



RURAL AND URBAN DISASTER RISK REDUCTION: SIMILARITIES AND DIFFERENCES: A STUDY OF MOROGORO MUNICIPALITY COUNCIL AND MOROGORO DISTRICT COUNCIL, TANZANIA

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Abstract: Rural and urban areas are inextricable entities when it comes to disaster risk management. For this reason, understanding rural and urban vulnerability is vital for developing effective disaster risk reduction strategies. Even though rural areas and urban areas are intrinsically linked, rural vulnerability remains mostly unconsidered. This study aims to investigate an overview of the rural and urban trends in disaster risk reduction, looking at their similarities and differences, using Morogoro Municipality Council and Morogoro District Council as a case study. To that end, the current literature on rural-urban linkages, vulnerability, and the factors that influence them is scrutinized. The study identified that these two spatial areas are vulnerable to hazards that cause disasters. However, they differ in some respects in terms of the magnitude, severity, extent, and impacts that those disasters bring. To a large extent, variation is driven by factors such as population size and density, geographic locations, infrastructure resilience, institutional setups, economic bases, political stances, resource distribution, and social conditions. All of these factors contribute to differences in disaster occurrences between rural and urban environments, as well as disaster risk reduction trends following the 2015–2030 agenda, fostering equality in disaster risk reduction programs between rural and urban.

Keywords: *Disasters, Disaster Risk Reduction, Hazards, Disaster Management.*

1.0 Introduction

Since the 1980s, disasters have hit every continent of the world with increasing frequency and intensity (UNSDR, 2021). Meanwhile, the number of recorded natural and man-made disasters, along with their effects on livelihoods and economies at both local and national levels, is increasing significantly. These include geophysical, technological, climate, and weather-related disasters, as well as outbreaks of animal and plant pests and diseases (FAO, 2017; UNSDR, 2021). However, the trend of these disasters differs from area to area and at varying time scales.

Yet, an important component of understanding disaster trends is understanding who has been affected, how, and why (IFRC, 2020). The magnitude of vulnerability to disaster occurrences between urban and rural communities varies in terms of geographical location, seasonality, and exposure of population and infrastructure (Petraroli and Baars, 2022). Other factors include socio-economic conditions, natural resource capital, political



and institutional mechanisms, equity in terms of resource distribution and gender, and coping and adaptive capacity (Wisner et al., 2004).

In this regard, for successful disaster risk reduction interventions globally, a high priority should be given to rural and urban areas with great consideration. Without careful attention to needs assessment and designing response strategies between urban and rural communities, increased provision of infrastructure and services can indeed increase disaster vulnerability (Adebimpe, 2011; Chai et al., 2021). Floods, for example, may affect a large portion of the built environment in urban areas while affecting a much larger portion of the natural environment in rural areas. The effects will not be the same between these two spatial areas, though they depend on each other.

Practically, many countries have initiated efforts to reduce their disaster risk, such as risk assessment, response, recovery, preparedness, and, in some cases, mitigation programs. For instance, Turkey, Jordan, Indonesia, the Philippines, India, Uzbekistan, Ecuador, and Colombia all have active national urban disaster risk reduction programs (Knox Clark, 2012). Unfortunately, less consideration has been given to rural areas in terms of disaster risk reduction measures, while urban and rural areas depend on each other socially, economically, politically, and ecologically, as clearly stipulated by the preposition of the Center-Periphery model. Rural areas depend on urban areas as they provide employment, education, health care, emergency services, and information to the rural population. Also, rural areas are undergoing rapid demographic, economic, and governance changes due to rural-urban interdependencies (Dasgupta, 2014). Similarly, cities depend on rural areas for labor, food, and other ecological services (Gebre, 2019). Hence, the chain of this interconnectedness between rural and urban areas may be affected by disasters and may have negative or positive effects on disaster risk reduction. Furthermore, as emphasized by the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNSDR, 2017), understanding the rural and urban circumstances of disaster victims can aid in understanding the speed of mitigation, preparedness, response, recovery, and the severity of impacts. Also, the agenda for 2015–2030 insists on equality in disaster risk reduction programs between rural and urban areas.

Therefore, from the preceding arguments presented above, there is a need to assess how disaster risk reduction in rural and urban areas differs and how it can be intervened upon so as to know how policies, laws, and regulations can be made better able to address the challenge and conquer advantages in the two spatial areas without violating equity and equality. This paper, therefore, investigates the trend of disasters and disaster risk reduction strategies in the selected communities in Morogoro Municipality and Council, which represents the urban context, and Morogoro District Council, which represents the rural context.

2.0 Methods



2.1 Study Area

This study was conducted in the Morogoro Municipality Council and the Morogoro District Council both from the Morogoro region. The choice of the study area is based on the fact that these councils are administratively dependent on each other as they are both under the same District Commissioner (DC) but have two different directors: Morogoro Municipality Council has a Municipal Director (MD), while Morogoro District Council has a District Executive Director (DED). Hence, they normally share the same administrative characteristics, programs, projects, and plans and differ to some extent. Therefore, understanding how these two jurisdictions interconnect in disaster risk reduction is of great importance. Also in each of these two councils, sample wards were picked based on the availability of disaster records, the physiographic setting that exposes the wards to likely man-made and natural-induced disasters, and the presence of organizational structures that deal with disasters.

2.2 Methods and Tools for Data Collection

Interviews with key informants from the Morogoro Municipality Council, among them the Municipal Environmental Officer, Municipal Health Officer, Regional Firefighting and Rescue Commander, some Wards Executive Officers (WEOs), the Chairman of the Regional Red Cross Societies, the Regional Traffic Officer, and Tanzania Catholic Relief Services (TCRS), were conducted. As for Morogoro District Council, an interview with key informants was conducted with Wards Executive Officers, Wards Extensional Officers, and some of the Village Executive Officers (VEOs). The topics included in the checklist encompass the disasters in which Morogoro Municipality Council and Morogoro District Council face most; disaster risk reduction initiatives taken to reduce disaster risks; and the challenges facing these two administrative jurisdictions in disaster risk reduction.

Also, field site visits (observations) were conducted in three (3) divisions (Matombo, Ngerengere, and Mvuha) in the Morogoro District Council to see how community life creates strong relationship bonds and its effects on disaster risk reduction in rural areas. As for Morogoro Municipality, visits were conducted at Bonde la Mchuma and Mafisa to see the exposure and vulnerability of the communities to floods. All visits were mainly conducted to observe the actual situation on the ground regarding the matters discussed with the key informants. The observation was aided by the use of an observation schedule.

Meanwhile, publications relevant to disaster risk reduction strategies in urban and rural areas around the world were reviewed in libraries, books, journals, and government offices around the world. These included conceptual materials on ideas, debates, and issues in relation to the subject matter. The information gleaned from the literature was useful in triangulating and supplementing the primary data and observations.



2.3 Data analysis and presentation

The majority of the data collected were qualitative, necessitating the use of qualitative data analysis techniques. Qualitative data were analyzed by gaining an understanding of the underlying reasons, opinions, feelings, and motivations of the respondents towards the questions. The qualitative data were presented by quoting key issues raised by various respondents while taking into account their opinions and understanding of the issues raised.

3.0 Results and Discussion

3.1 Disaster Occurrences in Morogoro Municipality Council

Floods were identified as one of the hazards causing disasters in Morogoro Municipality Council. According to the study, the main causes of floods in Morogoro Municipality Council were rivers, sewers, and drainages. The same observation is nearly identical to those presented by Knox Clark (2012), Getahun and Gebre (2015), and WMO (2017), that most urban floods originate from rivers, flash floods, coastal floods, ground water floods, and structural failures. A discussion with the Morogoro Municipal Council Environmental Officer revealed that the municipality is vulnerable to floods, particularly during the rainy seasons, mainly in March and April, as he was quoted, "....

Years ago, floods never existed in Morogoro Municipality Council, but currently an area is experiencing several cases of flooding due to the presence of illegal activities such as digging sand in different areas around the municipality, particularly areas near Sokoine University of Agriculture's Mazimbu Campus and Kasanga.

His arguments are seconded by WMO (2017), which states that urban floods are in part caused by human activities within a floodplain, including unplanned growth and development or the breach of a dam or an embankment that has failed to protect planned development. Also, interviews with the Morogoro District Commissioner revealed low awareness of flood risk among the people, as he was quoted as saying that;

"Citizens could not know if they were at risk after living in prone areas; there are some risks that can be seen with the eyes and those that can't be seen from living in prone areas."

These views corresponds with findings by Ross (2005) that there tends to be a low awareness of flood risks and that there are communities that do not know they are at risk of flooding and that any flood would have serious impacts on them.



The study also revealed that having rapid urbanization, population density, poor sewage systems, and economic activities near the sources of water (such as areas around Uluguru Mountain and Bondwa) were the causes of frequent floods in Morogoro Municipality Council. Furthermore, the tendency of people to reside in flood-prone areas (such as Bonde la Mto Mchuma at Kichanagani and Mafisa) was also identified as a main cause of floods in the area. This concedes the views by Blaikie (1994) of the disaster crunch model and the views by Wisner et al., (2004) that when people settle in unsafe areas, it triggers disasters. However, both the negative and positive effects of floods influence the lifestyles of communities, as in many flood-prone areas across the globe, people have adopted a lifestyle of living with floods. Communities in flood-prone areas are more vulnerable to flooding than those in low-risk areas (WMO, 2017).

In addition, there are some urban design features exacerbate the risk of flooding (e.g. reduction in urban green space, increased hard surfacing, increased density of development, and potentially increased barriers to flood flows such as road embankments). Hence, due to the density of population and urbanization, flooding problems in urban areas are characterized by low probability but high consequences. That means there is a low probability of the occurrence of floods, but once they happen, they could have catastrophic impacts. This is because when floods occur, more people are likely to be killed and injured within a small area, and the level of needs may overwhelm the ability of the humanitarian system and the government to provide support during the response.

The study further identified deaths of people (in a few cases), destruction of properties (i.e., houses, shops, markets, bridges, and roads), and hindrance to the mobility of people and vehicles during floods. The results in Table 1 show that, from 2014–2020, in Morogoro Municipality Council, 12 people were recorded dead from floods, with 2 injuries and 3170 victims. In addition, 702 households remained homeless, while the total number of destroyed houses was 431, with 281 moderately destroyed houses due to floods. Furthermore, the results show that 6 bridges, 5 schools, 154 toilets, 3 roads, 12 poultry houses, and 2501 hectares of farms were destroyed. This implies that floods exacerbate enormous effects compared to other disasters in Morogoro Municipality Council, including fire outbreaks and road accidents, as cemented by WHO (2020) and IFRIC (2020), and that floods affect more people globally each year than any other disaster.

Further, the study identified fire outbreaks as a common hazard that occurs regularly in the Morogoro Municipality Council. The Municipality has been experiencing the burning of residences, schools (such as Bigwa Sisters Secondary School in 2006), and oil tanker explosions that occurred in October 2019 at Itigi-Msamvu, where approximately 75 people were reported dead and more than 150 people injured. It is further found that undisciplined



use of electricity, inadequate knowledge of fire management and control, poor economic foundations, and rapid urbanization have contributed to escalating fire hazards in Morogoro Municipality Council. However, the trend of fire cases in Morogoro Municipality Council is higher than in Morogoro District Council. The reason is the installation of electricity in almost all parts of the municipality, which is contrary to the Morogoro District Council, where few areas have adequate electricity. Through this statement, it shows clearly that electricity takes the lead in causing urban fires, and others follow.

Furthermore, the results found that road accidents account for the deaths of a number of people in Morogoro Municipality Council and that they occur frequently. According to data obtained from the Morogoro Region Fire Fighting and Rescue Force and local authorities, it is estimated that 19 people died in road accidents with 68 victims, while 48 people were injured in Morogoro Municipality Council between 2014 and 2020. According to the trend of effects, road accidents are the second-leading disaster in Morogoro Municipality Council after floods. According to the findings, road accidents have been caused by reckless driving, stress, overloading, over-speeding, driving while drunk, the use of mobile phones when driving, unnecessary overtaking, ignoring traffic signs (such as railroad crossings and zebra crossings), poor infrastructure, street racing, animal crossings, and the use of unrepaired vehicles. Road accidents increased nations' and individuals' financial burdens, particularly in medical expenses, emergency transportation, police costs, and funerals (Vitalis, 2022). An interview with a regional traffic police commander identified that the government, through its responsible organs such as traffic police, LATRA, and TANROADS, has been working hard to reduce road accidents in Morogoro Municipality Council through regular vehicle checkups, posing fines to road safety wrongdoers, providing road safety awareness, installing road safety signs, and performing regular road repairs. It found that road safety awareness has been regularly provided via FM radios (i.e., Planet FM Radio) during its morning session called "Asubuhi Kamili," in which a commander is called via phone to explain the status of roads and road safety on a specific day. Regular visits by traffic police to bus stations (such as Msamvu bus terminal and Daladala stations (e.g. Kaloleni and Mafiga) and motorcycle parking, popularly known as "vijiwe vya boda boda," have also raised awareness among road users.

Table 1: Disaster effects in Morogoro Municipality Council from 2014-2020

HAZARD	D	I	V	DH	TDH	MDH	BR	SC	TO	RO	P	F
Fire Outbreak	2	9	26	16	4	27	0	0	0	0	0	0
Floods	12	2	3170	702	431	281	6	5	154	3	12	2501
Road accidents	19	45	68	48	0	0	0	0	0	0	0	0



Key: D=Deaths, I=Injuries, V=Victims, DH=Destructed Households, TDH=Total Destructed Houses, MDH=Moderate Destructed Houses, BR=Bridges, SC=Schools, TO=Toilets, RO=Roads, P=Poultry, F=Farms (hectares). Source: Fire and Rescued Force and Morogoro Municipality Council reports, 2020).

"We regularly provide road safety awareness to road users, especially drivers, passengers, pedestrians, and motorcyclists, as well as conducting regular checks up on poor-condition vehicles," he was quoted as saying in an interview with a Morogoro Regional Traffic Officer (RTO). The police officer further said, "Safety is everyone's responsibility, and they have been insisting people adhere to rules and regulations kept by the government so as to reduce road accidents in Morogoro Municipality Council because "no one is above the law." This study recognizes the contributions made by traffic police and other responsible road safety agencies in reducing road accidents. However, more efforts should be put in place to ensure effective road safety.

3.2 Disaster Occurrences in Morogoro District Council

According to the study, Morogoro District Council, like Morogoro Municipality Council, is vulnerable to several disasters, though the severity and effects differ from those of the municipality due to a variety of factors such as the diversity, dynamics, and density of these two spatial areas. According to the study, the Morogoro District Council is not unique when it comes to flooding. Though not all parts are susceptible to floods, in most cases, floods take cover in lowland areas compared to highland areas. Wards such as Selemala, Mvuha, Tununguo, Kisasi, Bwakila Chini, Ngerengere, Mkulazai, Matuli, and Kidugalo are geographically lowland areas that are experiencing floods, though not in all parts of these lowland areas. A study revealed that the occurrence of floods in these areas is due to their geographical location as they are located in lowlands and hence receive a greater accumulation of water from highlands during rainy seasons; their proximity to rivers (such as the river Ruvu, the river Ngerengere, and the river Mvuha, just to mention a few); socio-economic activities, especially near the sources of water (i.e. farming, pastoralism, and artisanal mining); and the establishment of settlements in flood prone areas by believing that those areas are good for agriculture; hence, people find themselves in danger during floods.

Moreover, some wards such as Kibungo Juu, Tawa, Bwakila Juu, Kibogwa, Konde, Kinole, Mkuyuni, Kiroka, Kisemu, Mikese, Koleru, Tegetero, Lundi, Mtombozi, Tomondo, Mkuyuni, Kasanga, and Bungu were found not vulnerable to floods. This is due to the fact that these wards are located in highland areas. However, some lower parts of these areas may experience flash flooding, though not to the same extent as in other flood-prone areas. This shows that the occurrence of some disasters, including floods, is determined by location. This supports the assertions by Blaikie et al., (1994) in the Pressure and



Release (PAR) model that disasters are the result of the intersection of socio-economic pressure and physical exposure.

Results indicate that floods have been causing deaths (though in small numbers), destruction of properties, and injuries. However, in Morogoro District Council, floods affect more of the agricultural sector, i.e., farms, crops, and lands are destroyed and bring direct losses to the farmers, as shown in Table 2, about 2984.3 hectares of farmland were destroyed by floods between 2014 and 2020. Though, at the same time, the agricultural sector is also a major contributor to global greenhouse gas emissions (Ribeiro et al., 2020), which in turn cause the occurrence of extreme weather events like floods, droughts, and extreme temperatures, which pose a bigger threat to rural resilience.

Furthermore, the study identified frequent fire outbreaks as one of the Morogoro District Council's chronic hazards. In contrast to the municipality, frequent forest fires have occurred in Morogoro District Council. This normally occurs in August, September, October, and November, usually when farmers prepare farms for cultivation. Farmers use the burning method to clean farms before cultivation. Consequently, fires spread out rapidly into large areas and are out of control until it rains. Forest fires in Morogoro District Council occur in mountainous areas, for example, Koleru, Bungu, Kasanga, Tawa, Kibungu Juu, Kibogwa, Kinole, Tegetero, etc. It is difficult to find forest fires in non-mountainous areas such as Ngerengere, Mvuha, Tununguo, Kidugalo, Mkulazi, Matuli, etc. This could be due to the fact that, traditionally, these areas do not use the burning method to prepare farms for cultivation. Table 2 shows the effects of fire outbreaks on livelihoods from 2014 to 2020, with only three people killed, five injured, six total victims, and one total destroyed house with two moderately destroyed houses. However, as previously revealed in this study, electricity is the most common cause of house fires. Because of inadequate electricity installation in many areas of the district, the effects of fire on people and houses in Morogoro District Council are less severe.

The study further revealed that road accidents in Morogoro District Council occur but not regularly and with fewer effects, despite most roads being rough and impassable during rainy seasons. The few cases of road accidents could be due to low traffic congestion and low speeds due to the nature of the roads, as shown in Table 2. The number of deaths in Morogoro District Council due to road accidents is low, as only one person was reported dead, with four injuries and five victims from 2014–2020. The results in Table 2 show that the impacts of road accidents on other socio-economic components such as houses, bridges, schools, toilets, roads, poultry, and farms are low or none at all. This could be because the nature of road accidents as disasters does not directly affect the aforementioned components but rather people. The results also found that the eruption of diseases (e.g., Cholera) is periodic in nature since it normally occurs when there is an



eruption countrywide. However, most people do not adhere to health principles, as they do not boil water since they use water directly from rivers, wells, and dams without treating it.

Table 2: Disaster effects in Morogoro District Council from 2014-2020.

HAZARD	D	I	V	DH	TDH	MDH	BR	SC	TO	RO	P	F
Fire outbreak	3	5	6	2	1	2	0	0	0	0	0	0
Floods	4	5	24117	5500	649	0	1	6	11	0	0	2984.3
Road accidents	1	4	5	0	0	0	0	0	0	0	0	0

Key: D=Deaths, I=Injuries, V=Victims, DH=Destructed Households, TDH=Total Destructed Houses, MDH=Moderate Destructed Houses, BR=Bridges, SC=Schools, TO=Toilets, RO=Roads, P=Poultry, F=Farms (hectares). Source: Fire and Rescued Force and Morogoro Municipal Council reports, 2020).

3.3 Challenges in Disaster Risk Reduction between Morogoro Municipality Council and Morogoro District Council

The study showed that Morogoro Municipality Council has a higher population density than Morogoro District Council, a higher asset density, and socio-economic and spatial vulnerabilities that make the area more vulnerable to being badly damaged by both natural and man-made hazards. As a result, managing disasters in urban settings is more difficult than in rural regions. Also, it was observed that compared to rural areas, urban areas have a higher concentration of people living in high-risk zones, which increases their likelihood of suffering casualties and financial losses from climatic or geodynamic events and may make it more difficult to prevent disasters. In Morogoro Municipality Council, for instance, the study discovered urban residents who reside in flood-prone locations like Bonde la Mchuma in Kichangani, which puts them at risk for flash floods once they occur. The same circumstance can also be observed in Morogoro District Council, where residents choose to live in flood-prone areas since they are suitable for farming. But, when floods occur in these locations, residents find themselves in danger, making escape difficult.

It was found that areas such as Mikese, Mkambalani, and Kiroka of Morogoro District Council seem to benefit from disaster risk reduction interventions from Morogoro Municipality Council despite these areas administratively being part and parcel of Morogoro District Council. This is because of the proximity rule (service externalities spillage). This situation automatically acts as "informal insurance" as rural people become assured of support from urban areas near them. Furthermore, the study noted that the bonds of relationships among people are stronger in some rural communities in Morogoro District Council than they are in urban areas in Morogoro Municipality Council because of the prevalence of long-standing relationships based on reciprocity and mutual assistance, which both create these relationships and become stronger as a result of them.



During study visits at Matombo, Ngerengere, and Mvuha divisions, it was found that the strong relationships among rural dwellers provided a sense of ownership of the disaster risk reduction programs introduced to them. For example, in 2021, a non-governmental organization called Tanganyika Christian Refugee Services (TCRS) conducted a capacity-building program for the village disaster management committees and supported the establishment of those committees in Tawa and Tomondo Wards in Morogoro District Council. In addition, through this, strong bonds were formed between the committees and ordinary people, making them able to help each other during disasters. Furthermore, these relationships help societies manage, control, maintain, and use local knowledge to manage disasters from one generation to the next. However, these relationships may also occasionally have negative impacts as they can prevent people from leaving disaster-impacted or disaster-prone areas and can support the mobilization of certain groups against the government's orders to leave disaster-prone areas. It is argued that one of the most immediate and important decisions following a disaster is whether to "stay or go." Strong community bonds reduce eviction, an effect that may have both positive and negative impacts on disaster mitigation, preparedness, response, and recovery, hence hindering the creation of resilient communities. This was revealed by one of the Ward Executive Officers when he said that;

"People usually refuse to leave disaster-prone areas because of the notion that they can not go far and leave their relatives, arable lands, and houses."

However, a community in which people come together with shared commitments to mitigation, preparedness, response, and recovery will have certain advantages in terms of the mobilization of resources and manpower, as well as in community reinvestment after disasters. Also, an unwillingness to consider leaving a disaster-prone location may have a negative impact on individual and family recovery, particularly when the community is unable to fully recover and support the recovery of housing, infrastructure, and the economy.

The study revealed that rural areas in Morogoro District Council lack zoning and have less capacity to fully enforce existing codes. This could probably be due to inadequate awareness of land zoning and building codes. Furthermore, most rural dwellers' insufficient economic status causes them to fail to comply with the government's existing building codes when compared to urban areas in Morogoro Municipality Council. This is just to say that disaster risk reduction (DRR) is a function of many components. So for successful DRR, consideration should also be given to the socio-economic well-being of the people



3.4 Training, Education Level and Youth Employment Creation

Results show that trainings offered to youth and education level of youth had positive coefficients of 0.125 and 0.416 hence influencing business performance and employment creation (Table 2). This suggests that the more trainings received to youth and the higher education level of respondent the increase in the number of youth employed by the respondent. Generally, acquisition of entrepreneurship trainings and increase in level of education lead to increase in entrepreneur awareness and perceptions. This was also reported by Robb *et al.* (2014) that entrepreneurship training helps in building necessary skills for business start-up, management, risk control as well as enterprise expansion. Therefore, this study argues that the impact of training on employment creation promotes enterprise growth which ultimately trigger additional labour requirements.

4.0 Conclusion

The results provide an overview of the disaster occurrences in rural and urban settings as well as disaster risk reduction with regards to their similarities and differences. The study identified that both spatial areas are vulnerable to natural and man-induced hazards, which are functions of human-nature interactions. However, the study findings show that disaster occurrences differ in some respects in terms of the magnitude, severity, extent, and impacts that those disasters bring. To a large extent, variation is driven by population size and density, geographical locations, infrastructure resilience, institutional setups, economic base, political stance, resource distributions, and social conditions. Furthermore, urban communities have a comparative advantage in Disaster Risk Reduction, due to the concentration of government institutions such as fire services, police stations, insurance companies, and disaster management departments. Even those so-called humanitarian organizations such as Red Cross Societies and Relief Services Organizations have also mushroomed in urban areas rather than in rural areas, despite being hit by a number of disasters such as floods, frequent fire outbreaks, and others. The study recommends the availability of equality in Disaster Risk Reduction (DRR) programs between rural and urban areas because disasters are always characterized by being non-selective. This equality is dependent on relocation of better infrastructure, strong and outstanding governance and technological set-up that can reduce disaster vulnerabilities in both rural and urban areas.

Acknowledgement

The authors are grateful to the Morogoro Municipality Council Authority, Morogoro District Council Authority, Morogoro Region Fire Fighting and Rescue Force, Tanzania Traffic Police, Wards Executive Officers, and Tanzania Red Cross Societies for giving the author access to data.



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