration is a function of social networks such as kinship ties and established friendships. The presence of family members already in a potential destination area promotes rural out migratory moves in many ways. In the first place, out migrants need to be supplied with positive information about destination areas as people tend to migrate less to an area for which they have little or no information; as the Amharic saying goes '*yemayawukut ager aynafikim*- means there is no craving for the unknown place'. Secondly, if there is a receptive population at the destination, adaptation of the migrant to the new destination will become easier. Pioneering migrants simplify situations for new entrants, thereby smoothening and facilitating their adaptation process. Whether finding jobs, assisting schooling or provision of temporary accommodation and food, or the psychic benefits of having some patron is considered; relatives in a destination play a pivotal role for the migration of individuals to the destination per se. Therefore, the kinship and friendship relations established by the potential migrants in the origin areas and pioneering migrants in the potential destinations are major determinants of outmigration. Presence of relatives/

Table 6. Social networks and external influences inducing rural out migration of children and youth (part of multiple responses).

Causes of migration	Migrant sending households' location				Total hhs	
	Mecha District		*Sodo Zuria* District			
	No. of hhs	% of hhs	No. of hhs	% of hhs	No. of hhs	% of hhs
Lure of pioneering migrants	82	54.7	97	64.7	179	59.7
Presence of relatives/friends in town	16	10.7	24	16.0	40	13.3
Lure of labour recruiting agents	6	4.0	29	19.3	35	11.7

Source: Field survey, February - May 2011.

friends already in town and other destination areas was indicated by 13.3% (Table 6) of the migrant sending households as a factor for the migration of their departed young members from home.

Peer influence is also a significant determinant of the migration of children and youth from the study areas. Children depart from their rural homes because of the enticement presented to them by their own peers of conditions in the destination. There is a tendency for children already in town doing informal jobs to exaggerate the freedom that they enjoy in an attempt to decoy new comers. Visiting migrants tell the honey and milk story of the urban areas to the potential migrants in their home village. The way they speak, the stories they tell about urban life, the way they are dressed, the ornaments they are decorated with, the gifts they present to their parents and relatives are all alluring to the potential rural children and youth migrants who are beset by a wide array of misfortunes. The information that potential migrants in the rural areas usually obtain from pioneering migrants makes them ambitious and eager to migrate. As one can decipher from Table 6, peer influence is a significant determinant as indicated by 59.7% of the migrant sending households for the migration of children and youth from the study areas. The limited impact of the lure of labour recruiting agents in the migration of children and youth out of rural areas could be explained by the closed nature of the community and the inability to penetrate the social niche.

Elderly interviewed respondents reported that long ago, the departure of a family member in a rural household used to be mourned. There were very few households that had a departed member. Today there are too many households who have migrant children in the *kebeles*. The attitude people have on the migration of a family member has greatly changed to the positive. There are also instances where families pressurize their grownups to move out and support them economically. Interviewees also reported that young people who work as daily labourers within the village on somebody's house are accorded low social status and ridiculed which in turn motivates them to migrate than staying in the village. Parents also visit their children who live in urban areas and when they return they often come to the village with new clothes, household utensils, and money both for themselves and for other closer relatives at the village. This in turn initiates parents in the neighbourhood to compel their children to move out to benefit economically from migration. Parents, triggered by diminishing farm plots and dwindling livestock resources, wish their children to out-migrate and work in towns and commercial farms when they observe that the migrant children of their fellow villagers remit cash and bring gifts to their parents that improve their living conditions. Slightly more than half of the migrant sending households (54.3%) positively value the out migration of young family members and encourage their children to leave while 27.7% do believe that their family would have been poor if none of its members worked in the town. A large percentage of the migrant sending households (69.3%) consider the urban-ward migration of boys/young men as a good thing which could be associated with the great demand for girls for household chores, the risks of migration of girls such as abduction, the limited educational attainment of girls and the lower probability of finding urban jobs, the disgrace the family is likely to face if out migrating girls end up becoming a prostitute among others.

Other causes for the departure of youth from rural areas indicated by the migrant sending households were military service and Diversity Visa Lottery. Parents indicated that there were cases where the out migration of rural youth out of the village was an answer to the call for a contribution in safeguarding the safety and security of the state by joining the military. Some of the migrant sending households replied that youth are recruited to join the army in the incumbent regime on a willingness basis; though they recall, the *Dergue* (Military Junta that ruled Ethiopia from 1974 to 1991) used to snatch their family members to take them to the warfront, many of whom died during the civil war that ended in 1992.

Regression model of the determinants of rural outmigration

Poisson regression model was used to make analysis of the determinants of the outmigration of rural children and youth from the migrant sending households in the selected districts. The application of the model became indispensable because the dependent variable was a count data with limited number of distinct values (ranging

Table 7. Summary of the results of the Poisson regression analysis of the determinants of the number of children/youth migrating from the households.

Parameter	Parameter estimates					
	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper bound
Constant	-6.105	0.194	-31.468	0.000	-6.485	-5.725
[Sex of hhh = 1]	-0.342	0.137	-2.489	0.013	-0.611	-0.073
[Sex of hhh = 0]	0[a]	.	.	.	.	.
[Possession of radio = 1]	-0.816	0.128	-6.360	0.000	-1.068	-0.565
[Possession of radio = 0]	0[a]	.	.	.	.	.
[Relative at destination = 1]	-0.166	0.105	-1.583	0.113	-0.372	0.040
[Relative at. destination = 0]	0[a]	.	.	.	.	.
[Food adequacy = 1]	-0.200	0.107	-1.869	0.062	-0.410	0.010
[Food adequacy = 0]	0[a]	.	.	.	.	.
[Entertaining children = 1]	0.243	0.116	2.094	0.036	0.016	0.471
[Entertaining children = 0]	0[a]	.	.	.	.	.
[Non-farm employment = 1]	0.137	0.098	1.397	0.162	-0.055	0.330
[Non-farm employment = 0]	0[a]	.	.	.	.	.
[Marital status of hhh = 1]	0.065	0.137	0.479	0.632	-0.202	0.333
[Marital status of hhh = 0]	0[a]	.	.	.	.	.
Literacy status of hhh	1.003	0.091	10.978	0.000	0.824	1.182
Age of hhh at departure	0.076	0.004	20.652	0.000	0.068	0.083
Siblings at departure	0.285	0.027	10.395	0.000	0.231	0.339
Farmland size at departure	-0.113	0.100	-1.123	0.261	-0.309	0.084
Amount of farm produce	-0.004	0.003	-1.332	0.183	-0.010	0.002
Number of livestock at departure	0.006	0.013	0.438	0.662	-0.020	0.031
Distance to nearest urban center	-0.15	0.005	3.267	0.001	0.006	0.024
Model: Poisson						

Design: Constant + Sex of hhh + Possession of radio + Relative at destination + Food adequacy + Entertaining children + Non-farm employment + Marital status of hhh + Literacy status of hhh + Age of hhh at departure + Siblings at departure + Farmland size at departure+ Amount of farm produce + Number of livestock at departure+ Distance to nearest urban center.

from one to seven) and the data when checked for linear regression did not satisfy the assumptions of normality and linearity.

Unlike the ordinary least square- multiple linear regression, logistic and loglinear/poisson regressions have relaxed data assumptions where there is no assumption that the dependent and independent variables be related linearly, the dependent need not be normally distributed, independents need not be interval in level of measurement and there is no assumption of homoscedasticity. The loglinear model assumes a multinomial distribution of counts within each combination of categories of independent variables. Predictor variables in loglinear Poisson regression could be categorical or continuous predictors added as covariates in either count or rate Poisson regression models; and like other forms of loglinear analysis, Poisson regression is predicting the count or rate. The dependent variable is the number of children departing from the migrant sending rural households. The independent (explanatory) variables that are believed to determine the out migration of young members from rural households identified though meticulous literature review and own observation of the study areas as well as through survey are listed as follows:

x_1 : Farm size (per capita land holdings in hectares) at departure of the migrant

X_2 : Number of heads of livestock possessed by the household at departure of the migrant

x_3 : Quintals of agricultural produce (cereals) obtained in a year by household

x_4 : Family size (number of siblings) at departure of the migrant

x_5 : Educational status of the migrant sending household head (grade level completed) at initial departure of the migrant

x_6 : Age of the migrant sending household head at initial departure of the migrant

x_7 : Sex of the migrant sending household head (1: Male, 0: Female)

x_8 : Marital status of the household head at departure of the first migrant (1: Married, 0: separated/Divorced/ Widowed)

x_9 : Presence of relatives in a destination at the time of initial migration (1: Yes, 0: No)

x_{10} : Possession of radio in the household at departure of initial migrant (1: Yes, 0: No)

x_{11} : Engagement in non/off-farm employment by the household head (income other than agriculture) at departure of initial migrant (1: Yes, 0: No)

x_{12} : Adequacy of food produced by the household to feed family all the year round at departure of initial migrant (1: Yes, 0: No)

x_{13}: Attempt to fulfill/entertain the needs of young family members and giving them chance to express themselves (1: Yes, 0: No)

x_{14} : Distance of the nearest urban center from the household's premises (km)

The Regression model

$$\ln \mu = \beta_0 + \beta_1 x_1 + \beta_2 x_2 ..... \beta_{14} x_{14} + e \quad (2)$$

Where $\ln \mu =$ number of children of the i^{th} household

$x_1 - x_{14}$ = explanatory variables

The reduced model of the regression analysis is therefore,

$$\ell n\mu = -6.105 + 0.285x_4 + 1.003x_5 + 0.076x_6 - 0.342x_7 - 0.816x_{10} + 0.243x_{13} - 0.15x_{14} + e \quad (3)$$

From the explanatory variables family size (number of siblings) at departure of the migrant (x_4), educational status of the migrant sending household (grade level completed) at initial departure of the migrant (x_5), age of the migrant sending household head at initial departure of the migrant (x_6), sex of the migrant sending household head (x_7), possession of radio in the household at departure of initial migrant (x_{10}), households' attempt to fulfill/entertain the needs of young family members and giving them chance to express themselves (x_{13}) and distance of the nearest urban center to the household's premises(x_{14}) were found to be significant in explaining the variation in the number of children and youth migrating out of a rural household .

Family size (number of siblings) at departure of the migrant, educational status of the migrant sending household (grade level completed) at initial departure of the migrant, age of the migrant sending household head at initial departure of the migrant, and attempt to fulfill/entertain the needs of young family members and giving them chance to express themselves determined the response variable positively. On the other hand, sex of the migrant sending household head that is whether the household male headed or female headed, possession of radio by the household at departure of initial migrant, and distance of the nearest urban center to the household's premises determined the response variable negatively.

When the number of siblings increases by one unit, the number of children migrating from the household increases by 33% ($e^{0.285} where\ e = 2.718282...$) is 1.33. When the number of schooling years attended by the migrant sending household expressed in terms of grade level completed increases by one level, the number of children migrating from the household will be multiplied by 2.72 ($e^{1.003} where\ e = 2.718282...$). When the age of the migrant sending household head increases by one unit, the percentage of children migrating from that household increases by 8% that is $e^{0.0763} where\ e = 2.718282...$) =1.08. Male headed migrant sending households in rural areas generate 29% less migrant children and youth than the female headed migrant sending households that is ($e^{-0.342} where\ e = 2.718282...$) is 0.71. It is natural to assume that male headed households for a plough based agricultural system could be economical at a better standing than the female headed households and therefore give rise to limited migration of children and youth. Migrant sending rural households who possessed radio during departure of initial migrant have 56% less migrant children and youth than households who did not have radio ($e^{-0.816} where\ e = 2.718282...$ is 0.44). Although migrant sending households were assumed to generate more migrants from rural areas as a result of access to information about destination areas, more migrants originated from households who did not possess radio. A possible explanation could be because households who possessed radio were better-off rural households, where children and youth could access family resources rather than opting to migrate.

Households who attempted to fulfill/entertain the needs of their young family members and provide to their level best possible the opportunity to express themselves generated 27 % more migrants against the expectation that neglect is a cause of migration (1.27 =

$e^{0.243}$ *where* e *is* $2.718282...$). It could be assumed that if the needs of children are satisfied in the rural areas, there is a natural curiosity to try something different somewhere. Better off households do not also thwart the educational needs of their children and youth, which of course is a major determinant of migration. Another significant determinant of the number of migrants from a rural household is the distance of the household's premises to the nearest urban center. The greater the distance of the households premises from the nearest urban center, the fewer the number of migrants from the household. Migrant sending rural households who are located closer to an urban center have 86% more migrant children and youth compared to households who are found far from the urban center, which is ($e^{-0.15}$ *where* $e=2.718282...$) 0.86.

CONCLUSION AND RECOMMENDATIONS

The central intent of this study has been the investigation of the causes for the departure of children and youth out of rural areas. The discussions made underpinned that there are numerous causes of migration where economic and social motives are intermingled with demographic and environmental situations. Rural children and youth decide to depart either because they are unsatisfied with the existing conditions in their areas of origin or are curious to find congenial conditions elsewhere.

Increased household size and lack of farmland is a major cause for the departure of young people out of rural areas. Lack of income diversification and the desire to fetch cash income, rural underemployment, and household indebtedness and inability to payback debts result in considerable outmigration of children and youth out of rural areas. Agricultural inefficiency, rural household poverty, dissatisfaction with the perceived dull village life and the glamour and excitement of towns are major motivations in rural-urban children and youth migration.

Widespread rural education and improvements in rural infrastructure are closely intertwined with the outmigration of children and youth. The practice of early arranged marriage, the tendency of urban residents to get married to women of rural origin, the presence of stepparents and marital instability are contributory factors to the migration of children and youth from rural areas. Existence of pioneering migrants in the potential destination areas and peer influence are also important determinants of the migration of children and youth from the study areas. Rural residents are gradually developing positive attitudes towards the migration of a family member. Since rural poverty is the ultimate cause that drives children and youth out of their rural domicile, the primary role of the government has to be a sustained and multifaceted effort on rural poverty reduction. Education programs and curriculum that are relevant in improving productivity of the rural economic sector; assisting rural households to diversify income through non-farm income generating means and integrated population and reproductive health services could be important poverty reduction endeavours that prevent excessive exodus.

Relieving children and youth from being engaged in an arduous, time taking and backbreaking activities; and helping children to give more time to their education provides them an opportunity to succeed in obtaining professional urban jobs if they migrate. Environment induced excessive migration could be averted through intensified water and soil conservation endeavors to improve productivity. There should be sensitization on domestic violence and ill-treatment, and the impact of marital dissolution and related factors on migration. The traditional parent-arranged and forced early marriage practices common in rural areas should be discouraged through strict enforcement mechanisms on parents who permit marriage of minors.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Transit oriented development in medium cities in Africa: Experiences from Kisumu, Kenya

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Transit Oriented Development (TOD) is a planned area with land use that has optimal reach of public transport by urban populace it serves. Availability and accessibility of public transport minimizes reliance of use by private users and this is the cardinal rule of TOD Principles have been developed that provide a framework for understanding TOD. Kisumu is used as a case study in exploring these principles and their validity in medium sized African city. The application of these principles in guiding city planning and development highlights how TOD can be an effective driver of sustainable urbanization. The paper presents the concept of TOD and then builds into the case study city: Kisumu. It enables the reader to contextualize the discussions in the subsequent sections. The paper then addresses TOD conceptualization. It looks at the broad categories of TOD that has been demonstrated in Kisumu as a result of the interventions of various actors. It finally looks at the challenges and opportunities that exist for TOD as a planning and development framework.

Key words: Transportation, densification, accessibility, sustainable urban development, Kisumu.

INTRODUCTION

Globally, it has been noted that most urban dwellers are not able to access their cities especially within the urban passenger transport system. This type of transport focuses non-motorized transport, formal public transport, informal (motorized) transport and private motorized transport (UN-Habitat, 2014). Sustainable urban development must always utilize the available urban space for different types of land use activities such as residential, commercial and recreation. These land uses must also be within walking distance of public transport (Caves, 2004). Mixed use development which sees a combination of land uses such as residential, workplaces and commercial reduces trip distances, thus making it possible to complete trips by foot or bicycle (UN-Habitat and Institute for Transportation and Development Policy - ITDP, 2018). Planners advocate for the promotion of dense and compact urban form to ensure that there is space for efficient public transport use. This is further reaffirmed by the New Urban Agenda's global commitment to sustainable urban development which is a critical step for realization of sustainable development in an integrated and coordinated manner at various spatial

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levels, taking into consideration the views of relevant actors. To implement the New Urban Agenda, the 2020 Agenda for Sustainable Development must be localized. This will thus lead to the achievement of the Sustainable Development Goals (SDGs) and targets (UN, 2017). This includes Goal 11 of making cities and human settlement sustainable through inclusivity and resilience. It also strives to ensure that the environment is protected for its urban environmental quality as noted by (Li and Weng, 2007).

Cities in Africa have in the past suffered because of poor governance and management. In order to achieve sustainable urbanization, governance and management, they must be streamlined with the SDGs and the New Urban Agenda. This Agenda seeks to give direction on how to link sustainable development and urbanization (UN, 2017). Transit Oriented Development (TOD) comes in handy in order to achieve this objective.

Transit Oriented Development (TOD) creates a focus on non-automobile as the mode of transportation, to reduce pollution and enhance fuel efficiency. TOD is expected to lead to sustainable livable cities (Chan et al., 2016). TOD tries to enhance access to public transport and non-motorized transportation through nodes that are centrally located to allow for easy access for citizens in high density commercial and residential development (Dittmar and Ohland, 2012, Thomas et al., 2018). The use of TOD in planning and development of medium sized cities, such as Kisumu, allows for exploration of this concept in sustainable city growth. Kisumu is going through transformation as the County Government implements policies on transportation and densification of urban development. This provides an opportunity to assess application of the TOD principles in a middle-sized African City. The objective of this paper is to assess the use of TOD principles in planning of Kisumu City in the last five years. It demonstrates through existing interventions the application of these principles. Although it has its unique characteristics, Kisumu represents a typical medium sized Sub-Saharan African city, going through rapid urbanization with minimal resources to provide urban transport infrastructure.

TOD transit centers are usually rail stations that link the rail system and the city creating meeting points (Knowles, 2019). TOD is being recognized internationally as the new paradigm for transport and development planning, which has the aim to achieve more sustainable and equitable cities. TOD tries to connect mass transit and non-motorized transport with centrally located terminal facilities surrounded by high density residential and commercial neighborhoods (Dittmar and Ohland, 2012).

Zhang et al. (2019) emphasise that TOD is one of the key tools in urban spatial planning. There are three aspects showing how TOD is related to urban spatial structure. *Firstly,* TOD focuses on the complete quantification of different urban elements, *Secondly*, TOD can be applied as a method of recognizing the urban growth or dynamism and *Thirdly*, TOD emphasizes a balanced growth, structure and sustainability of cities.

Chan et al. (2016) provides Principles of Transit Oriented Development. These ten principles are “1) Put stations in locations with highest ridership potential and development opportunities, 2) Designate 1/2 mile radius around station as higher density, mixed-use, walkable development, 3) Create range of densities with highest at station, tapering down to existing neighborhoods, 4) Design station site for seamless pedestrian connections to surrounding development, 5) Create public plaza directly fronting one or more sides of the station building. Create retail and cafe streets leading to station entrances along main pedestrian connections, 6) Reduce parking at station, site a block or two away, direct pedestrian flow along retail streets, 7) Enhance multi-modal connections, making transfers easy, direct, and comfortable, 9.) Incorporate bikeshare, a comprehensive bikeway network, and ride-in bike parking areas, and 10) Use station as catalyst for major redevelopment of area and great place-making around station” (Chan et al., 2016:178). Goodwill and Hendricks (2002) provides a comprehensive assessment of TOD that demonstrates how TOD can be used to shape the growth and development of a city. There are cases where there is a deliberate policy to institute TOD as demonstrated in Johannesburg where TOD was a deliberate planning strategy adopted by the City government (Harrison et al., 2019). This would have been the best approach for a city like Kisumu however the authors did not see a structured approach to the use of TOD hence the focus on the principles and to assess if they apply to Kisumu’s planning interventions.

METHODOLOGY

Key Informant Interviews were conducted to tap on the experiences from the policy makers and practitioners. This information was collected through interviews with the City Director of Planning, City Director of Environment, County Chief Officer Planning, staff at School of Planning and Architecture Maseno University, School of Spatial Planning Jaramogi, Oginga Odinga University of Science and Technology and Urban Researchers at Kisumu Local Interaction Platform. These are persons who have been engaged in planning and policy research in Kisumu for over five years. The information was consolidated to generate the general thematic areas. Data obtained from these interviews was processed and coded using the content analysis by putting issues based on differences and similarities. Documentation was reviewed to triangulate these findings and shared in roundtable meetings to create consensus around the thematic areas and their interpretation. Information was also drawn from activities of University researchers from Kisumu and Gothenburg in the last decade, which though limited in scope, provides an opportunity to present a perspective on sustainable urban development.

This paper utilizes *framework analysis* which builds on the thematic analysis (Smith and Firth, 2011). It allows the authors to assess the cross-sectional descriptive data and capture the various phenomenon under investigation. Framework analysis is a tool for

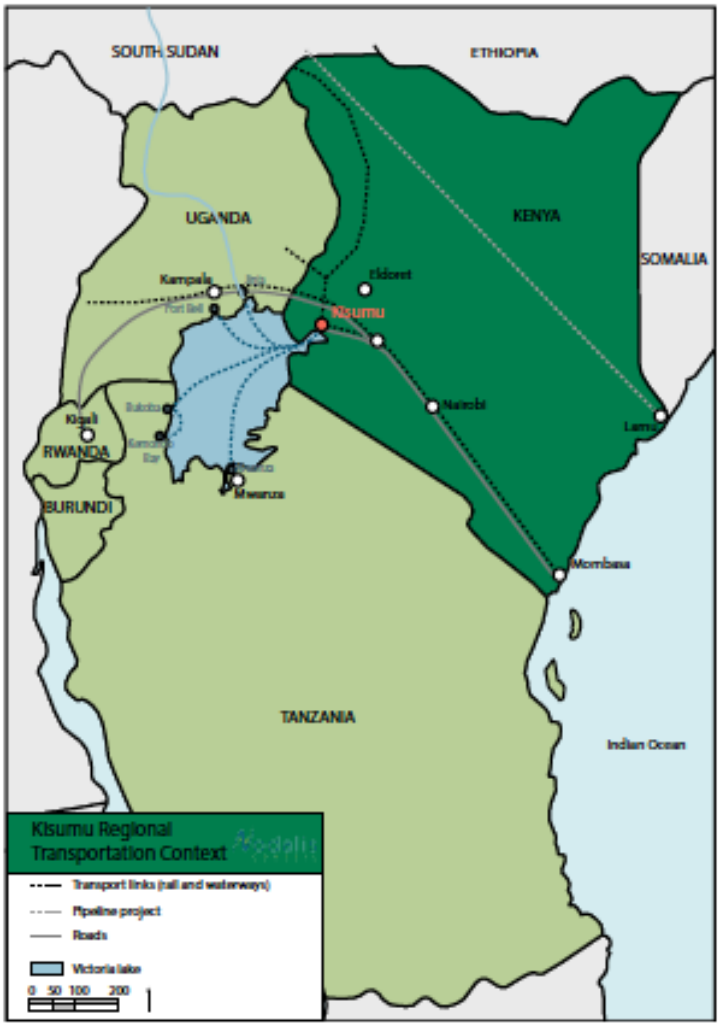

Figure 1. Kisumu in regional context.

analyzing textual material to create an audit trail between the original material and the final conclusions (Dymitrow and Brauer, 2017). They ensured familiarization with the data by the Key Informants through round table discussions. The authors then used the TOD as a framework for further discussion and assessment. Data were coded based on the identified thematic areas relating to TOP principles and placed in excel chart for ease of further assessment. These were 1) stations in accessible locations, 2) mixed-use, walkable development, 3) range of densities, 4) pedestrian connections, 5) public space and retail and cafe streets, 6) Reduced parking at station, 7) Enhance multi-modal connections, 8) comprehensive bikeway network and 9) station as catalyst for redevelopment.

Assessment and interpretation of the data were done to validate the conclusion that is drawn with regards to how the TOD principles are applied in Kisumu. It is used to organize and manage research by means of thematic summary, creating outputs which allows for analyzing data on a thematic basis. The method is most effective for analysis of primary data, such as in systematic reviews of published texts, where it can be used to test a concept or to develop it (Smith and Firth, 2011; Srivastava and Thomson, 2009; Ward et al., 2013). In order to present a comprehensive picture, the analyzed data material included scientific publications about TOD and Kisumu, Acts of Parliaments and policy documents relating to Kisumu. Although subjective, the method allowed the authors to capture diversity around TOD in Kisumu. However, the methodology allowed for assessment of the relationship between the principles entailed in TOD and the planning implementation in Kisumu through an iteration process that involved the Key Informants.

Kisumu city

Kisumu City, a typical medium sized African city and the third largest in Kenya, is located on the shores of Lake Victoria with a population of 567,963 (Government of Kenya, GoK, 2019). Kisumu was established in 1901 as a terminal of the railway from Mombasa to Uganda. It also has a port connecting lake ports in both Uganda and Tanzania (Figure 1). Kisumu is the leading commercial/trading, fishing, industrial, communication and administrative center in the Lake Victoria basin. It has grown as a transportation hub for Western Kenya. Linking, Kenya to the East African Countries via rail, road, water and air (Onyango and Agong, 2018). The City provides typical features that one finds in post-colonial African cities struggling to grow and develop in a competitive global environment.

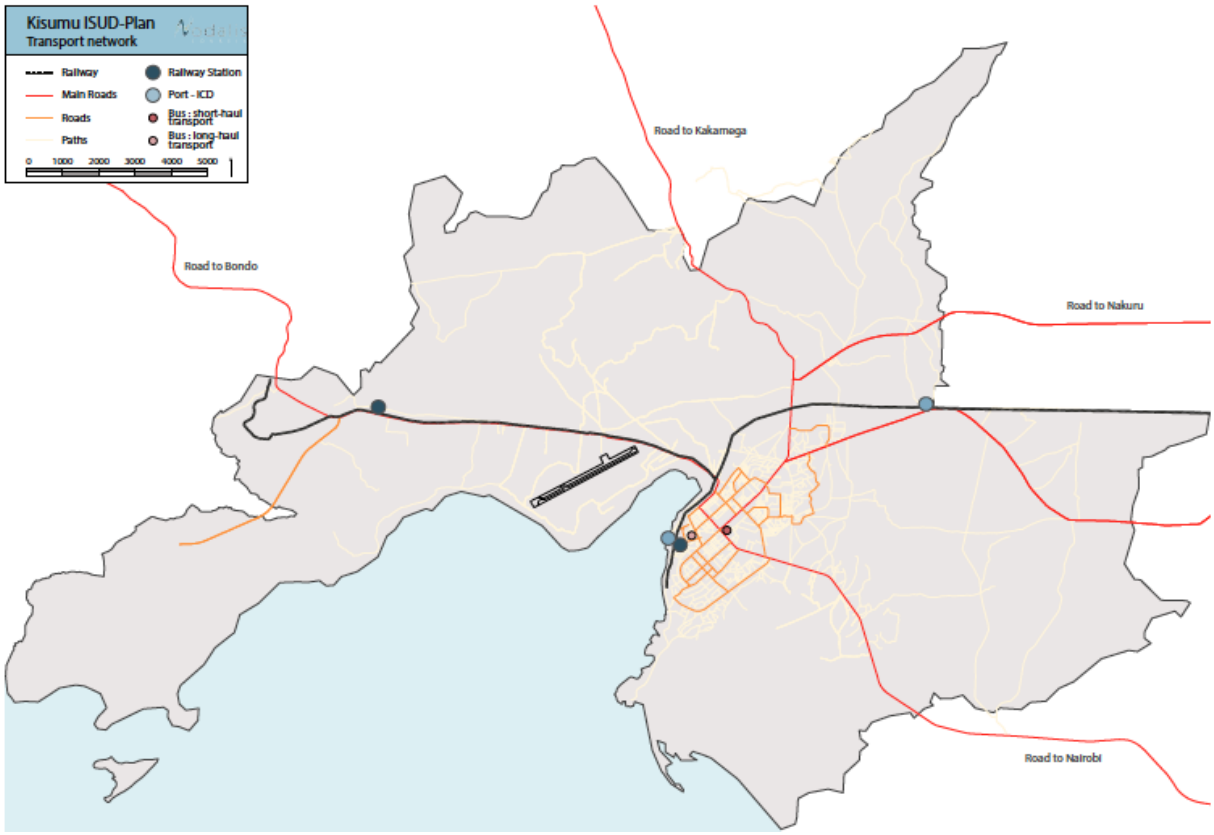

Figure 2. Transport Network in Kisumu City
Source: CGoK (2014).

However, the use of the automobile has influenced the expansion of the city quite substantially. Kisumu has gone through various planning regime starting with 1899 Framework map, a land-use map in 1900 providing impetus for growth and a Physical Plan prepared in 1984 that was never fully implemented. The elevation to a City Status in 2001 created an urgent need for a comprehensive plan that would ensure sustainable growth. The Kisumu Integrated Strategic Urban Development Plan (CGoK 2014) provided the basis for the latest plan, the Local Physical and Land Use Development Plan (LPLUDP 2020). Some of the key challenges the City is grappling with include transport, housing and related support infrastructure.

The growth of the City has created four distinct areas, the Urban Core made up of the 1) built up areas of the old city, 2) the Slum belt made up of informal settlement of Nyalenda, Manyatta, Nyamasaria and Bandani which form a belt around the urban core, 3) the Eastern Extension which is made up of a rapidly urbanization areas stretching to Ahero town, and 4) Northern/Western area that is basically rural in nature but slowly being developed as low-density residential suburbs. The development in each of these areas creates unique mosaic with regards to transit development and densities. The ISUD Plan and the LPLUDP envisions the City growth being driven by urban nodes connected through arterial roads with densified residential and commercial development (Figure 2).

Kisumu is basically a City with over 50% of movement done by walk (Figure 3). “53% of daily trips in Kisumu are pedestrian trips. After walking, significant modes include matatus (13%), motorcycle boda-bodas (13%). Other modes include private motorcycles (6%), car (6%), bicycle (3%), tuk-tuk (3%), and bicycle boda (1%)” (ITDP, 2020). It thus presents a perfect opportunity of integrating transit planning that is not automobile oriented.

RESULTS AND DISCUSSION

Footprints of Tod in Kisumu

The growth and development of Kisumu has to be inexorably linked to transport development in the country. Kisumu was established as a railway terminus. The railway station formed the core of the town’s development. The railway station was linked to the port with eventually RORO Ferries operating to connect the town and other destinations around the Lake Victoria (County Government of Kisumu-CGoK, 2018). The essence of planning is to ensure that urban growth is organized and developed with due consideration for convenience, efficiency, conservation, environmental quality and social equity (Dambeebo and Jalloh, 2018). Despite this, it is pertinent that there are many challenges to consider when planning a city which is currently developed. The challenges concern issues such as governance, social justice and the right to the city,

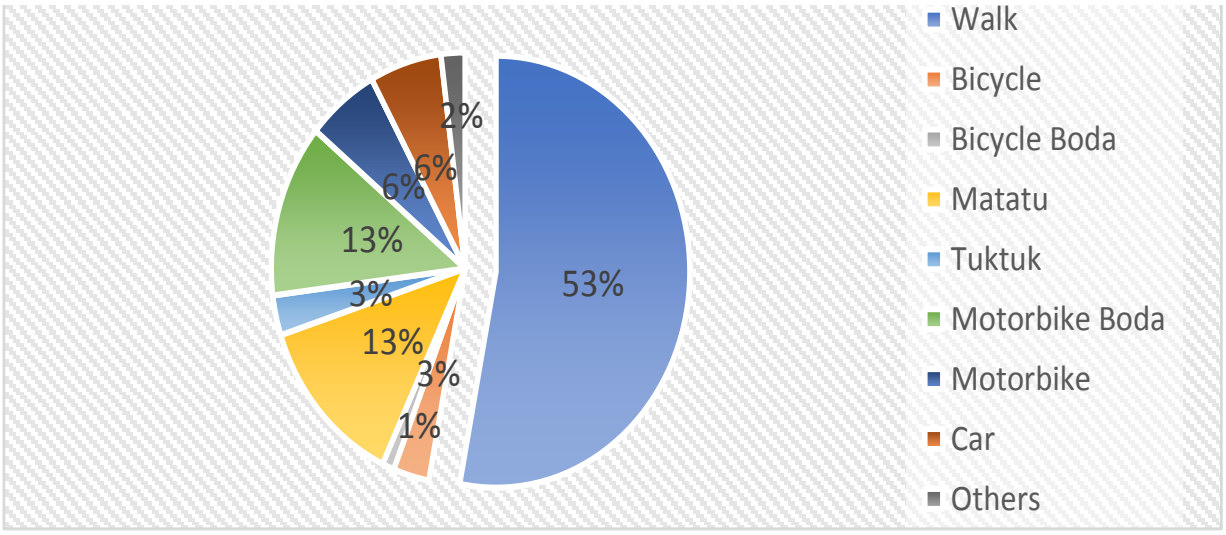

Figure 3. Modal split.
Source: ITDP 2020).

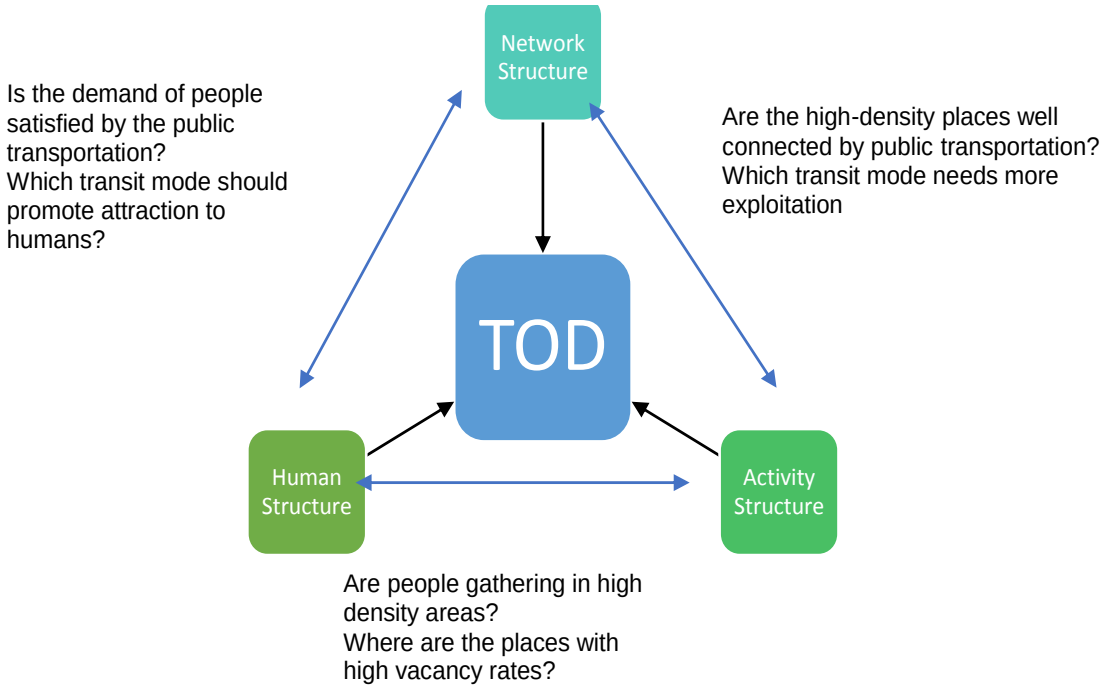

Figure 4. Network-activity-human model.
Source: Zhang et al. (2019).

accessibility and public transportation, aesthetics and liveability in the area but also the risk of gentrification. These challenges are best tackled during public participation forums whereby all stakeholders are brought on board thus the need for community participation. Figure 4 shows the relationship between activities, human structure and network structure which enhances TOD.

TOD is a planning strategy in Kisumu that is not deliberately applied, but enables a future that is more sustainable and where the car is not the main means of transportation. There is also a focus of increasing the

Plate 1. Improvement of pedestrian walks and cycle paths in Kisumu CBD.

accessibility to basic services such as schools, health care, common spaces and leisure time activity. Through this, it is possible to develop an innovative, human and sustainable Kisumu city, creating possibilities to use the city as a test bed for innovation for sustainability. The challenge is how to go about planning a sustainable city (Ngetich et al., 2014). The transportation network is the framework of the city and this includes the public transportation system. Each component of the network comprises of lines and nodes (Taylor, 2017). These structures result in multiple land-use patterns creating the base for TOD.

Careful management and modification of the natural environment into built environment is fundamental to improving the quality of life for residents in Kisumu (Owino et al., 2017). This can only be successful if it is integrated with transport planning. Efficient transport and easy access to jobs, shopping, education, and leisure facilities is a path to a strong, prosperous, and equitable economy. This can be achieved by actively shaping the pattern of the urban growth around transport with a focus on sustainable access. This calls for the need to influence the location, density, design, and mix of land uses to bring jobs, housing, and services closer and make it safer and easier to walk, cycle, and use public transport (ITDP, 2020).

Tod development strategy

The use of Chan et al. (2016) principles to assess TOD in Kisumu provides an opportunity for a standardized approach to assessing TOD approach to structure and planning in the city. It must be pointed out that in the planning processes there is no deliberate philosophical grounding based on TOD but rather the use of the principles in such processes.

The railway and bus terminals

The first principles look at *the* railway stations and bus terminals as locations with highest ridership potential and development opportunities. The physical environment and quality of life has deteriorated as a result of the widening gaps between supply and demand for infrastructure in transportation thus interfering with the positive aspects of urbanization (Owino et al., 2017). Kisumu has a central bus station and a railway station which has not been operational for over two decades.

Transportation is a vital land use activity which transforms the natural and built environment. Due to transportation, rural communities neighbouring the City have transformed into urban neighbourhoods which grow as unplanned and linear in form. Such urban areas face a number of planning challenges such as inaccessibility and poor development control (Jhawar et al., 2013). Uncontrolled development results in mismanagement of resources leading to substandard living environment (Jhawar et al., 2013; UN-HABITAT, 2014). Transport planners and urban designers have endeavored to create car-oriented communities which are more transit friendly by using physical design features. TOD as a concept tries to enhance movement by discouraging reliance on the automobile and encouraging use of alternate modes of transportation such as transit, walking, and biking. A number of streets in Kisumu are being developed to make them pedestrian and cyclist friendly (Plate 1). With

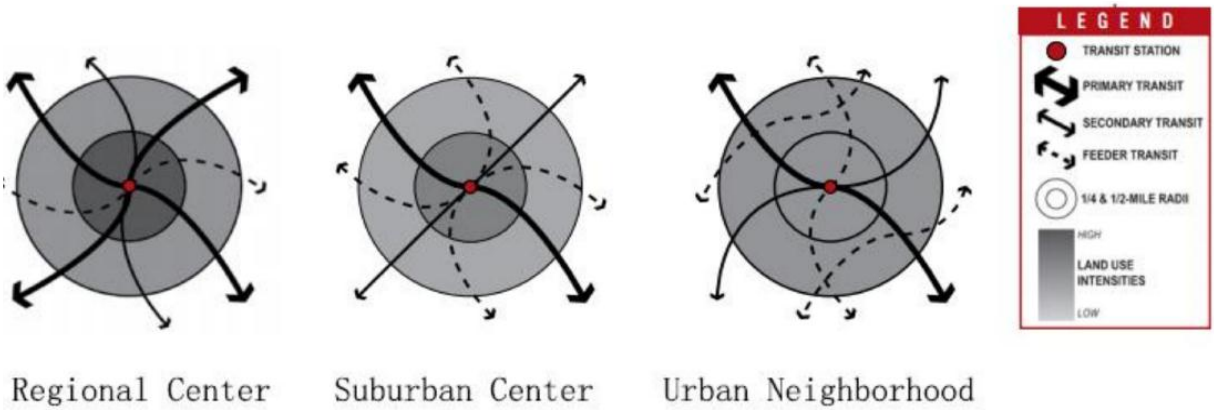

Figure 5. Transit Oriented Development Land-use patterns.
Source**:** Tong et al. (2018).

the advent of new technologies, architects, planners, engineers and builders have been able to come up with environmentally friendly urban designs that offers better living standard. The designs conform to the planning standards and regulations (GoK, 2007, 1998, 1968).

Revamping of the 220 km long meter-gauge railway from Nakuru town, which had been neglected for over 25 years will help revive economic activities along the rail route. It is going to open various business opportunities. The rehabilitation of the meter gauge railway is being undertaken by the National Youth Service, Kenya Defense Forces in partnership with Kenya Railways Corporation (Ndambuki, 2020). The rehabilitation is an effort towards shifting some transport from the road to rail which is cheaper and enhances sustainable urban development. The success being witnessed today can be attributed to President Uhuru Kenyatta's keen interest in seeing to it that the cost of production is brought down drastically to ensure that the pillars of the Big 4 Agenda legacy are realized. The rehabilitation involves revitalization of the previously abandoned and dilapidated railway network across the country. This rehabilitation will herald the reestablishment of the missing link in the business and agriculture supply chain that faced a myriad of problems when the railway services collapsed in the eighties and the subsequent folding up of the Rift Valley Railways concession six years ago.

The Nakuru-Kisumu railway is very important to the newly-rehabilitated Sh3 billion Kisumu port which requires cargo to make it viable. Locals have been concerned that the Sh3 billion port risks being a white elephant project should the route remain neglected. The railway line once complete will provide both cargo and passenger travel services. As part of the TOD development the steamer MV Uhuru was rehabilitated by Kenya Navy at about Sh200 million and is now plying the routes from Kisumu to Uganda transporting mainly petroleum to Port Belt and Jinja. The development will further stimulate cross border commercial activities.

Public transit and densification

The second principle addresses a designated 1/2 mile radius around station which supports higher density, mixed-use development that encourages walking. Such development provides connectivity to the public transport. Public transport in Kisumu City is managed by the private sector. This is a combination of different vehicles running on the city roads. They include the 16 seater shared taxis (Matatus), the three wheeler Tuk-Tuks, Motorbikes and bicycles (Onyango and Agong, 2018). The growth of public transport has enabled Kisumu to grow from a compact walking town to see the emergence of sub-urbia. According to Tong et al. (2018), transportation planning has led to the transformation of TOD (Figure 5) shows the transit oriented development land-use patterns. Figure 6 shows the integrating slum into the city through transit planning.

This is mainly noticed where major roads exist. The Nairobi, Kakamega and Busia highways demonstrate this concept well with the city expanding along these corridors which also act as the trunks for the public transport. Most new urban homebuyers prefer owning houses in the suburbs. Their preference to live in the suburbs poses challenges to public facilities providers who are forced to extend services farther from the urban core. The import is urban sprawl. The most defining characteristic of sprawl being low-density development spread out over large areas of land (Peirce, 2006). Planners of Kisumu City have tried to ensure that this sprawl effect is contained through densification. For approval of development to be granted, one of the conditions is that the housing development must be of a minimum four floors (CGoK 2020). Public transport corridors are developed to stimulate the densification process. The City has identified Kiboswa, Nyamasaria and Otonglo as key nodes where transport termini will be developed for long-haul public transport. This process allows for reduction of vehicular movement to the current bus-terminal in the

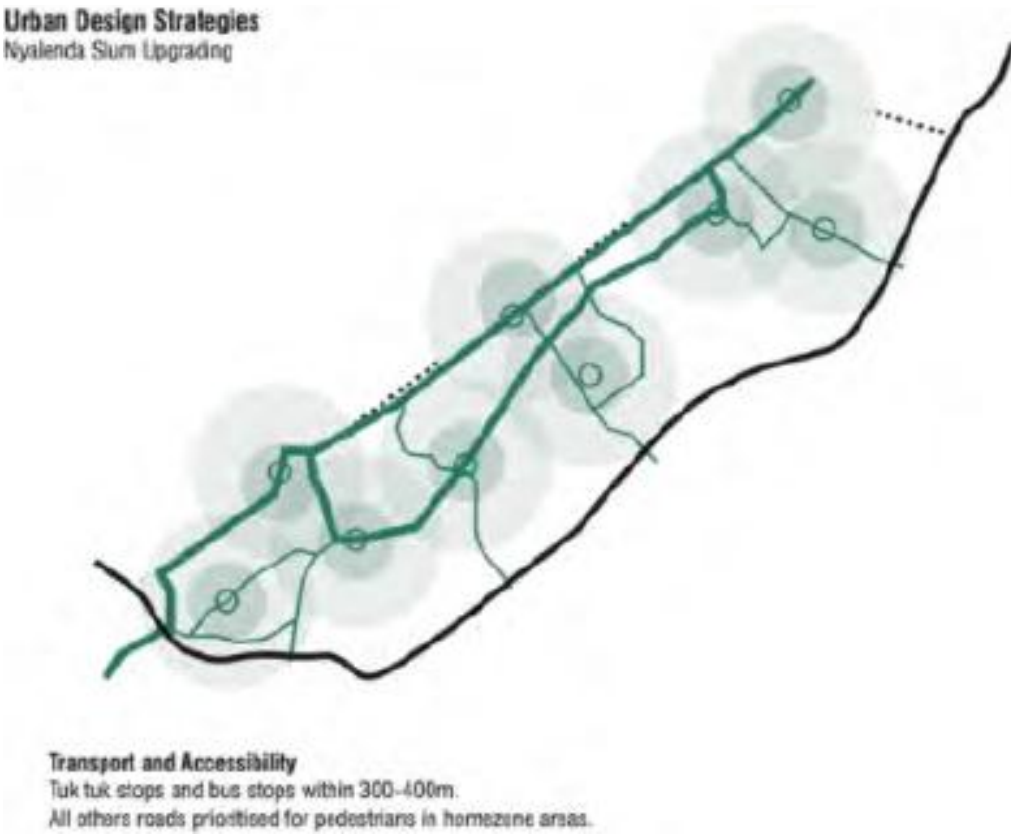

Figure 6. Integrating the Slum into the City through transit planning.
Source: LPLUDP (2020).

heart of the city.

Fair, green and accessible

In the last decade Kisumu has undertaken a number of planning interventions designed to make the city a place for all its citizens (fair), a place that enhances the natural environment in the city (green) and linked well through a transit-oriented planning that maximizes use of land (accessible). The third principle of *Creating range of densities with highest at station and getting less dense in the residential neighborhoods* has been well captured by the concept of fair, green and accessible (Simon, 2016). In order to catch up to the high speed of urban development, it is necessary to build a compact, balanced, and sustainable city through TOD. It is of great significance to analyse the relation and interaction of different urban elements and their comprehensive impact on urban structure (Zhang et al., 2019).

TOD aims to ensure that the city is made compact. Densified or compact liveable urban neighborhoods attract more people and business capitals. Planning and developing such neighborhoods becomes critical in reducing urban sprawl and protecting the environment. The concept of compact neighborhood has included adopting redevelopment strategies and zoning policies that channel housing and job growth into urban centers and neighborhood business districts, to create compact, walkable, and bike- and transit-friendly hubs. The County Government is implementing new zoning regulations that encourage mixed development (CGoK, 2020). This includes strategies for better access for peri-urban unplanned settlements of Nyalenda, Manyatta and Nyamasaria. The Mixed-use development that allows for more than one type of use in a building or set of buildings is also encouraged in Kisumu (Plate 2). In planning terms, this can mean some combination of residential, commercial, industrial, office, institutional, or other land-uses (Schwanke, 2016). This is a strategy that reduces automobile dependency due to policies of exclusive zoning. One finds this quite common in the high-rise residential areas with commercial/light industry locations on the ground and first floors and residential areas occupying the upper floors. On the other hand, we find that buildings fronting the main roads also tend to have commercial/light industrial activities on the ground floor.

One of the Big 4 Agenda is affordable housing (GoK, 2020). The aim of affordable housing is to encourage more people to live within the city. Lack of affordable

Plate 2. Mini-Buses (Matatus) Tuk-tuks and Motorcycles collecting passengers along city streets.

Plate 3. Redevelopment of slum areas of Nyalenda into mixed-use high density development.

housing is considered to negatively impact on a community's overall health leading to low productivity. For example, lack of affordable housing can make it more difficult to attract low-cost labor, and increase transportation costs as workers travel longer distances (Pollard and Stanley, 2007). The private sector has been at the forefront of development of new housing as evidenced in (Plate 3). The County is providing improved infrastructure to encourage investors to begin construction of housing within the city.

Pedestrian and bicycle access

The principle of having a station site for easy pedestrian connections to surrounding development is well demonstrated by the Central Bus station in Kisumu. As a whole, better transport and communication will negate compact cities and lead to the dispersal of homes and workplaces as it becomes more and more possible to take the activity to human being rather than the human being to the activity. Those with the resources to do so will increasingly seek the space and solitude of low density housing where dependence on personal transport is accepted and made easy (Peirce, 2006). The only constraint will be the need to offer a range of job opportunities to members of the family, and sufficient access to educational facilities. As such, the nature of employment will be transformed by the future use of automation and by other factors. Public transport thus

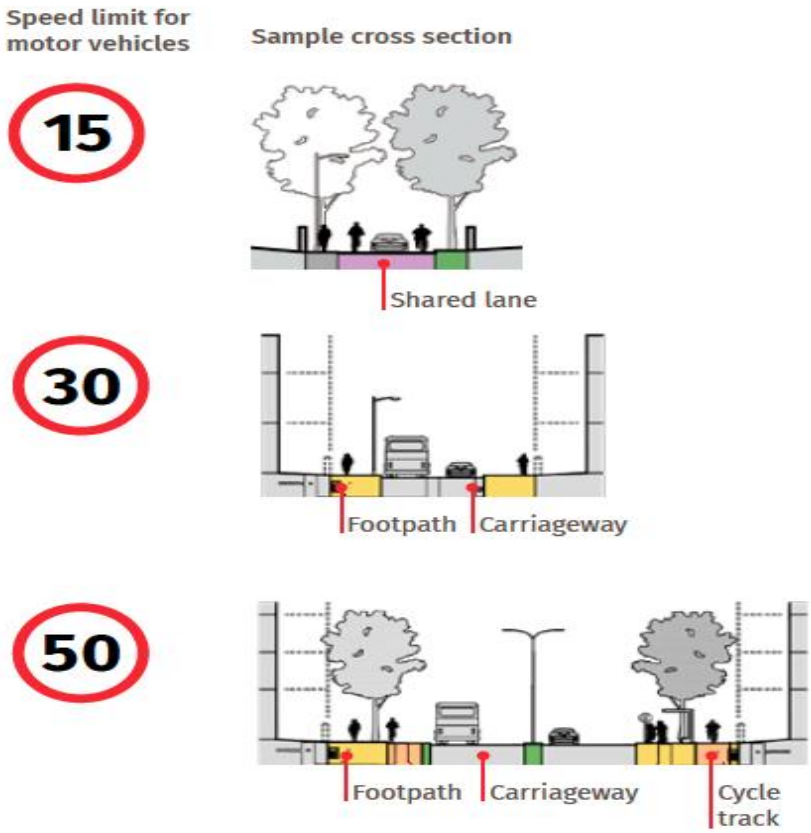

Figure 7. Design of road reserves.
Source: ITDP (2019).

becomes critical in enhancing opportunities for all the city residents. The improvement of road infrastructure in the city is geared towards making all areas accessible by different means of transport while maintaining a green environment through mixed development. The design of the road reserve has been identified as a tool to enhance safe transit development (Figure 7) and a cycling network plan for Kisumu (Figure 8).

The principle of incorporating bikeshare, a comprehensive bikeway network, and ride-in bike parking areas is being developed in the urban core of Kisumu. The key element of the TOD strategy in Kisumu is to beautify streets, make them convenient, and safe for pedestrians and cyclists. Biking and walking instead of driving reduces greenhouse gas emissions, is economically viable, and ensures that the citizens remain healthy (Achola, 2020). Bhatta (2010), points that the goal of transportation is to transfer maximum possible people or goods within the shortest possible time. Mitullah et al. (2017), note that bicycles violate this basic assumption of transportation. Realising that bicycles are preferred for shorter trips; and a separate bicycle lane serve this purpose by reducing traffic congestion on the main streets and thereby pollution Kisumu City is developing a network of cycle paths and pedestrian walkways in the city core. The retrofitting of city streets is providing cycle and pedestrian lanes within the city and promoting the use of cycling and walking. However, for cycling and walking to be effective the emphasis on a compact city still prevails. Interviews with the City Manager and the County Director of planning indicate that the City has embarked on implementation of the Cycling Network Plan with active engagement of the City Management with support of the County Government.

Managing parking

The other principle addresses parking at station site with direct pedestrian flow along retail streets. Cities have realized the significant impact of parking on urban land use, transport systems, traffic patterns, pedestrian access, and urban form (Biswas et al., 2017). Previously, cities focused on parking as a supply issue, making efforts to provide more parking to accommodate “projected” demand. Cities now realise that appropriate parking charges can act as a lever to discourage the use of personal motor vehicles and ensure that personal motor vehicle users compensate the city for occupying valuable street space. Kisumu, like many African cities is

Figure 8. A Cycling Network Plan for Kisumu.
Source: ITDP (2020).

introducing time-based charges for on-street parking, introducing moratoriums on government-subsidized parking, and setting maximum parking standards in new private developments (De Cerreño, 2004). The goal of these parking management techniques is to control the supply of parking, especially in areas with good access to public transport, thereby encouraging a shift toward the use of public transport, walking, and cycling. The growing number of private cars in the Kisumu City has resulted in increasing demand for parking.

On-street parking within the Kisumu CBD is managed by the County Government, which charges a minimum fee of USD1 per slot per day along gazetted streets, with higher fees for larger vehicles (CGoK 2018). Parking revenues help fund the overall County budget and are allocated to various projects in the County, including both transport- and non-transport-related projects. To control parking in the CBD the City management is redesigning a few street to provide for parking while removing parking from the main street (Plate 4). Most streets outside the CBD are not gazetted and thus subject to haphazard parking. Drivers often park on pedestrian footpaths or shared NMT lanes, forcing pedestrians to walk in the carriageway. Kisumu still has a challenge in meeting this principle in the areas around the transport nodes. However, with improved pedestrian walkways, previously undesirable parking is now attracting users since they can walk comfortable to destinations in the mixed development sites.

Incorporating transit service into future development/redevelopment

The next principle requires that Public plaza directly fronts one or more sides of the station building. In Kisumu this was provided at the old railway station and the city public bus terminus has a large park that is used for public meetings. Around the bus terminal however are traders who want to take advantage of the pedestrians walking to the bus-park to the adjoining CBD. This also builds into the principle of Retail and cafe streets leading to stations along the main pedestrian connections.

These two principles; having a *public space* in front of the terminus on the one hand and *retail and cafes* on the route to the terminus, have been well integrated into development of shopping malls in the city with transit services having well developed pedestrian walkways allowing for access to these malls and transport services (CGoK 2020). The versatility of the Tuk-tuk allows it to integrate well into the role of an inter-modal transfer vehicle in such development. The city is yet to develop a comprehensive strategy for pick-up points for public service vehicles. We thus see a lot of conflict of users (Onyango and Agong, 2018).

Adapting transit services to suburbia

The principle of Multi-modal connections, which make transfers easy, direct, and comfortable, is important in a compact city. The public road transport system in Kisumu City is dominated by the 14-seater matatu, the motorcycles and the tricycles (Tuk-tuk). Unfortunately, they are parked haphazardly thus creating traffic congestion with very limited access space for pedestrians and cyclists including those on bicycles and providing for a smooth multi-modal connection and easy transfer (Achola, 2020). The anticipated renewals of operations of the railway and the Kisumu International Airport have taken cognisance

Plate 4. Retrofitted roads in the city.

of the need to provide for termini for the Matatus and taxis. This has potential of improving multi-modality and access to suburbia. However, the current operations of the low volume vehicles in public transport are still not a sustainable public transport system. Dar-es-Salaam in Tanzania for example has a Bus Rapid Transit (BRT) system (ITDP, 2018). The large buses have their own reserved lanes with shaded boarding and alighting terminus (Plate 5) and good connections to matatus for the last mile connection and have thus improved access to the city suburb.

In many African cities, the use of public transport is in most cases associated with poverty stricken people and equated to lower living standards whereas car ownership is often related to better living standards (Sietchiping et al., 2012). This culture has persisted leading to the congestion on the existing transport corridors. Planning for a more sustainable transport system in cities is a question of how they are handling and changing cultures that are related to certain norms and living standards. Kisumu has adopted a public transport policy moulded on the Dar-es-salam model which should see the city implementing a dynamic transport system (CGoK, ITDP and UN-Habitat 2020).

Overcoming community resistance

The final principle is using the station as a catalyst for major redevelopment and focalising the station in the city design. A quick navigation of futuristic literature on TOD indicates some common predictions and a few contradictory ones. There is a general consensus about changes in transport and communication and their effects on employment and the spreading of towns; there is an agreement also about increasing social mobility and the extension of social networks, but guidance about the rate of change, the configuration of the expanded conurbations and the future of the city is not so clear. With the exception of some politicians and members of the public, few others have ventured any opinion about the future quality of the urban environment (and of urban life in general) in contrast to the many forthright statements about the quality of the countryside and the adequacy of resources (Hull, 2010). The forecasts upon which most stakeholders agreed in order to actualize TOD may be summarized as follows. Opportunities for inter-urban and, in most cities, intra urban transport are likely to improve. The major provision will be for the motor car but in the inner areas of the city, public transport will remain necessary and, in some cases, very significant. The availability of suitable energy sources for personal and public transport may be a determining factor in future policies. People's opportunities for travel will be strongly conditioned, as now, by their journeys to work will be made, at least in part, by bus or train. There will also be improvements in other facilities for communication, particularly those which will aid the county government, industry, commerce, education and research by speeding up the collection, transfer and processing of complex

Plate 5. Retrofitting streets to provide for parking within walking distance to transport nodes.

information, irrespective of the distances involved. To some extent, such technological developments may restrain the otherwise increasing demand for conventional personal transport and the movement of goods.

Conclusion

This paper has highlighted the application of TOD principles in planning and spatial development within the last decade. Interviews with Key Informants who are players in this process have helped highlight the TOD principles used. This is against a backdrop of a number of planning documents being used to transform the city of Kisumu. The assessment of the planning regimes and legislation that is being implemented in Kisumu in the last five years has seen an appreciative adherence to TOD principles. It must be emphasized that planning in Kisumu is not deliberately anchored on TOD but rather applies the principles without stating that it is using TOD. The authors note that there are a number of advantages which have been achieved by TOD oriented planning. These benefits trickle down to the entire city and the transport system in general. TOD ensures that the city is transformed into a pedestrian friendly environment which takes cognizance of all the modes of transport resulting into a balanced transportation system thus reducing the per capita cost of infrastructure development, hence sustainable. The identification of development of commercial nodes has allowed for decongestion of the CBD while attracting investment near residential neighborhoods with mixed development, a very practical approach in TOD planning.

The challenges noted in TOD include financial risk to developers since there are no guarantees that they will reap from adhering to requirements of TOD. This is tied to high initial public investment costs in the infrastructure, unsupportive regulatory framework developed with a focus on automobile use and community resistance to densification and focus on public transport especially in the affluent residential areas. The City administration and County Government have therefore focused on putting up and improving road infrastructure, water, sanitation and street lighting to attract investors within the urban core. To enhance returns on this investment there is therefore need for a continuous and concerted education and awareness creation by champions within the city management on the benefits of TOD in the long term. It would be practical if the City Management now deliberately uses TOD as a strategy for the urban transformation that it has engaged in to enable Kisumu demonstrate the capacity for sustainable development of medium cities in Africa.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests

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