

Exploring the Characteristics, Drivers and Control Strategies of Informal Settlements on Mkimbizi Hill in Iringa Municipality, Tanzania

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Abstract

This study explored the characteristics, drivers, and control strategies of informal settlements on Mkimbizi Hill in Iringa Municipality, Tanzania. The study employed a mixed research design whereby heads of households were randomly selected while key informants were purposively sampled. Data were collected through a questionnaire survey with heads of households, in-depth interviews with key informants, and field observations. Quantitative data were analysed by statistical product and service solution software. Qualitative data were organised into themes and involved content analysis. It was established that the study area is occupied by individuals of different social and economic characteristics with informal land tenure, limited access to social services, and are exposed to the risk of the collapse of buildings and rockfalls. The study also found that informal settlements in the study area were caused by the lack of education on urban settlements, proximity to essential social services, cheap plots, and poor settlement planning. Nonetheless, the study showed that the strategies used to control informal settlements in the study area included intermittent patrol, awareness creation on sustainable urban development, and settlements for economically weak individuals. The study recommends proper land use planning for sustainable urban development by the authorities.

Keywords: Characteristics, drivers, informal settlements, Iringa Municipality, Mkimbizi Hill, strategies

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Introduction

Cities worldwide grow very fast in population and spatially. The rapid population growth in urban areas is triggered by natural births and rural-urban migration (Onyekachi, 2014). For instance, records have shown that 54 percent of the world's population lived in urban areas by 2014, and projections indicate that the population will rise to 66 percent by 2050 (UN, 2014; Magina et al., 2020). Furthermore, records show that increased population growth and urbanisation are projected to add 2.5 billion people to the world's urban population by 2050. Nearly 90 percent of this population increase is concentrated in Asia and Africa (Magina et al., 2020). Rapid population growth has contributed to an increased demand for land and housing. Consequently, low-income people cannot afford land and adequate housing due to high land and housing costs and a lack of housing supply (Suditu & Vâlceanu, 2014; Alzamil, 2018). Besides, some government authorities have limited capacity for urban planning (Rasmussen, 2012). Although rapid growth of urban populations has led to the development of informal settlements in most of the world's cities, especially in developing countries (Onyekachi, 2014; Magina et al., 2020), economic incapacitation, corruption, political and policy decisions contributed to same (Soyinka & Siu, 2018). Informal settlements are a global phenomenon because they are found in the global South and North (Kamalipour & Peimani, 2019). It has been suggested that informal settlements differ in size and other characteristics from country to country (Nazire & Kita, 2016).

As noted earlier, the informal settlement development is a typical issue in many developing countries. The UN-Habitat report on the state of the world's cities indicates that in 2010, about 32 percent of the urban population were living in informal settlements in developing countries (UN-Habitat, 2011). In Africa, about 62 percent of the urban population lived in informal settlements

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by 2012 (UN-Habitat, 2013). Among the sub-Saharan African countries, Tanzania had about 50-80 percent of her urban population living in informal settlements by 2004 (Kombe, 2005), and Dar es Salaam city had about 75 percent (Rasmussen, 2012). Most of the studies on informal settlements concentrated on major cities of Tanzania, such as Dar es Salaam (Kombe, 2005; Rasmussen, 2012; Magina et al., 2020; Zhang et al., 2020), Mwanza (Magina et al., 2020; Zhang et al., 2020), and Arusha (Msuya et al., 2017) with little attention to small towns like Iringa Municipality.

According to urban planning and human settlement development procedures, informal settlements are illegal residential formations because they lack basic infrastructure, security of tenure, and adequate housing (Tilaki et al., 2011). Dwellings in informal settlements are constructed without formal designs and standard specifications concerning legal rules and regulations controlling urban developments (Akhmat & Khan, 2011; Dovey & King, 2011; Onyekachi, 2014). Construction materials are commonly recycled and range from plastic, canvas, timber, steel, concrete, rubber, bamboo, and bricks whose designs are based on culture, climate and density (Dovey & King, 2011). Informal settlements usually lack public utilities like power, clean portable water, sanitation, and drainage (Onyekachi, 2014). They also lack social services like schools, hospitals, entertainment, churches, mosques, and markets. Dovey & King (2011) clarify that informal settlements should not be regarded as unsustainable because they sustain one-third of the population in most cities.

Strategies to control informal settlements in urban areas are many. One of the strategies is the shifting from negative policies such as forced eviction or benign neglect (Taher & Ibrahim, 2014). Some countries have imposed high penalties on culprits, introducing automating permit acquisition

processes, monitoring, and detecting unauthorised building operations (Somiah et al., 2015). Other strategies are immigration control, slum clearance, resettlement projects, urban upgrading, subsidising low-cost housing, and setting up public housing projects to absorb the poor and improve their livelihoods (Alzamil, 2018). Akhmat & Khan (2011) recommended the budding stage, characterised by very low horizontal density, to be the best time to intervene informal settlements. When the settlement reaches the thriving stage, it becomes an expensive, dislocative, and impractical option. However, studies conducted by Suditu & Vâlceanu (2014) and Alzamil (2018) in Romania and Indonesia respectively, found that control of informal settlements through demolition contributes to the formation of informal settlements somewhere else. Alzamil (2018) highlighted further that the demolition of informal settlements contributes to economic and social consequences since the displaced low-income residents must restructure their lifestyles. Thus, more effective strategies to control the development of informal settlements are needed because the available ones have been ineffective (Dovey & King, 2011; Msuya et al., 2017) and they are site-specific.

According to the Iringa Master Plan Report 2015 – 2035, the population of Iringa Municipality grew from 88,088 (1988), 117,469 (2002), 151,345 (2012) to 155,885 (2014) (Iringa Municipal Council, 2017). The report further indicates that out of 33,140 hectares of land, informal settlements cover 2,991 hectares, accounting for 55 percent of the total residential area. The common areas with informal settlements are Don Bosco, Igumbilo, Ipogolo, Isakalilo, part of Kihesa, Kisiwani, Lukosi, Makanyagio, Mkimbizi, Mafifi, Mtwivila, and Nyamuhanga. However, detailed studies to explore informal settlements in Iringa Municipality are not readily available. Therefore, the present study explores the characteristics, drivers and control strategies of informal

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settlements on Mkimbizi Hill in Iringa Municipality. The study is crucial for decision making on whether the government should continue with the provision of social services, as revealed by the characteristics of the study area. Information on the drivers of informal settlements of the study area is paramount in responding appropriately to control informal settlements in the study area and beyond. Information on the practical strategies used to manage informal settlements in the study area can be applied somewhere else to prevent the same. As a whole, information from this study is vital for sustainable urban development.

Methods

The study was conducted on Mkimbizi Hill in Mkimbizi Ward in Iringa Municipality, Tanzania (Figure 1).



Figure 1: Study Site (Source: Google Earth)

The population of Mkimbizi Ward during the 2012 census was 10,388 occupying a total area of 3,320 hectares, out of which 37.4 percent is planned and 62.6 percent is unplanned (Iringa Municipal Council, 2017). There are two hills in Mkimbizi Ward with informal settlements: Mwang'ingo/Kihesa Kilolo and Mkimbizi. Mkimbizi Hill occupies part of Mkimbizi D and Mkimbizi C streets. Mkimbizi D Street hill was selected for this study because it forms a unique type of settlement whereby people have informally settled on the hill. Based on the typologies of informal settlements developed by Dovey & King (2011), the study hill falls under the escarpment type of informal settlement. Available records from the Mkimbizi D Street office indicate that the number of individuals residing on the hill grew from 49 in 2015 to 67 in 2017. The hill is covered by a discontinuous Miombo forest. Miombo forests are the potential for climate change mitigation through carbon sequestration (Campbell et al., 2007). The conversion of this forest to settlements will reduce carbon uptake, thereby increasing climate change and the associated consequences.

The questionnaire with a combination of open and close-ended questions was administered to 56 heads of household selected randomly to solicit information on the characteristics and drivers of informal settlements, including the risks associated with living in the informal settlements. The researcher arrived at 56 respondents out of 67 as a convenient sample size to obtain detailed information related to the study. The random sampling technique ensures equal representation of individual aspects from the studied population (Bryman, 2004). The convenient sample size was reached by administering questionnaires to the head of households who were home during data collection. In addition, in-depth interviews were conducted with the key informants (i.e. Street Executive Officer, Ward Executive Officer, and the Municipal Town Planner) who were selected

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purposively. Purposive sampling is a non-probability form of sampling used to obtain a sample strategically relevant to the research questions that are being posed (Bryman, 2004). The leaders in the study area have deliberately been included in the study to obtain information on informal settlements and strategies to control further development since they are responsible for implementing policies, including urban development policy. Data corroboration was done through field observation to gather nonverbal information in pictorial forms.

Quantitative data from the questionnaire were organised into independent and dependent variables and analysed with the help of the statistical product and service solution (SPSS) version 27 to generate frequencies and percentages. These data were presented in the frequency tables and graphs to simplify interpretations. On the other hand, qualitative data from the interviews, questionnaires, and observations were organised into themes, subjected to content analysis, and presented in narrative and pictorial forms.

Results and Discussion

Characteristics of Informal Settlements on Mkimbizi Hill

The researcher intended to explore the characteristics of the studied informal settlement by focusing on the population, quality of housing and typology, infrastructure, risks associated with living in the informal settlement, and availability of social services.

Population characteristics

Characteristics of the population on Mkimbizi Hill are summarised in Table 1.

Table 1: Population characteristics (N=56)

	Variable	Response	
		Frequency (n)	Percentage (%)
Cadre:	Youths (18-45 years)	40	71.4
	Adults (46+ years)	16	28.6
Education:	Primary	37	66.1
	Secondary	9	16.1
	Post-Secondary	3	5.4
	Not attended any	7	12.5
Marital status:	Married	49	87.5
	Single	7	12.5
Household size:	<4	31	55.4
	4-8	21	42.9
	>8	1	1.8
Residence time:	<6 years	25	44.6
	6-10 years	13	23.2
	11-20 years	10	17.9
	>20 years	8	14.3
Area of origin:	Immigrants	45	80.4
	Native	11	19.6
Livelihood activities:	Informal employment	52	92.9
	Formal employment	4	7.1
Average monthly income:	<TZS 70,000	3	5.4
	TZS 70,000-140,000	8	14.3
	TZS 140,000-280,000	4	7.1
	>TZS 280,000	8	14.3
	Don't know	33	58.9
Transport facility owned	Motorcycle	11	19.6
	Bicycle	4	7.1
	Car	2	3.6
	Nothing	39	69.6
Mode of acquiring plot:	Bought	47	83.9
	Inherited	8	14.3
	Given free	1	1.8

Source: Field Data

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Generally, Table 1 shows that the study area was dominated by heads of household with primary school education, married with average household sizes of less than four individuals, and stayed in the area for less than six years. The table indicates further that most of the heads of household are immigrants, earning their livelihoods from informal employment and so do not know their average monthly income. The table also shows that majority of the heads of household from the study area bought the plots they occupy.

Results from the household questionnaire (Table 1) show that many youths live in informal settlements. This finding corroborates the proposal of Tilaki et al. (2011) that most dwellers in informal settlements are concerned with their future more than others located in the region. Therefore, there is no obligation that youths are more concerned with their future than elders are. Somiah et al. (2015) and Sakala (2016) found that most dwellers in the informal settlements in Sekodi-Takoradi Metropolis in Ghana and Garden House in Lusaka, Zambia, respectively, were young adults. However, this should not be taken equally to all squatters as it depends on the age of a particular squatter. The study area was recently established, whereby 68% of her dwellers stated to be in the study area for less than ten years (Table 1). The influx of people from rural areas to the study area (see Table 1) might be attributed to the establishment of three higher learning institutions: Mkwawa University College of Education, Ruaha Catholic University, and the University of Iringa. Therefore, after some decades, the population of study the area will have elders if the government controls the further establishment of informal settlements.

Results presented in Table 1 show that most respondents had primary education followed by secondary school education, not attended school and post-secondary education. Most of the scholars of informal settlements have found almost the exact composition of education levels

among inhabitants of informal settlements in developing countries (Nawagamuwa & Viking, 2003; Adjei, 2010; Tilaki et al., 2011; Adinyira & Anokye, 2013). On the contrary, Somiah et al. (2015) found that about 60 percent of informal settlement dwellers in Sekondi-Takoradi Metropolis of Ghana had secondary and tertiary education.

Results on marital status presented in Table 1 show that many individuals living in the study area were married. It is often the case that marriage contributes to the desire to have a permanent settlement. Since most respondents in the study area had low economic status, it influences seeking cheap plots available on the hills. This finding concurs with Msindo et al. (2013) that the need to have their own houses had pushed individuals in the Epworth suburb in Harare to buy illegal stands and build their own houses.

Findings in Table 1 show that about 55% of the squatter had less than four individuals in their household. Although this percentage may appear small, it is significant considering the nature of houses found in the study area, where most of them had two rooms. Although the study did not intend to identify the sex of individuals in the household, it suffices to give out that a good house for a family should have at least three rooms: one for father and mother, the second for male children, and the third for female children. Alzamil (2018) reported overcrowding as a common situation in informal settlements in such a way that units with more than five people share a single room for sleeping, cooking, and living.

The time an individual has settled in a specific area can indicate the growth rate of a particular settlement. Results in Table 1 show that the number of individuals inhabiting the study area increases with time, with the majority having lived for less than six years. The same was obtained

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during an in-depth interview with the Street Executive Officer of the study area. With time, the increase in the number of individuals living in the study area corroborates the UN-Habitat (2013) findings that in Africa, over half of the urban population (61.7%) lives in slums, and by 2050, the urban population dwellers are projected to increase from 400 million to 1.2 billion.

The study thought to uncover whether natives or immigrants inhabited informal settlement in the study area. Data in Table 1 show that many respondents who inhabited Mkimbizi Hill were immigrants. Similar to this finding is the study by Gebeyehu (2016) in Gondar Town in Ethiopia, who found that about 55 percent of individuals living in squatters were immigrants. This offers high levels of social capital due to shared ethnicity and rural connection (Dovey & King, 2011). Alzamil (2018) reported that most of the individuals in the informal settlements in Indonesia were immigrants who could not afford the cost of housing due to the high cost of construction materials, land management systems, and housing policies because they were poor. The influx of people to the study area could be attributed to the establishment of the higher learning institutions in Iringa Municipality, which is thought to open avenues for green life among the immigrants. Contrary, Tilaki et al. (2011) and Onyekachi (2014) reported that most migrants in urban areas live in poorly serviced settlements with environmental conditions that are threats to health. That is why inhabitants of the study area decided to establish settlements despite the backwardness in relief, transport system, and some social services.

The findings in Table 1 show that most respondents were informally employed because they had primary education, which hindered formal employment. Tilaki et al. (2011) have reported similar results that most dwellers in informal settlements are unskilled labourers. Therefore, they are employed in low-paid work in different sectors. Msindo et al. (2013) pointed out that a few the

settlers in Epworth Suburb in Harare earned their living from vending and in the informal sectors. Alzamil (2018) reported that most of the residents in informal settlements often work as fishermen, security guards, scavengers, workers, food stalls, and as salesmen in small retail shops. These activities contribute to low earnings, which influence the purchasing power of plots and type of house among dwellers of informal settlements (Melesse, 2006). That is why Soyinka & Siu (2018) recommended economic empowerment for housing development among the urban poor. The government should offer a mortgage to purchase medium and low-priced housing to create affordable housing ownership.

Studies have indicated that most individuals living in informal settlements are poor because they engage in low-paying activities (Melesse, 2006; Tilaki et al., 2011; Msindo et al., 2013; Alzamil, 2018). In this study, it is incredible and awkward that about 60 percent of respondents were unaware of their monthly earnings (Table 1). The reason given by the respondents for this was that they were employed in the informal sector. To these respondents, one gets income when God wishes. One of the respondents testified: *“it is difficult to know how much I earn because I am not formally employed getting activity to do for money is not determined only God knows”*. Simiyu et al. (2019) also found that individuals in Kisumu, Kenya, depend on casual work in which workers are paid daily. Taher & Ibrahim (2014) reported a high unemployment rate to be the main characteristic of the squatter. However, Akhmat & Khan (2011) found that informal settlements also comprise middle-income households.

Findings in Table 1 show that about 30 percent of respondents reported owning transport facilities. Transport facility refers to anything that facilitates the movement of goods and services from one

place to another. It can be a bicycle, motorcycle, car, or tractor. Although it will be described in the section of infrastructure, it is worth mentioning here that access to the home with whatever type of transport facility is difficult due to the hilly nature of the study area (Plate 2). One respondent during questionnaire administration validated this by saying that: *“I used to park my motorcycle downhill in my friend's home because it is impossible to reach my home with it.”* Irrespective of the type of transport facilities owned by 30 percent of the respondents, Alzamil (2018) reported a direct correlation between the poverty rate and the proliferation of informal settlements. This means that most respondents who mentioned owning nothing in terms of transport facilities reflect their economic characteristics.

Findings in Table 1 show that most individuals bought the land at a low price from the previously owned individuals. According to Kironde (2009), land can be obtained informally through occupation without a permit, allocation by local leaders or landowners, inheritance, or purchase. Based on the hilly nature of the land of the study area, the urban authority could not legally allocate it to people because it is a reserved area. Onyekachi (2014) also found that most of the lands in unsafe environments are acquired informally with no government certification. Furthermore, Gebeyehu (2016) found that illegal land purchase from the neighbouring peasants was the principal way of acquiring land for housing in Gondar Town in Ethiopia. It includes buying from neighbouring peasants and land speculators, acquiring from relatives, and forceful illegal settlement. Individuals in informal settlements lack land tenure documents such as legal deeds to prove land ownership (Nazire & Kita, 2016). This means that individuals in informal settlements, including the study area, cannot use their plots as mortgages or collateral because they own them illegally.

Quality of housing and typology

Findings on the quality of housing and typology are presented in Table 2.

Table 2: Quality of housing and typology (N=56)

Variable		Response	
		Frequency (n)	Percentage (%)
House wall material:	Sun-dried clay bricks	27	48.2
	Burnt clay bricks	24	42.9
	Cement bricks	3	5.4
	Mud	2	3.6
Classification of the house:	Ordinary	29	51.8
	Local	14	25.0
	Modern	13	23.2
Type of toilet:	Flushing toilet	37	66.1
	Pit latrine	19	33.9

Source: Field Data

Table 2 shows that slightly less than half of the households had houses with walls made up of sun-dried clay bricks. The houses, which the respondents classified as ordinary and local, had one to two rooms with small windows and toilets appended to them (Plate 1a) or set a bit afar (Plate 1b). Similarly, studies have indicated that most houses in informal settlements have irregular structures (Shekher, 2020) because they are built without professional assistance (Akhmat & Khan, 2011; Onyekachi, 2014; Momade & Hainin, 2018). Zhang et al. (2020) also found that houses in informal settlements are constructed close to each other without distinct boundaries. Observation shows that modern houses in the study area had large windows, ornamental trim, open floor plans, modern toilets, and asymmetrical shapes (Plate 1b). These findings concur well with Dovey & King (2011)

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and Tilaki et al. (2011) that most houses in informal settlements are built with low-quality materials. Taher & Ibrahim (2014) and Onyekachi (2014) found that most informal settlement structures were temporary, made of mud walls and grass or other roof covering. Fortunately, there was no grass-thatched house observed in the study area. All houses were roofed with corrugated iron sheets. The availability of different qualities of houses in the study area conforms to the view of Alzamil (2018) that informal settlements are one of the community's efforts to overcome the problem of affordability. Although affordability is regarded as a housing solution, it requires self-help and self-management strategies (Azhar et al., 2021).



a. Ordinary house



b. Modern house

Plate 1: Types of houses found in the study area (Source: Authors' pictures)

Observation discovered that most flushing toilets had sinks prepared with mortar, contrary to ceramic materials. Toilet sinks made of mortar are difficult to clean, considering that the majority (75%) of respondents had houses that were not connected with tap water (Table 3). There is a significant risk of overflowing sewage to those whose homesteads cannot be accessed by cars to collect sewage from the soak pits because the study area was not connected with the sewerage system. Researchers such as Onyekachi (2014), Nazire & Kita (2016), Soyinka & Siu (2017), Alzamil (2018), and Simiyu et al. (2019) have reported the lack of sewage systems in the informal settlements.

Characteristics of infrastructure

Findings on the accessibility to homestead, water and electricity connections are summarised in Table 3.

Table 3: Characteristics of infrastructure (N=56)

Variable		Response	
		Frequency (n)	Percentage (%)
Home reaching by car	Yes	19	33.9
	No	37	66.1
Tap water connection:	Yes	14	25.0
	No	42	75.0
Electricity connection:	Yes	15	26.8
	No	41	73.2

Table 3 shows that most respondents cannot reach their homes by car. They use other means such as on foot, bicycles, or motorcycles due to the hilly terrain (Plate 2) and configuration of houses. Hilly terrain that limits the accessibility of the study area by cars is a typical characteristic of the escarpment type of informal settlements provided by Dovey & King (2011). Some houses in the study area were inaccessible by cars because they are built in difficult and/or rather rough terrains and their arrangements were inconsiderable of clear passways. Masimba (2016) also discovered that it is difficult to provide road access in Epworth. This is attributable to the fact that houses are constructed close to each other with very narrow lanes between them. Zhang et al. (2020) had similar findings that there is poor accessibility in informal settlements due to narrow and short roads with high proportions of dead ends. Limited access to homes of the study area by car limits emergency medical services that require vehicles such as ambulances and other transport facilities.

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Plate 2: Footpaths to the home of some respondents (Source: Authors' pictures)

Field observation and questionnaire results revealed that a quarter of individuals in the study area had tap water (Table 3), which is supplied by the Iringa Urban Water Supply and Sanitation Authority (IRUWASA). Interviews with the Street Executive Officer and Ward Executive Officer of the study area revealed that the terrain of the study area obstructs the smooth distribution and supply of tap water. Gouging around rocks and steep slopes increases the cost of connecting homes with tap water in the study area. The difficulty in connecting tap water in the study area is also caused by the uncertain economic status of her inhabitants (Refer Table 1). Some households without tap water connections collect water from the connected households through payment; others collect water from the natural wells found in the study area, which is not always safe. It may contribute to waterborne diseases. Similar findings have been reported by Momade & Hainin (2018), who established that most squatters in Nampula, Mozambique collect water from a nearby source at a low cost since their locations are not served with tap water. Simiyu et al. (2019) had

similar findings that dwellers of informal settlements do share some essential services such as water due to limited supply and accessibility.

Results in Table 3 indicate that about 27 percent of houses were connected with electricity. Other houses were not connected with electricity, probably due to the economic status of individuals. It was found during field observation that some individuals used solar energy to light their houses due to solar panels placed on the roof of houses. Poor electricity supply in informal settlements has also been reported by Tilaki et al. (2011), Taher & Ibrahim (2014), Onyekachi (2014), Alzamil (2018), and Simiyu et al. (2019).

Accessibility of critical social services

The study also explored the accessibility of social services such as education, worshipping and health services by the studied population. The results are summarised in Table 4.

Table 4: Rating of distance for some essential social services (N=56)

Variable		Response	
		Frequency (n)	Percentages (%)
Distance rating for schools	Very far	9	16.1
	Nearby	47	83.9
	Far	0	0.0
Distance rating for worshipping centres	Very far	6	10.7
	Nearby	50	89.3
	Far	0	0.0
Distance rating for health facilities	Very far	56	100
	Nearby	0	0.0
	Far	0	0.0

Source: Field Data

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Table 4 indicates that 84 percent of respondents revealed that education centres are located near their homes. Children in the study area attend schools found downhill. Field observation found that there were three primary schools: Mshikamano, Ukombozi and Mkimbizi, which are located about one to two kilometres downhill, and one secondary school called Mtwivila located a few metres at the foot of the study hill. Onyekachi (2014) had the different findings that informal settlements are deprived of social services like education.

Temples, churches, synagogues, and mosques are examples of structures created for worship. A place of worship is a specially designed structure where individuals or congregations meet for religious matters. Field observation found small churches in the study area, and other worshipping centres (churches and mosques) are located downhill about two kilometres. This is contrary to Tilaki et al. (2011), UN-Habitat (2013) and Alzamil (2018) that informal settlements lack centres for worshipping.

Findings revealed that the issue of health in the study area was a major problem since there were no health services nearby (Table 4). Taher & Ibrahim (2014) reported that informal settlements in many developing countries exhibit high rates of diseases because of the lack of primary health care. Although the time it takes to access health services was not asked, Simiyu et al. (2019) state that accessing health facilities is said to be deprived if it takes over 30 minutes to access it. Similarly, Alzamil (2018) found that many residents in North Jakarta, Indonesia, lack access to health facilities because they are outside walking distance. Individuals of the study area stated that to access health services in Ngome Health Centre one needed about 5 km, Field Force Unit Dispensary (about 5 km), and Iringa Referral Hospital (about 6 km), which cannot easily be reached on foot. However, the health services problem will not last long because the interview

with the Street Executive Officer and Ward Executive Officer revealed that the construction of the health centre, which is within walking distance from the study hill, was underway. This might further attract informal settlements in the study area if the responsible authority would not instigate appropriate strategies to curb the situation.

Risks of living in the study area

People settle in an unsafe environment because they cannot afford plots in a safe environment (Gamba & Herold, 2009). Questionnaire-based results revealed that while the majority (77%) of respondents contended that they are not exposed to risks, 14% and 9% said to be exposed to a risk of collapse of buildings and rockfalls, respectively (Figure 2).

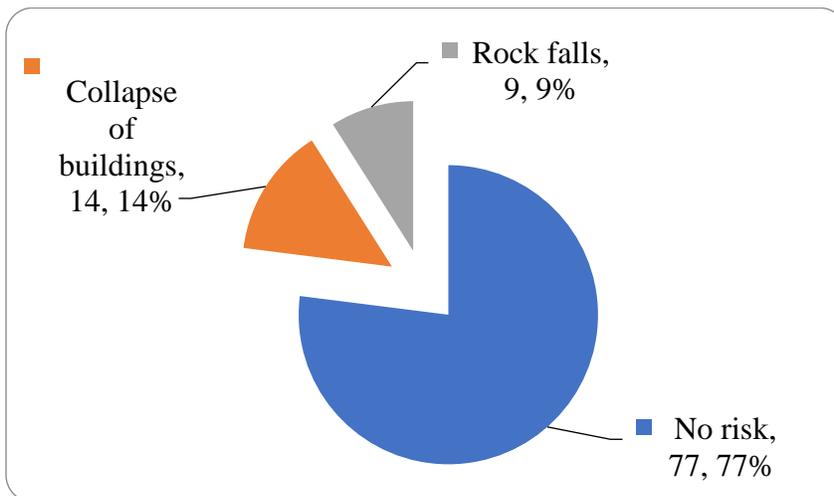


Figure 2: Risks of living on Mkimbizi Hill

Although results in Figure 2 indicate that few respondents (23%) maintained that they are not exposed to different risks, field observation reveals that living in the study area is full of dangers (Plate 3). There is the risk of the collapse of buildings due to slope destabilisation (Plate 3b) and sun-dried and mud-walled houses (Plate 3c). The hanging rocks (Plate 3a) are also dangerous to

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human life. Plate 3d indicates a rockfall attributed to slope destabilisation due to land levelling for constructing the house foundation.



Plate 3: Risks identified in the study area (Source: Authors' pictures)

Dovey & King (2011) reported landslides as common phenomena in the escarpment type of informal settlements due to steep topography. Risks in informal settlements are reported by UN-Habitat (2013), Alzamil (2018), and Wondimu (2021). However, an in-depth interview with the Iringa Municipal Town Planner revealed that some Municipal areas would be declared hazardous for settlements because the Iringa Municipal Council was reviewing its Master Plan to regularise some informal settlements. Full implementation of the reviewed Master Plan does not mean that the study area will be out of risk because the materials used for constructing houses caused the collapse of such buildings.

Drivers of Informal Settlements on Mkimbizi Hill

Education

Results presented in Table 1 show that majority of respondents had primary education. This implies that a low level of education contributed to the establishment of informal settlements in the study area. Interview with the Ward Executive Officer of the study area also revealed that lack

of awareness of urban settlements policy contributed to establishment of informal settlements in the study area. This is substantiated by the finding that all the respondents admitted that they settled in the area without any permit from the town authority. Similar findings have been provided by Tilaki et al. (2011) who showed that a low level of education is highly associated with the increase of unplanned settlement in developing countries. Corroboratively, Nawagamuwa & Viking (2003) found that a low level of education and high illiteracy rate constitute the main characteristics of individuals in informal settlements. Furthermore, Adjei (2010) and Adinyira & Anokye (2013) observe that informal settlements occur due to a lack of education or ignorance about planning schemes and building regulations. As a point of departure, Somiah et al. (2015) found that education level contributes nothing to the development of squatters because 60 percent of informal settlement dwellers in Sekondi-Takoradi Metropolis of Ghana had secondary and tertiary education that could be used to translate urban development policies.

Accessibility

Despite the difficulty posed by the terrain to access most of the study area (Plate 2), the area is located near the Iringa-Dodoma road (about two kilometres), Iringa Municipal Council Headquarters, and the town centre (about six kilometres), which ease access to essential needs. This supports the observation of Magalhaes & Eduardo (2007) that most people prefer living in areas where they can easily access infrastructure and urban services. Somiah et al. (2015) also found that people established informal settlements in areas that are accessible based on the location. Based on these findings and the reviewed literature, it is evident that the nearness to Iringa-Dodoma road and town centre contributed to the surfacing of informal settlements on the study hill.

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Social services

Findings in Table 4 show that, with the exception of health services, which the respondents rated as located very far from the studied hill, education and worship services were both rated to be close to their homes. The availability of education and worship services contributed to the proliferation of informal settlements on the studied hill. Mohit et al. (2010) had a similar observation that closeness to facilities such as schools, religious buildings, hospitals, and markets attract settlements.

Modes of acquiring plots

Findings in Table 1 show that most individuals bought the land at a low price from the previously owned individuals. According to Kironde (2009), land can be obtained informally through occupation without a permit, allocation by local leaders or landowners, inheritance, or purchase. Based on the hilly nature of the land of the study area, the urban authority could not legally allocate it to people because it is a reserved area. Onyekachi (2014) also found that most of the lands in unsafe environments are acquired informally with no government certification. Furthermore, Gebeyehu (2016) found that illegal land purchase from the neighbouring peasants was the principal way of acquiring land for housing in Gondar Town in Ethiopia. It includes buying from neighbouring peasants and land speculators, acquiring from relatives, and forceful illegal settlement. Although the findings in Table 1 indicate that most respondents purchased plots from the individuals who claimed to own the hilly land, this claim should be examined in two dimensions. During the urban planning, the land stated to be sold, which now constituted the squatter, was left ideal with little care by the urban authority. This substantiates the findings of Akirso (2021) that the squatter settlement results from land policy and administration failure that

has contributed to weak land management. Akirso (2021) clarifies further that less government control of open spaces and lack of a comprehensive legal response towards the problem of squatting are the causal factors contributing to the emergence and spread of squatter settlements in Jimma town in Ethiopia.

Value of plots

Findings reveal that more than three-quarters (87.5%) of respondents stated that the informally owned plots are cheaper than the nearby planned plots. The same was noted during an in-depth interview with the Street Executive Officer and Ward Executive Officer of the study area. This finding corroborates Onyekachi (2014) that individuals living in squatters in Nigeria cannot afford legal land since that is comparatively expensive. Similarly, Msindo et al. (2013) found that individuals in the Epworth suburb in Harare decided to settle in unplanned areas because plots in the planned areas were beyond their buying power as some were either not employed or employed in the informal sectors with limited returns.

Somiah et al. (2015) reported that most unauthorised buildings are sited on cheap and vulnerable areas such as deep valleys, riverbanks, abandoned waste dumps, and dangerous slopes. The geomorphic characteristics of the study area contributed to the low price of plots because most of the area is covered with large stones and steep slopes. These make her dwellers vulnerable to mass wasting and the associated consequences. In addition, the plots are small, just for small and simple houses without apparent open spaces. However, if the costs of constructing houses in most of the study area are considered, such costs may surpass those to be incurred for the same in planned areas making the issue of "cheap plot" futile. This is because most of the materials used for construction must be loaded downhill and taken to the site through the human muscle. Site

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levelling is also laborious because it involves manual excavation of the earth. As it has been reported in the section describing risks faced by informal settlements, levelling of building land leads to rockfalls, kind of mass wasting, which are catastrophic to human life and properties.

Control Strategies of Informal Settlements on Mkimbizi Hill

Interview with the Iringa Municipal Town Planner and Ward Executive Officer revealed that the Iringa Municipal Council had established different strategies to control informal settlements. It includes intermittent patrol and awareness creation on sustainable urban development. However, both Iringa Municipal Town Planner and Ward Executive Officer admitted that some residents do not adhere to the agreement because they establish settlements during the public holidays and weekends. These findings conform to Taher & Ibrahim (2014) that buildings in squatters can be erected within a short time because they are simple and small. According to Alzamil (2018), such buildings reflect the financial capacity of residents. However, the finding that houses are built on weekends and public holidays creates difficulty in controlling them indicates management failure because knowing when individuals erect buildings could be taken as an avenue to prevent them.

Interview with the Street Executive Officer, Ward Executive Officer, and Iringa Municipal Town Planner revealed further that there was a time when individuals seeking water and electricity connection were required to provide approved building permits as the preliminary for the processes. Accordingly, the strategy failed due to the differed political interest where, specifically, each Ward Councillor reiterates the legality of informal settlement to raise 'political capital'. This finding echoes Tilaki et al. (2011) that informal settlements dwellers are sensitive to political issues, especially those influencing their lives. Now, political interest turns into political failure as it aggravates the surfacing of informal settlements. The political and legal failure reflects

government incapability in managing informal settlements emerged in the study conducted in Jimma Town in Oromia Regional State and Addis Ababa, both in Ethiopia by Arkirso (2021) and Wondimu (2021), respectively. Another study conducted in Epworth by Msimba (2016) provided a striking finding that towards the 2008 and 2013 elections in Zimbabwe, reserved land for future development were invaded by political party and gave them to loyal members as vote-buying. These substantiate the statement by Dovey & King (2011) that, within the urban field, there is considerable political capital available for politicians.

Interview with the Ward Executive Officer and Municipal Town Planners revealed further that the Iringa Municipal Council planned plots of the low price at Kipululu in Nduli Ward. The cost of plots ranges from Tanzanian Shillings (TZS) 800,000 to 1,200,000, targeting low-income individuals intending to reduce the surfacing of squatters in Iringa Municipality. However, the low-cost plots are not supplied with critical social services such as water, electricity, and roads and they are far from the town centre. Mohit et al. (2010) recommended that the location of future low-cost settlements consider closeness to facilities such as schools, police stations, hospitals, markets, shopping centres, public libraries, religious buildings, and bus and taxi stations to attract settlements. A project of this kind creates socio-economic stratification within the urban ecosystem, fuelling discrimination in service provision by the responsible government authorities. Individuals residing in the study area are probably denied the provision of social services such as water and electricity because of low levels of economy and education.

It was found during data collection that some houses were assigned numbers. Interview with the Street Executive Officer of the study area revealed that the street council was in the process of

assigning numbers to all houses in the street without considering whether the owner secured a building permit or not. The Street Executive Officer further revealed that the street council decided to assign numbers to identify the number of households in the street. Conversation with some of the respondents whose houses were assigned numbers revealed that the numbers indicate formalisation as substantiated by one of the respondents who stated that: “... *by assigning my house a number eliminates the fear of being either evicted or demolished.*” Although this can bring harmony to the households residing in the study area, it also ignites more informal settlers through immigration, and the inheritance of plot from parents by children. If the purpose of assigning houses number is to obtain tax, they become formal instead of informal since Kamalipour & Peimani (2019) report that things become formal when taxed.

The control of informal settlements in the study area is necessary because it is situated on a hill that poses a risk to the dwellers. The study hill is also a potential for climate change mitigation because it is covered with the Miombo forest. Fortunately, the settlements on the study hill have not reached the thriving stage because Akhmat & Khan (2011) recommended that the best time to intervene informal settlement is the budding stage. When the settlement reaches the thriving stage, its intervention becomes expensive and impractical. Therefore, the authorities need to devise appropriate strategies to stop the spread of informal settlements on the studied hill.

Conclusion and Recommendation

This study explored the characteristics, drivers, and control strategies of informal settlements on Mkimbizi Hill in Iringa Municipality, Tanzania, for sustainable urban development. The findings revealed that most of the residents in the studied area had primary school education, married with

average household sizes of less than four individuals who have stayed in the area for less than six years. The study revealed further that most of the inhabitants in the study are immigrants, earning their livelihoods from informal employment and do not know their average monthly income. The study also revealed that most of the residents bought the plots they occupy where they constructed ordinary houses made of sun-dried clay bricks and roofed with corrugated iron sheets. Nonetheless, the study revealed that cars could not easily reach the study area. It has limited social services such as water, electricity, and health and is exposed to the risk of the collapse of buildings and rockfalls.

The main drivers of informal settlements in the study area were the closeness to the main road and the availability of education and worship centres. Other drivers were the low price of plots and the failure of political and legal organs of the government to control the spread of informal settlements. It is evident from the study that the urban authority has tried to control the surfacing of informal settlements in the study area through intermittent patrol, awareness creation on sustainable urban development, and the establishment of low-cost plots targeting low-income individuals. Results also revealed that most of the established strategies to control informal settlements in the study area failed due to the differed political ideologies, lack of resources and inefficient leadership at the grassroots to enforce the devised strategies.

Since there is a conflicting interest between the government and some political leaders on sustainable urban development, roundtable talks are imperative to facilitate the smooth implementation of formulated by-laws governing urban development. Any differed interest should be discouraged, followed by close monitoring of urban development so that any initial and illegal construction can be demolished, followed by legal actions against violators. Education is

paramount in raising awareness of urban development policies. The study further recommends that the authorities be careful when formalising the settlements in the study area due to the hilly nature and the potential for climate change mitigation.

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