

Infographics of Tanzania's Death rate using Tableau

MISI – 799 Capstone Project

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CHAPTER 1: PROPOSAL

1.1 – Introduction

The United Republic of Tanzania is formed after the union of two independent sovereign states Zanzibar and Tanganyika. The population of Tanzania is around 32 million with 2.8% annual growth rate every year. Most the population lives on the Mainland and the remaining people lives in Zanzibar. The life expectancy in Tanzania is 50 years with 8.8% death rate. In addition, there is more than 800,000 refugee population. The economy of Tanzania mainly depends on Manufacturing, Tourism, Agriculture, Fishing, and Mining. 50% of the GDP is due to agriculture and this accounts for 66% of the exports in Tanzania. The educational system is a 2-7-4-2-3+ that consists of 2 years of pre-primary followed by 7 years of primary school and 4 years of secondary education followed by 2 years of Advanced level secondary and 3+ years for Technical and Higher Education.

In Tanzania, 33% of the children deaths are due to poor hygiene. Kids will spend most of the time in their schools. Lack of sanitation facilities and water supply not only influence the health hazard, it also affects the educational performance, school attendance, and retention. Sanitation, hygiene and water facilities are extremely poor in Tanzania's schools. In Tanzania, every year around 10,000 kids die from cholera due to poor sanitation and unsafe water. Water- related deaths cab be reduced by21% by having clean water and 37.5% deaths can be reduced with proper sanitation. Water coverage also affects the death rate. In various regions of Tanzania, 20% of the water kiosks are not functional. The World Health Organization(WHO) said that among the east African cities, the Dar es Salaam region in Tanzania is mostly affected with cholera and 4,992 cholera cases, and 74 deaths were tallied in the year 2015 from various regions of Tanzania.

Complementary Basic Education for Tanzania(COBET) is a programme to benefit the dropout students and for the children who missed the chance to enroll in schools. The COBET programme is more important in places like Tanzania as it enables the school girls to acquire the basic education. The Integrated Community Based Adult Education (ICBAE) program is designed and started as a 4-year project to develop the learning approaches of community-based for adults. The literacy rate was increased by 13% with a gradual development of the programme.

Data Visualization is the representation of data graphically. Scatter graphs, bar charts and maps are some of the examples for data visualization. The visualization principles are combined with many of the data sets and applications to create animations and sophisticated images by information technology. In academic settings, most of the instructors use new technologies for creating data visualizations so that it helps to understand the concepts easily and quickly by the students. Tableau helps businesses to make decision making easily with the help of data visualization. Tableau can be connected to various kinds of data sources like MS Excel, Data Warehouse or any web data. In this project, I am using Tableau software a business intelligence tool to create dashboards of the various factors that affect Tanzania's Death rate.

1.2 – Statement of Purpose

This project aim is to create the dashboards of the various factors that affect the Tanzania's death rate using Tableau. Tableau helps to analyze data visually and helps to compare and find a solution easily.

1.3 – Research Questions

- 1) How was water coverage correlated to disease rate in Tanzania?
- 2) What is the number of COBET and ICBAE facilitators and its proportion to the population in various regions of Tanzania?
- 3) How can tableau be used to create a dashboard of water coverage, disease rates and education in the region of Tanzania?
- 4) What are the trends in water coverage and disease rates in Tanzania?
- 5) How does disease rate correlate with the availability of hospital and pharmacies in Tanzania?

1.4 – Limitations

It is normal to have certain sort of limitations in a project. Like all other projects, this project also has its own constraints and limitations. The following are some of the limitations in this project:

Time plays a crucial role in all kinds of project. For this project, it almost took two months for me to find datasets related to Tanzania and to draw conclusions from it. After that, I have 2 months for the documentation and implementation which is less duration as I had other courses to do at the same time. It is necessary to know about “R” scripts for in-depth analysis which requires a lot of skills.

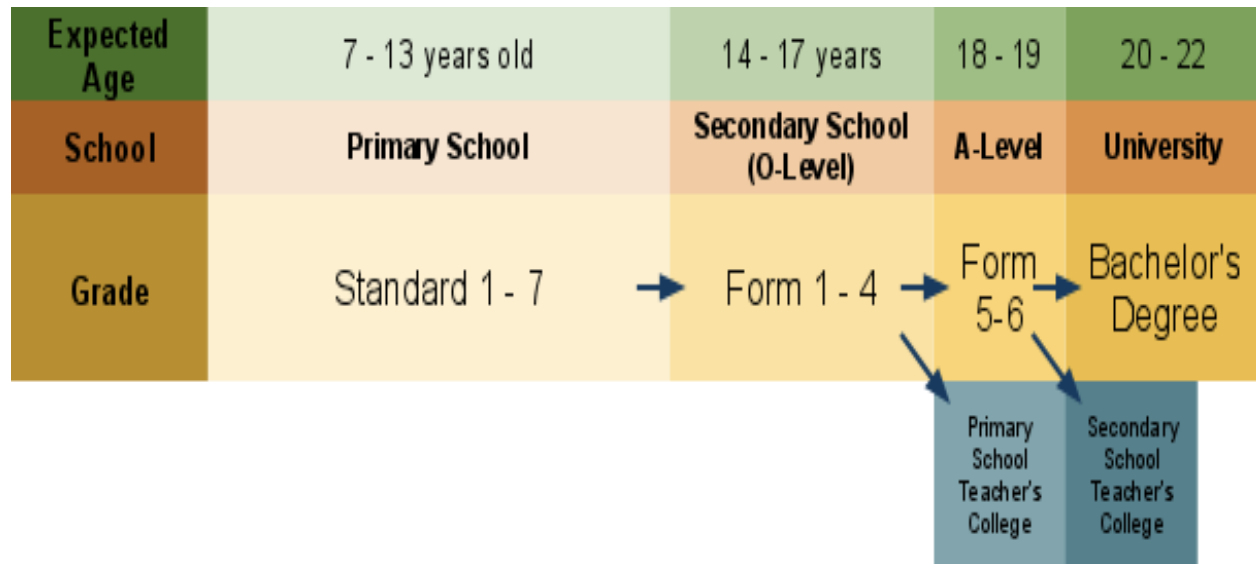
1.5 – Glossary

BI	-	Business Intelligence
COBET	-	Complementary Basic Education for Tanzania
ICBAE	-	Integrated Community Based Adult Education
ODL	-	Open and Distant Learning
REFLECT	-	Regenerated Freirean Learning and Empowering Community Techniques
WHO	-	World Health Organization
WSSA	-	Water Supply and Sewerage Authority

CHAPTER 2: LITRATURE REVIEW

2.1 Tanzania Education Levels

The official language of Tanzania is Kiswahili. In primary schools, Kiswahili is one of the subjects in primary schools and the medium of instruction and all textbooks are written in Kiswahili except English. In secondary school, English is the medium of instruction and it is one of the subjects from third standard onwards. The educational system in Tanzania is based on the 7-4-2-3 system: the primary school for 7 years followed by the secondary school for 4 years and followed by Advanced Level for two years which make students get certified in Advanced Certificate of Secondary Education. Advanced Certificate Examination has to be taken by the students in order to have entrance to the university for Bachelor’s degree which may take 3 years or more based on major (Frida, n.d.).



(Philippe, 2007)

Training and education in Tanzania are under the control of the Ministries, communities, individuals and NGOs. The ministries are responsible for Regional Administration, culture, and Education, Technology, Government Science. The administration, management, and

establishment of primary schools are under the responsibility of the Local Government, the Ministry of Regional Administration and the Ministry of Education. The Ministry of Education Zanzibar and the Ministry of Education and Culture operates the teacher colleges and secondary schools. Technical Colleges and Institute of Technology will be under the control of Technology and Higher Education and Ministry of Science (Frida, n.d.).

The Education sector has experienced various changes since independence. These progressions have formed the way of training in Tanzania. The resultant points of interest have been instrumental in making the present framework of structure and financing courses of action. The total of pre-primary education organizations has kept on expanding from 2,039 in 1997 to 2,335 in 1998, and increment of 14.5%. Additionally, the student's enrollment expanded from 47,867 in 1997 to 57,446 in 1998. But, the major issue offensively influencing the sub-sector absence of co-appointment because of the reason that two unique Ministries deal with the pre-schools. The Ministry of Education and Culture controls the primary education, while the kindergartens, Day care centers and nursery will be controlled by Ministry of Labor, Social Welfare, and youth. Many of the pre-schools, particularly Day Care are directed by NGO's/CBOs which includes religious foundations that are situated in urban zones. The funding comes for the most part from the group themselves where pre-primary schools and NGOs/CBOs are found.

Government perceives that the early years of life are basic for the advancement of a kid's mental and different possibilities and, specifically, its identity improvement and development. The government along these lines considers that with the contribution and collaboration of parents, neighborhood groups, and Non-Governmental associations it is conceivable to formalize and systematize the pre-education for kids and incorporate kids with unique learning capacities

or troubles and furthermore suitable helpful measures can be taken (Ministry of Education, 2000).

Education is the fundamental methods for giving people with the open door to accomplish their maximum capacity as far as gaining the learning, talents, attitudes required for different social and financial roles, and for their everything around self-improvement. It has facilitated Tanzanian government to advance fair financial development and law based change while directing our fundamental social-social qualities that are most esteemed in our public. Primary Education has endured various issues in 1990. These included declining quality, declining enrollments, declining consummation rates and expanded dropout rates. Still, in recent these issues are being tended to and positive outcomes have as of now been enrolled (Ministry of Education, 2000).

2.2 Water Issues

Access to safe, clean water is a basic need and human right. But still in Tanzania, there are many people that don't have access to fresh water. In the year 2010, 21% of Tanzania's urban population and 56% of the rural population are not able to have access to safe and clean water. Tanzania has enough water, but the problem is to travel a long distance to get water and does not have enough money to construct and install the water infrastructure. In rural areas, the water shortage was formed years and according to World Health Organization in Tanzania, one out of six are not able to access safe drinking. The water shortage was mainly due to high-level consumption, population growth, and climate change. In the past decade, sanitation and water sector have gone wide changes (Gronemeier, 2012).

Contamination of water bases for the city of Dar-es-Salaam starts from the unsystematic dumping of solid wastes, the release of untreated or insufficiently preserved wastewater to water

sources, the absence of standard clean offices and poor sanitary practices. The polluted water utilized for human utilization can prompt cause medical issues e.g. typhoid, cholera, etc., which, thus, prompts decreased working hours/labor. This has an immediate impact on creation yield which can prompt a rundown of nearby group welfare. Having understood this as an issue, the Government of Tanzania specified, in its water strategy of 1991, the requirement for the safety of water sources. In accomplishing this objective, proper waste management played a key role. Because of financial hardships, despite, spending allotment by the focal Government couldn't take care of the costs required for legitimate treatment of waste. This left Tanzania with no option other than substantial dependence on contributor and reciprocal associations for budgetary support of projects. To manage these issues, the Government as of now underscores including nearby group and NGOs, the arrangement of partner assets and associations, and contribution of the private area. Different attempts are the growth of teaching projects to make more attention to the nearby groups on the requirement for of water sources protecting. Even though at its early stages, the framework is hinting at some change. Cholera is a diarrheal illness affected by *Vibrio cholera* (Gronemeier, 2012).



(Water Issues, 2012)

Cholera occurrences are repetitive in numerous African nations and are connected to poor cleanliness and sanitation and in addition deficient readiness and limits. Tanzania has encountered cholera occurrences before, with the Kigoma district being the most influenced. This year, the nation built up an enduring plan for cholera counteractive action and control. Cholera is preventable, and can, at last, be eradicated where access to clean water and sanitation offices, and friendly hygienic conditions are guaranteed and managed for the entire population. Effective cholera control and prevention depend principally on the usage of coordinated multidisciplinary and far-reaching approaches that include implementations outside the wellbeing segment and that address a few components, including ecological living conditions, access to treatment and clinical administration of cases, immunization with Oral Cholera Vaccines, social activation of groups and epidemiological inspection (Inter Health, 2016)

2.3 Disease Problems

In Tanzania, the health sector is experiencing major change. The main cause of mortality and morbidity is malaria, particularly in kids under 5 years. In both the inpatient and outpatient the malaria disease ranks first. The financial effect of malaria is high to the point that it contributes exceedingly to underdevelopment and poverty. Attempts made in the previous century to control and combat malaria fever are not successful. The possibilities of accomplishing the Abuja announcement targets are doubtful inside the rest of the timeframe. presently, a 5-year strategic plan was advocated by the Ministry of Health that supports four primary methodologies in the encounter against the disease. These incorporate enhanced case administration, vector control utilizing germ spray treated mosquito nets, control, and prevention of malaria in epidemic and pregnancy preparedness, counteractive action and control. In any

case, these methodologies confront different difficulties including unsatisfactory human, budgetary, and material assets (Medical, 2002).

In sub-Saharan Africa, the major health issue is malaria, with more than 400 million cases and 1 million deaths a year. In Tanzania, more than 95% of the 37.4 million individuals are affected by malaria. The malaria is the main cause for 33% of death among kids less than 5 years old years and for up to 1/5 among the women that are pregnant.

Malaria represents more than 30% of the national disease burden, making it a top wellbeing need for a portion of assets for its counteractive action and control. It includes unequivocally in the National Package of Essential Health Interventions, and positions high in the priorities of National Health Research.



(Malaria, 2006)

Cholera is yet an issue in Tanzania. In Tanzania, around 48% of all assertions in the nation are because of notifiable sicknesses between patients aged 5 years or more were because of cholera cases in the year 1997. Around 57% of deaths are because of notifiable and most of the cases are due to cholera. Dar-es-Salaam district is one of the regions for the most part hit by cholera occurrences in the nation (Medical, 2002).

2.4 COBET

COBET is the abbreviation for Complementary Basic Education for Tanzania. This program is mainly proposed to assist the children that have dropped or missed their school for several reasons. COBET is for children till 18 years old and operates in 2 cohorts, the first one is from age 8-13 and secondly is from 14-18. In the academics, the COBET learners are heterogeneous, the majority of them can write and read in English and Kiswahili. The COBET programme plays a key role because it empowers the school girls with opportunity for basic education. COBET is important for youth as it explains them life and productive skills.

Aim and Objectives of COBET:

The main aim of COBET is to provide equitable, appropriate and skillful education to the children that are not going to school irrespective of their economic, gender or geographical status. The COBET was proposed to be affordable for both the learner and the family. The curriculum for the COBET program is designed to be appropriate, learner-centered and problem oriented. For making the programme more interesting and meaningful the teaching strategies were participative and interactive (John, 2000).

COBET program was implemented for only 6 months though it was short period information was needed so that they can improve the learner's modules and facilitators modules. For an educational programme, the most important aspect is to have an academic achievement

where as COBET comes under the community-based programme. So, it is essential to know to what extent the community had internalized and accepted the programme. The way facilitators correlated the related module and syllabus was good and the student modules and facilitator modules are well organized (John, 2000).

Facilitators were observed to perform several activities when presenting their lessons. 100% encouraged and motivated learners; offered fair punishment to offenders; prepared a lesson and used it; and maintained satisfactory classroom management. 95% answered learners' questions; gave and marked assignments; and corrected learners' misconceptions. The lowest observation was 5% of teachers summarized group observations, 45% prepared and used teaching aids. About 95% of the facilitators used appropriate language level for their cohort. For the process of recording the teaching strategies, ten different strategies were used. More than one strategy was used each facilitator. 45% of the facilitators used skill training and 50% used the demonstration method. Most of the COBET facilitators need seminars that would restore their insight and abilities in present day methods for approaching and educating COBET learners. Also, head educators complained that they were not aware of the COBET program and consequently required a seminar on the program for them to render significant administration and commitments (Ian, n.d.).

2.5 ICBAE

Integrated Community Based Adult Education (ICBAE) was developed in the year 1993 by the MOEC and the main aim is increasing the quality of basic education for youths and adults through the advancement of community based approach and learner- centered. ICBAE was a reaction to arranging of the national proficiency and post education programs approach being beat down and firm and its educational programs not considering the shifted needs and desires of

learners and groups on the loose. ICBAE depends on models created in a four-year project (1993-1997), encouraged by CIDA and SIDA in four wards. From 1997 to 2000 the scheme stayed in the pilot wards. After this, ICBAE was guided in 8 regions utilizing the REFLECT (Regenerated Freirean Learning and Empowering Community Techniques) (Basilina, n.d.).

The key characteristics of ICBAE are Community building, learner- centeredness, Integrated development and community capacity building. ICABE focus mainly on the learner-centered importance of learning. The responsibility of the program is to improve the community living conditions. It also focuses on to develop the political and socioeconomic fields. The main objective of the ICBAE programme is to empower the neighborhoods to take the responsibility to develop the projects and their programs. ICBAE learner's enrolment expanded from 675,000 to 957,289 from 2005 to 2009. Similarly, enrolment in Open and Distant Learning (ODL) expanded from 6,782 to 38,036 from 2005 to 2009. Regardless of these accomplishments grown-up absence of education rate expanded from 28% in 2005 to 31%in 2009. ICBAE is subsequently a center gathering Government Level 1 activity that mixes education, fundamental abilities and pay era NFBE actives and is focused at uneducated people, disregarded young people and youth, ladies and farmers. Undoubtedly, all characterizations of NFE target bunches given the nation consider rules are relevant to ICBAE the length of members are beyond 19 years old years (Basilina, n.d.).

2.6 Data Visualization

Data Visualization is the process of displaying the data graphically for two purposes: communication and sense-making. Most of the data will have important stories and data visualization helps to find and comprehend these stories, and after that to present them to others. The data is unique in that it represents things that are not physical. statistical data is conceptual.

Regardless of whether it concerns sales, athletic performance, incidence of disease, or whatever else, despite the fact that it doesn't relate to the physical world, can just succeed on the off chance that we comprehend somewhat about cognition and visual perception. To visualize data effectively, design principles must be known. Though data visualization more often relates quantitative qualities, it can likewise show connections that are not quantitative in nature. For example, the associations between individuals on social media like Facebook or terrorists that are suspected can be shown utilizing link visualization and node. Visualizing data is viable because it moves the balance amongst discernment and perception to the take more favorable position of the mind's capacities. With the progression of time, we've discovered better approaches to visualize data. Today, we are well-known with the chart types like sorts like a pie chart, bar chart and line chart. In any case, we occasionally stop to consider why they're more powerful than content, and numbers. Additionally, we can't spot the situation when they're wrong and can be progressed (Scott, 2006).

As visualization tools become more intense and more generally accessible, users will make descriptions of the connections between information not already thought to be as one. Tableau empowers organizations to make decisions on utilizing the information representation understandable to business clients of any industry. It engages organizations to stay aware of the continuously developing innovation and beat its opposition through creative methods of data visualization. Tableau analyzes and processes data in a logical way so that it can be followed easily. Tableau helps in making decisions quickly and can be adopted in any environment (Scott, 2006).

CHAPTER 3: METHODOLOGY

3.1 Overview

This chapter will give the details about the way to implement the project to answer the research questions. From this research, I came to know about the various factors that affect the death rate in Tanzania. 33% of the deaths in Tanzania are due to poor sanitation and lack of proper water supplies. The water coverage and only 70% and 20% of the water kiosks were not in good condition. To assist the dropout students and to gain knowledge about the basic education COBET and ICBAE programs were started. The facilitators created awareness among the people about the education and its importance and about the various factors that causes death. The hospitals in Tanzania are fulfilled with various difficulties and conditions since most of them are failed due to poor infrastructure. Because of uneven distribution of financial means, medical services are facing many problems. Main and central hospitals receive 85% of the finance and access only 10% of the population. Whereas 15% of the health expenditure was given to the health cares which access about 90% of the population. This, in turn, affects the people and cannot get good treatment and may die due to lack of medication.

3.2 Research Approach

1) How was water coverage correlated to disease rate in Tanzania?

Sanitation Poverty and Urban Water in Tanzania is prominent. Based on recent data suggestions, 74% of the Tanzania's urban population from 19 regional cities and Dar es salaam lives in unsupported Low-Income-Areas. Only 23% of the population are having access to consistent water supply. In Sub-Saharan Africa, Tanzania is not only highest in birth rates but also has highest urbanization rates (Gronemeier, 2012).

In 2010, based on baseline study in 550 low-income areas a total of 6.86 million people lived and the estimated population in 20 urban centers is around 9.2 million. This results around 2/3rds of the expected whole urban population in Tanzania including 109 residential areas. For Dar es Salaam and regional centers, according to the baseline study of Energy and Water Utility Regulatory Authority's the total population is 28% higher than the population figure. Considering the high urbanization rate, in Tanzania's cities, the population in big cities will increase from 9.2 to 13.8 million from 2010 to 2020.

As urbanization occurs, the pressure will be increased on the public system due to the increase in density of Low-income areas. The water demand in Dar es Salaam and in regional centers is expected to be double the supply of water. For the provision of sewage services and water supply, the water supply and sewerage authority(WSSA) is responsible. They produce 569,294 m³ water daily for 813km network length with 356,335 domestic connections. Presently, the total demand for water in Dar es Salaam per day is 898,591 m³. which means supply is a little bit higher than the water demand and this estimation does not include Low Income Areas. Though there are some domestic connections in some of the Low-Income Areas they often provide nonfunctional or poor services. The public service

provider that was licensed will operate 27% of the domestic water for Low-Income areas. But the water was not provided by 29% of these connections because they are faulty or disconnected or technical reasons. The domestic connections that do not provide water is more in Kigoma (45%) which is closer to Dar es Salaam (44%). According to the baseline study survey, there were 1,055 non-functional and functional water kiosks in Low-Income Areas. Still, at most only 4% of the population use the water kiosk for drinking. Dar es Salaam has more water kiosks but public outlets coverage is 0% and Tanga is the next area with more water kiosks and has 10% of the public outlet water coverage. The water coverage is more in Singida. Because of unavailability of housing and poor financial opportunities, most of the people are living without security due to the world's fastest developing urban areas. Cholera mainly causes due to the population density, informal housing and informal residents level of income (Gronemeier, 2012).

Like various poor nations in the world, Tanzania experiences from various issues that include the problems related to water. In a country where 33% of the nation is semi-arid to arid, it is extremely problematic for individuals to locate an access to clean water if they were not close to major lakes. Thus, for nation's people Tanzania's ground water is the significant source of water; still, the water is not clean always. Most of the ground water wells are near to drainage systems that are toxic that contaminate the fresh ground water. Therefore, Tanzanians has to use the surface water that has human waste or bacteria and they don't have any choice for drinking water or to wash their clothes. As per Tanzania National Website, malaria and cholera that are water-borne illnesses account for more than half of the diseases that affects the population of people does not have good sanitary options (Ministry of Education, 2000)

In Sub-Saharan Africa, the waterborne diseases are continuously increasing which is an economic burden causing more costs for households and health sector. Due to environmental factors like poor hygiene, unsafe drinking water and lack of sanitation water-related diseases like cholera are widely spreading. Though most of the communities have access to get water, the quality and quantity may not be sufficient to meet the fundamental needs. The physically challenging duty of collecting water was generally allocated to children and women. Based on one of the studies it was expected that children spent every day for more than million hours for fetching of water and this makes children miss school every day and may cause injuries too. More than 780 million people don't have access to improved water source. For the process of less contamination from pathogenic microbes, the improved water sources should include protected wells and piped water (WHO, 2009)

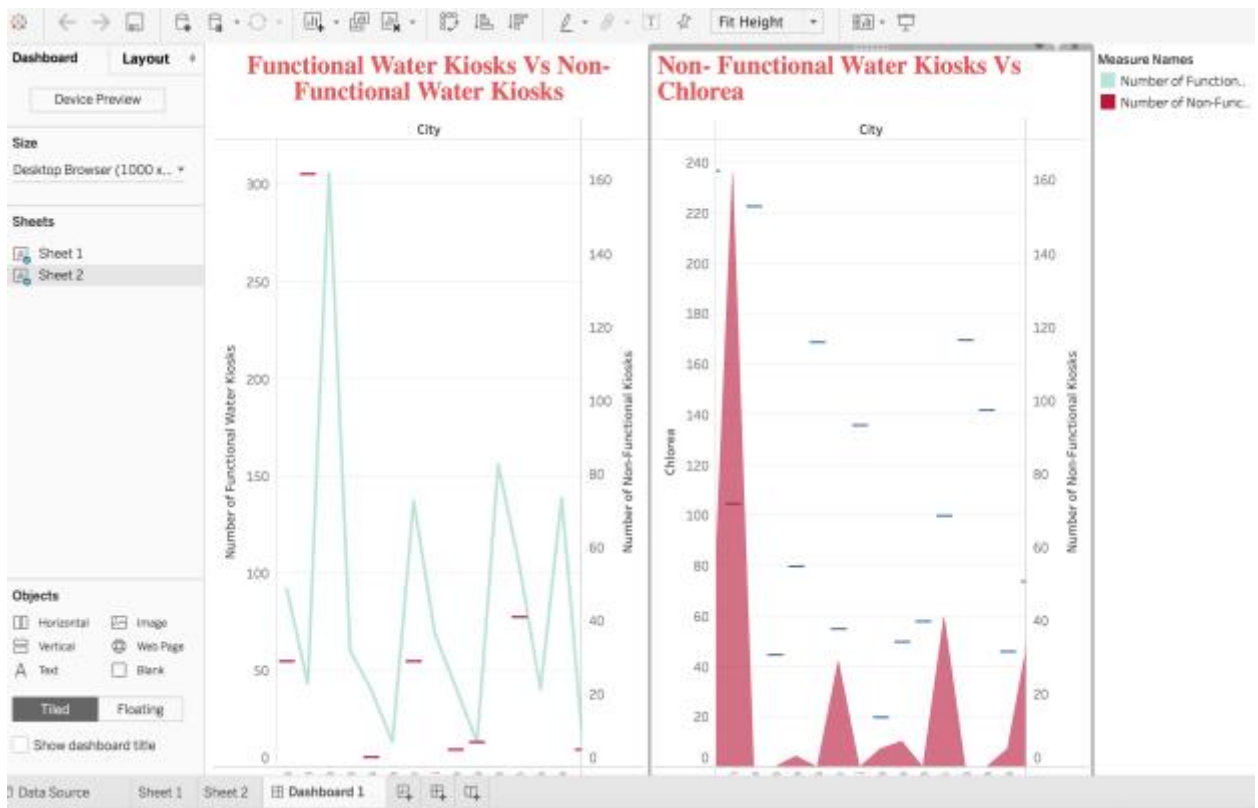
The continuous cholera outbreak in Tanzania which started in August 2015 has caused about more than 24,000 cases starting on 20 April 2016 which caused 378 deaths. Most of the deaths are reported from 23 regions of Tanzania. There was a decrease in new case number reporting during October-December 2015 in regions like Tanga, Arusha, Dar es Salaam and Singida but again the reported cases were raised from mid-December of 2015 to March 2016. Cholera is a very infectious water-borne contagious disease. Most of the people with cholera don't have symptoms still they can infect and shed bacteria on other people. In Tanzania, due to improper water facilities, 10% of the deaths are due to Diarrhea and cholera. Thus, water coverage is mainly affecting the disease rate in Tanzania (Ministry of Education, 2000).

2) What is the number of COBET and ICBAE facilitators and its proportion to the population in various regions of Tanzania?

Dar es Salaam is the most populated region in Tanzania and the population of Dar es Salaam is 4,592,454 in the year 2013. The population of Dar es Salaam for 2012 and 2013 was almost same and there is a decrease in death rate was decreased 4 times by 2013 when compared to 2012. This was mainly due to the COBET and ICBAE programmes that are introduced by the government to increase the awareness among people about the basic education. A total of 154 facilitators were allocated in Tanzania in 2012 which was increased to 262 by 2013. The learners for both COBET and ICBAE also increased from the 2012 to 2013. When we consider the second most populated region Mwanza the facilitator's proportion is more when compared to Dar es Salaam. In Mwanza, the population is about 690,880 with a total of 831 facilitators. The facilitators of Mwanza are 4 times higher than Dar es Salaam. In Arusha region, the COBET facilitators are more when compared to ICBAE facilitators, though there are more COBET facilitators most of the people in Arusha region are interested in ICABE programme. In almost most of the regions, the number of ICBAE learners are more when compared to COBET. In Mbeya region, they have more ICABE facilitators and it is populated region too. Most of the people in Mbeya have attended the COBET and ICABE classes. Dodoma is the region with highest ICABE facilitators with a population of 412820. The learners for ICBAE are 121903 with 2850 facilitators. The ratio of facilitators to learners is approximately 48:1 which is good for learners. Tanga region has 468 COBET facilitators with 2410 learners and 1663 ICBAE facilitators with a total 50673 ICBAE learners. The proportion of COBET learners to facilitators is 30:1, which can help learners to know more about the importance of education.

3) How can tableau be used to create dashboard of water coverage, disease rates and education in the region of Tanzania

For visualizing data, Tableau is the best tool and helps to combine ease of use and dashboards. Tableau dashboards help to create real-time and interactive visualizations. With the help of tableau, dashboards can be created that can correlate the relation between water coverage, disease rate, and education. Tableau is drag and drop interface. Different dimensions and measures from the left sidebar can be directly dragged into rows or columns and there is a chance to change shape color and size. One of the good thing with the dashboard is dashboards interact.

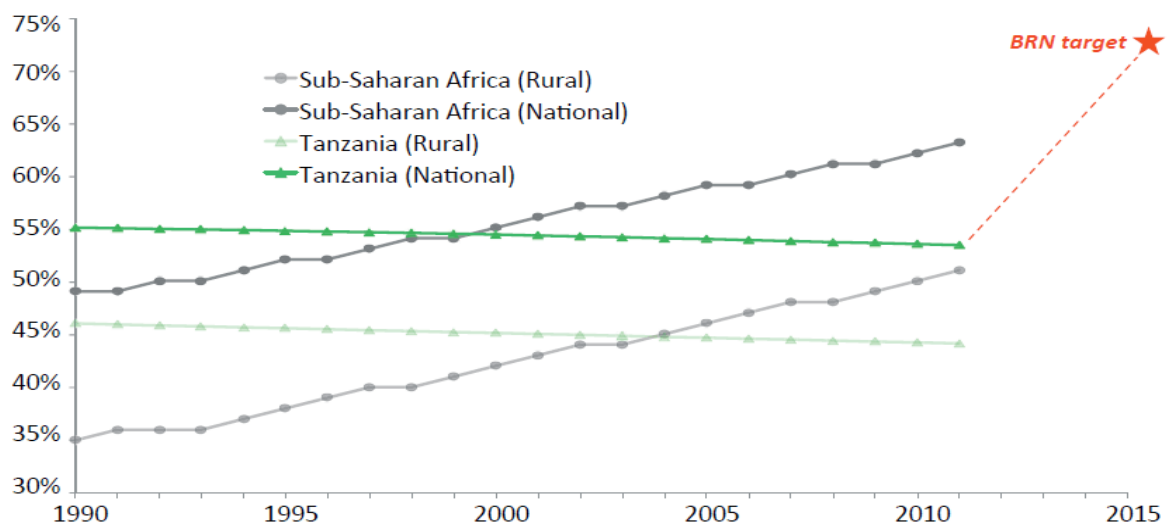


The above figure is a dashboard created using tableau that correlate the water coverage to disease rate.

4) What are the trends in water coverage and disease rates in Tanzania?

In 2016, Water.org conducted the market assessment in Tanzania. Outcomes are positive and key discoveries were that Tanzania is one of the quickest developing economies in Africa, however financial development has not profited all zones of the nation similarly. Rural areas specifically remain by and large exceptionally poor, with around 33% of the rural population delegated living underneath the neediness line. In any case, utilization of mobile banking is developing quickly. More than 9.8 million individuals at present have mobile banking.

In Tanzania, there is demand is high for both water and sanitation. The market for suppliers and water products seems like dynamic. Also, by growing finance sector, the opportunity for water credit is strong in Tanzania.

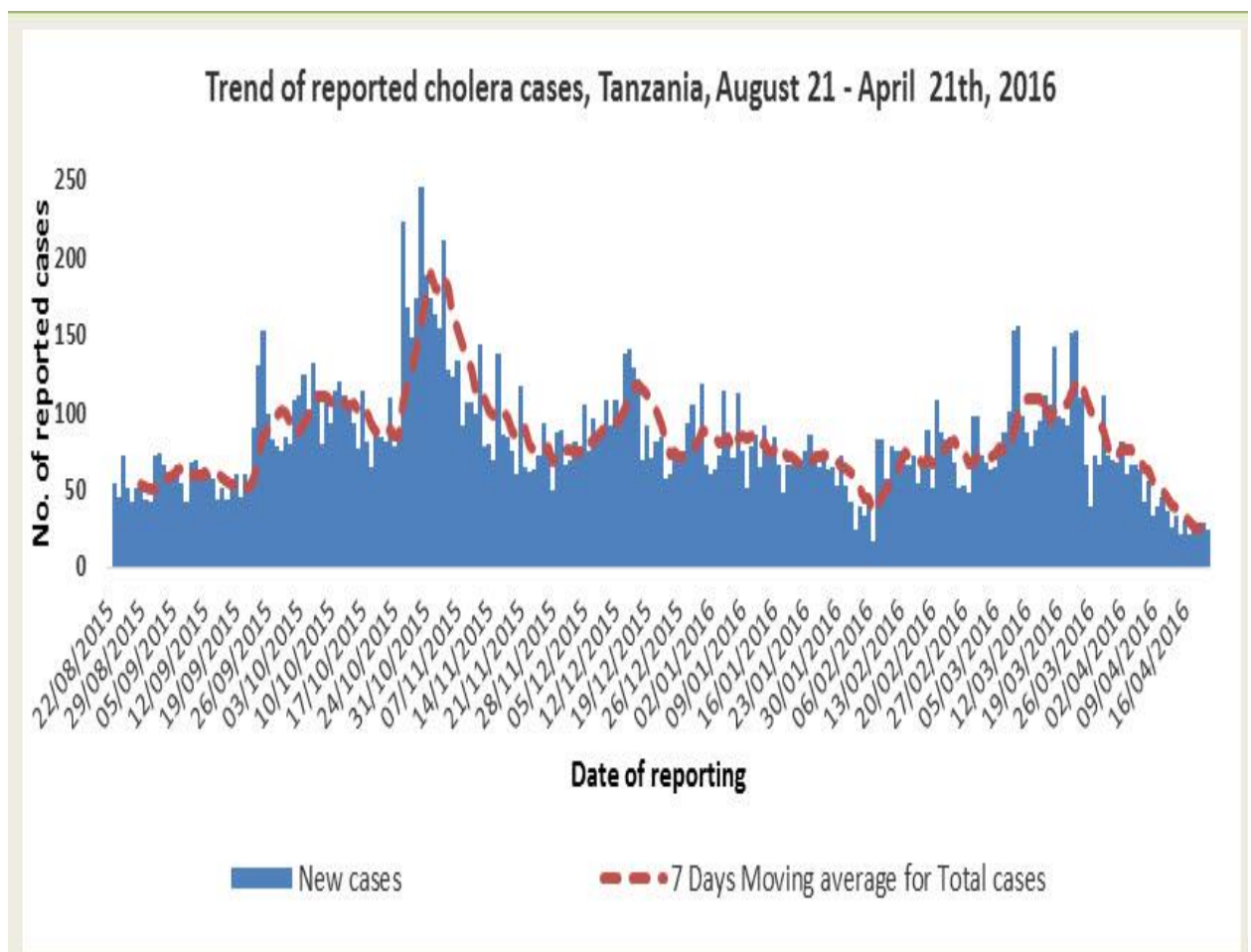


Source of data: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

(Water issues, 2017)

Nowadays in Tanzania, 17% of the deaths are due to HIV followed by 7% due to malaria. In mainland Tanzania, the serious health problem is malaria and it is causing

death for children that are below 5 years. 36% of the children deaths are due to malaria. In Tanzania, accounts for 5% of the countries death. In the nation, around 1.4 million individuals live with HIV in Tanzania. Annually 50,000 case are reported due to HIV and 53% of the adults are taking treatment. The leading for more infection rates is inequality among women. In the 6 regions of Tanzania like Morogoro, Dodoma, Mara, Kigoma, Arusha and Dar es Salaam, the deaths due to cholera are more. A total of 458 cholera death cases were reported from all these 6 regions in the year 2016.



(Cholera Cases, n.d.)

5) How does disease rate correlate with the availability of hospital and pharmacies in Tanzania?

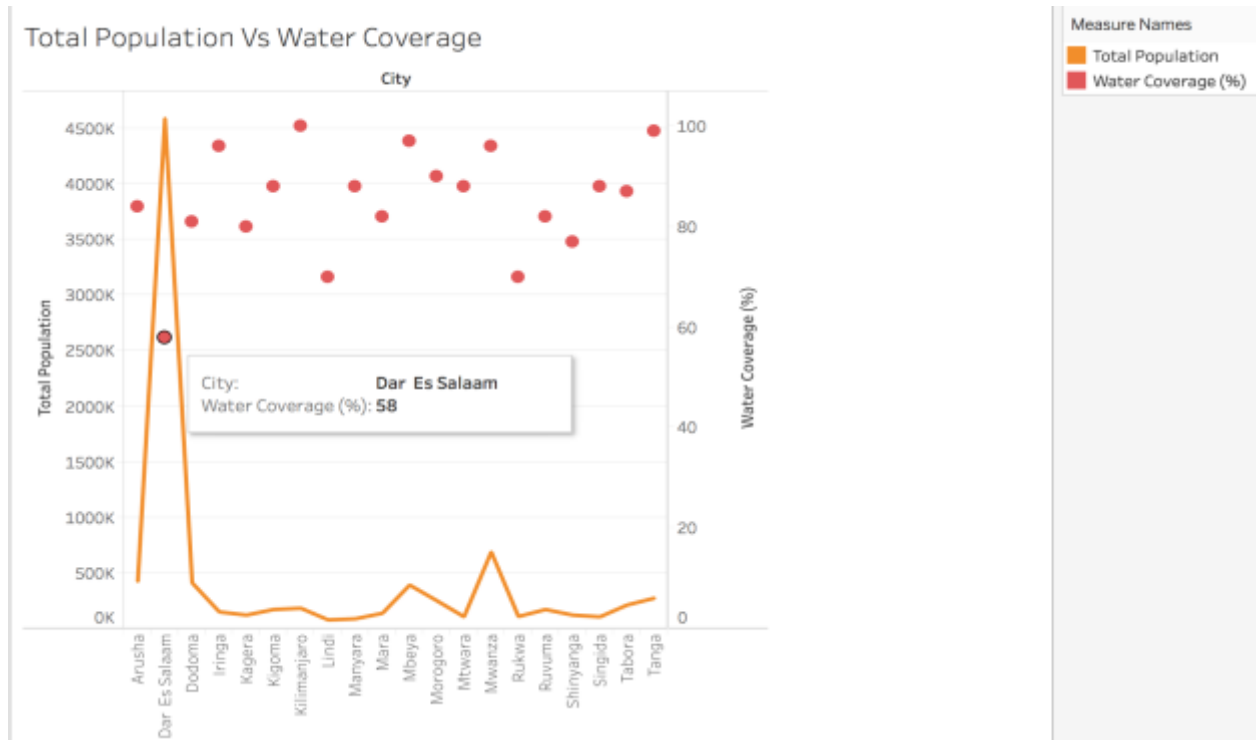
The death rate is high in Dodoma region and availability of pharmacies and hospitals is a key factor that affects the death rate. The population of Dodoma is 412,820 with only 64 hospitals and 32 pharmacies. Total 4320 people were dead in Dodoma due to lack of hospital facilities and pharmacies. The proportion of the total population to hospitals is 90:1. Health centers in Tanzania often have a shortage of works and lack of equipment and medical supplies. When the people fell sick they will just visit a traditional healer. These healers use herbal remedies but in general, ill patient requires medical interventions or strong drugs. In Mtwara region the hospital availability and pharmacies are low and this region has only 34 hospitals. Mean gap score for patients' level of satisfaction was -2.88 ± 3.1 which represents more dissatisfaction. In recent years, hospital care perspective was gained a lot with patient satisfaction and patients are happy due to the interactions like staff-patient relationships.

In one of the hospitals in Tanzania, a high level of patients' satisfaction was observed and it was due to the hierarchical delivery system of healthcare. Many of the people in Tanzania are being affected with many diseases due to the poor health facilities. The death and disease rate was decreased from the year 2012 to 2013 as the facilities in pharmacies and hospitals are improved. Most of the deaths in Dar es Salaam region are due to cholera and in the year of 2013, the death rate was gradually decreased due to the advancement in health care systems.

CHAPTER 4: FINDINGS

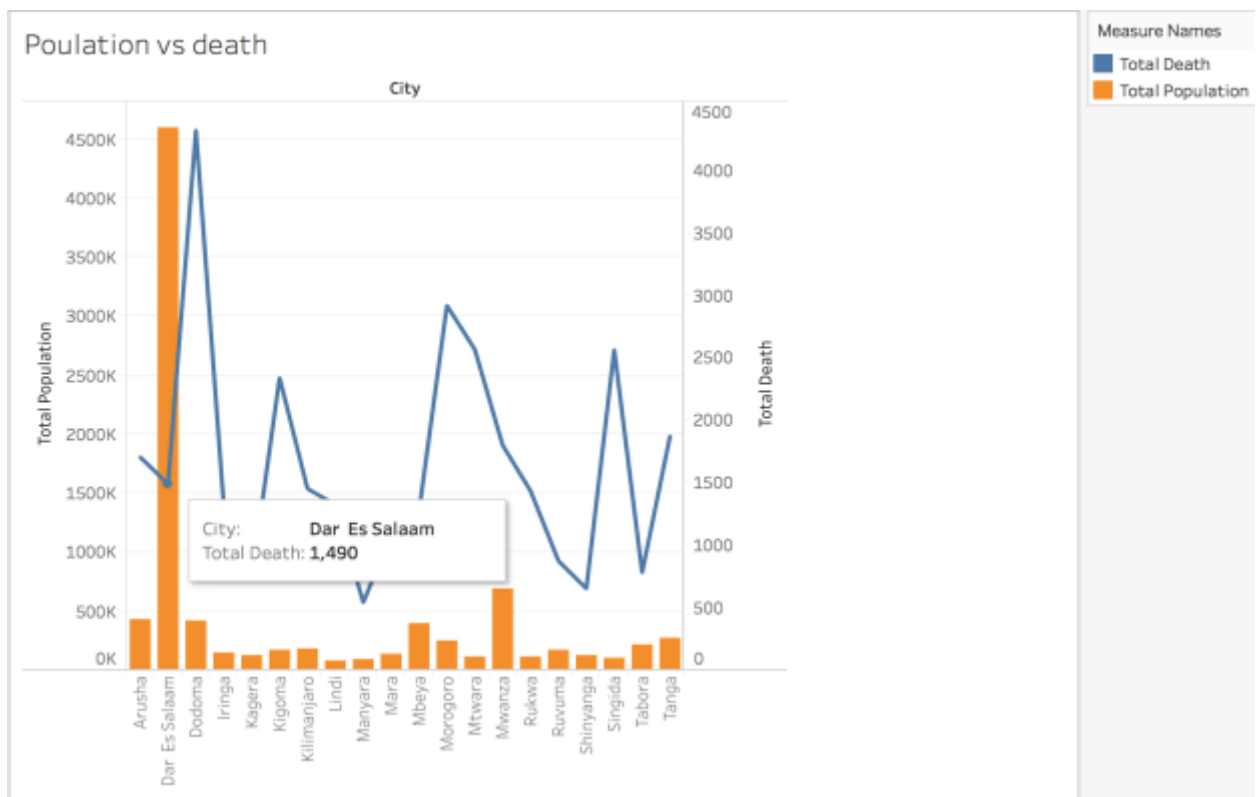
4.1 Research Findings

1) How was water coverage correlated to disease rate in Tanzania?



The above diagram visualizes how water coverage was the main cause for the diseases. If we consider highly populated region Dar es Salaam in Tanzania the water coverage is only 58%. So, 42% of the people does not have proper water facilities. Due to the scarcity of water, it may cause various diseases like Cholera, Hepatitis B, and Diarrhea. Water coverage also affects the death rate. In Dar es Salaam among 4500k people 1,490 was died and the main cause for that is due to lack of proper water sanitation and coverage facilities.

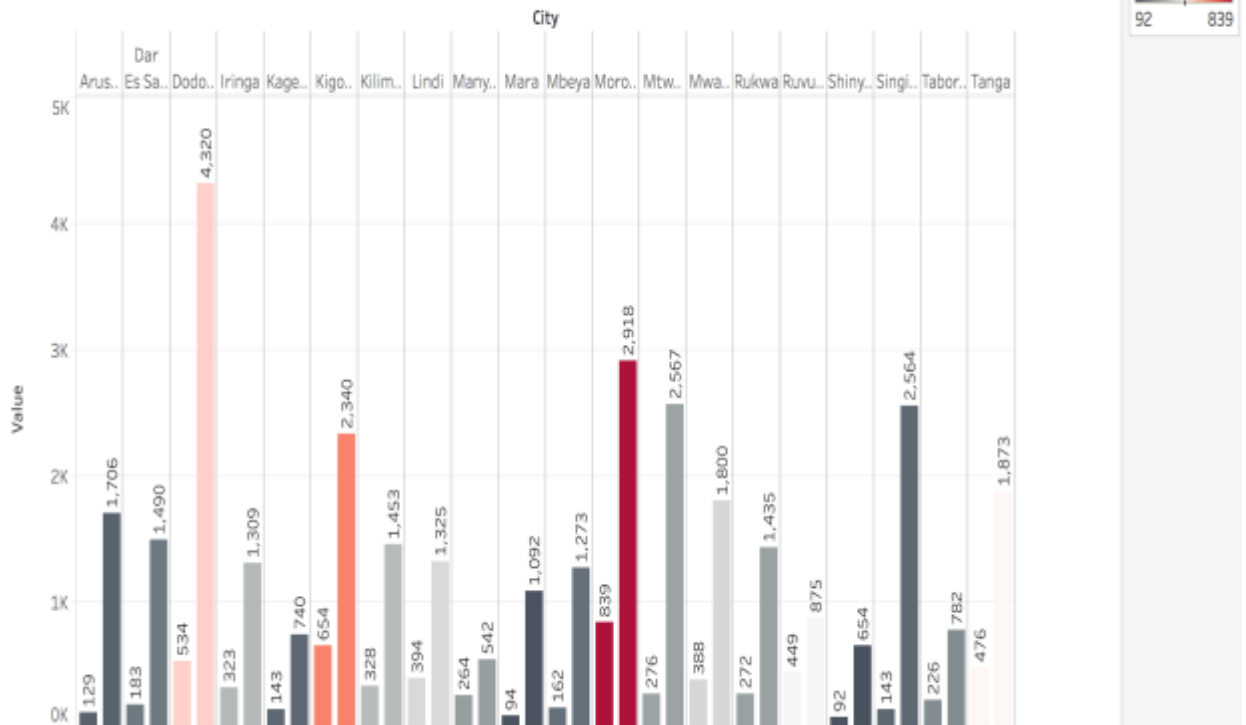
The images below show the death rate and the people that are died due to cholera. In the region of Dodoma, the death rate was high as the water coverage was low and 50% of the water kiosks are not Functional. The death rate is low in Arusha region as the water coverage I this region is more than 80%. In the populated region like Dar es Salaam the death rate less as the water coverage in this area is more and this region is developing financially with more water facilities. If we consider the region Morogoro the death rate is more after Dodoma this is due to lack of sanitation and water supply. The main cause of death are malaria and these are due poor hygiene.



Most of the deaths in Tanzania are due to cholera and cholera is widely spreading in all regions of Tanzania due to lack of water supply. The main problem in Tanzania is they have

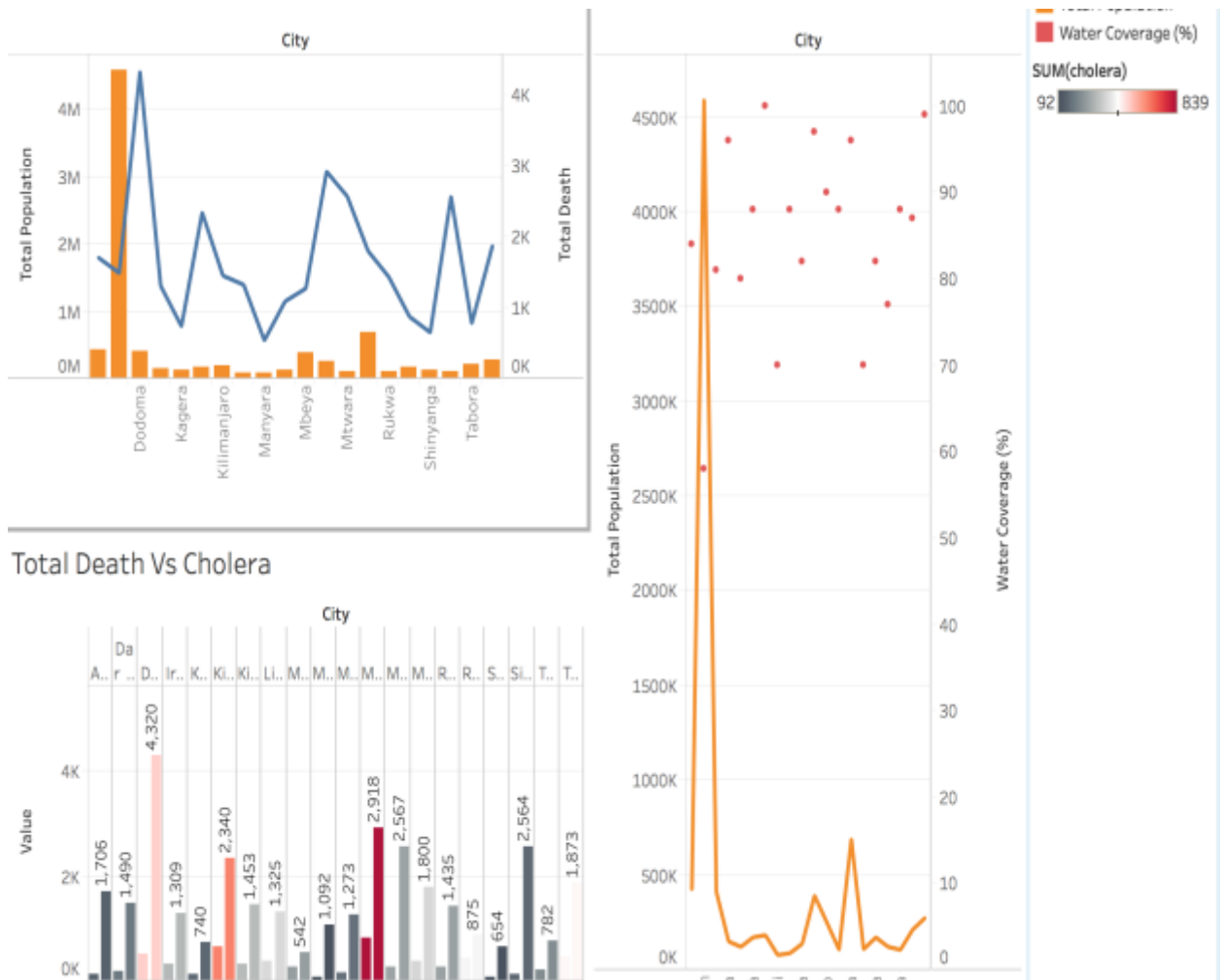
enough water but there are no proper facilities to use that water. The highest number of deaths due to cholera is in Morogoro. Among 2918 deaths, 839 people died due to cholera. This can represent how water coverage is mainly related to disease rate in Tanzania. In the region of Dodoma, 1/4 of the people are suffering from cholera. The figure below shows how many people are causing to death due to cholera. In the figure as the death rate of cholera increases, the colors will vary from gray to lighter and then darker to red. Though the water coverage is 100% in Kilimanjaro the 10% of the deaths in this region due to cholera. This is mainly because people don't have proper knowledge of hygiene.

Total Death Vs Cholera



The figure below represents the dashboard that correlates how water coverage affected the death rate. in most of the regions, water coverage is above 80% in the year 2013. If we

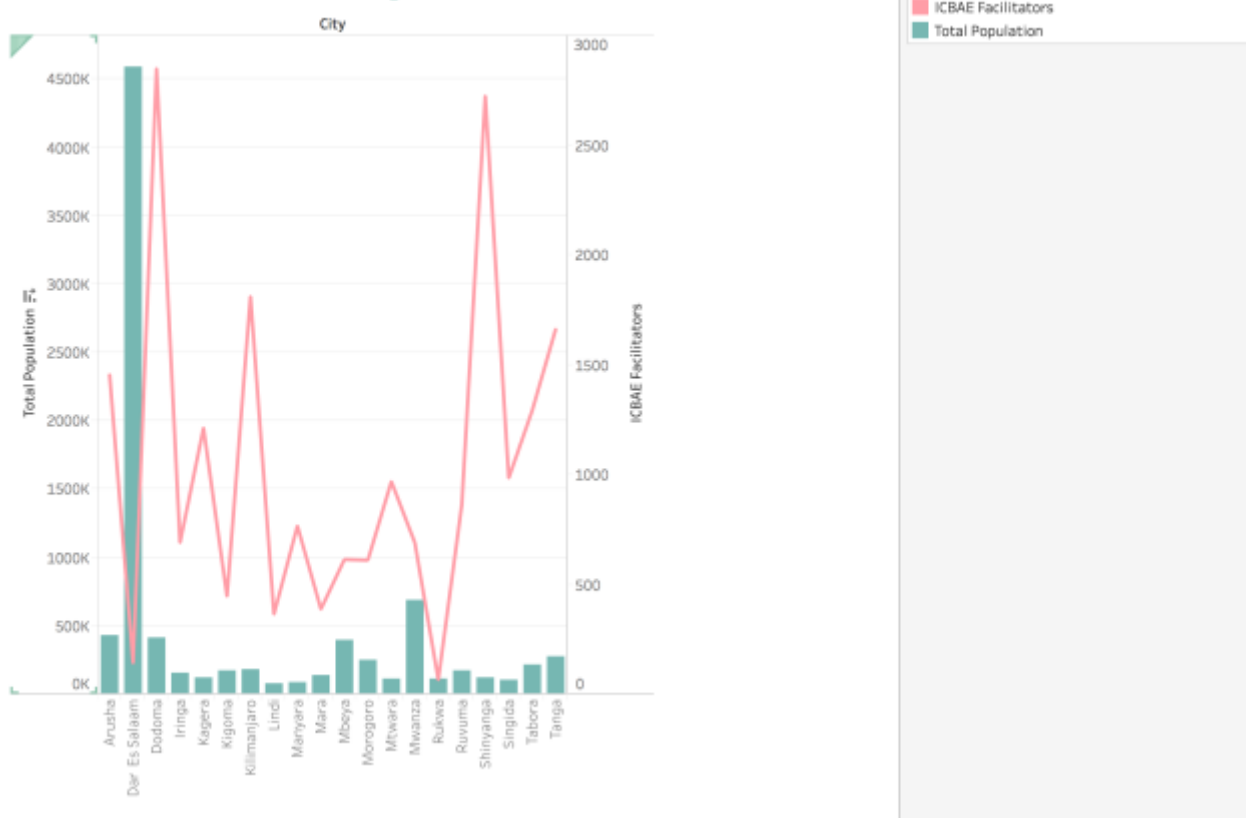
compare that to 2012 the water coverage was less than 50% in most of the regions. Still, in the highly-populated regions like Dar-es-Salaam, the water coverage was below 60%. Most of the water kiosks are not functional and due to this people are drinking contaminated ground water. Due to the less water coverage, the disease like cholera are most of the people are affected.



2) What is the number of COBET and ICBAE facilitators and its proportion to population in various regions of Tanzania?

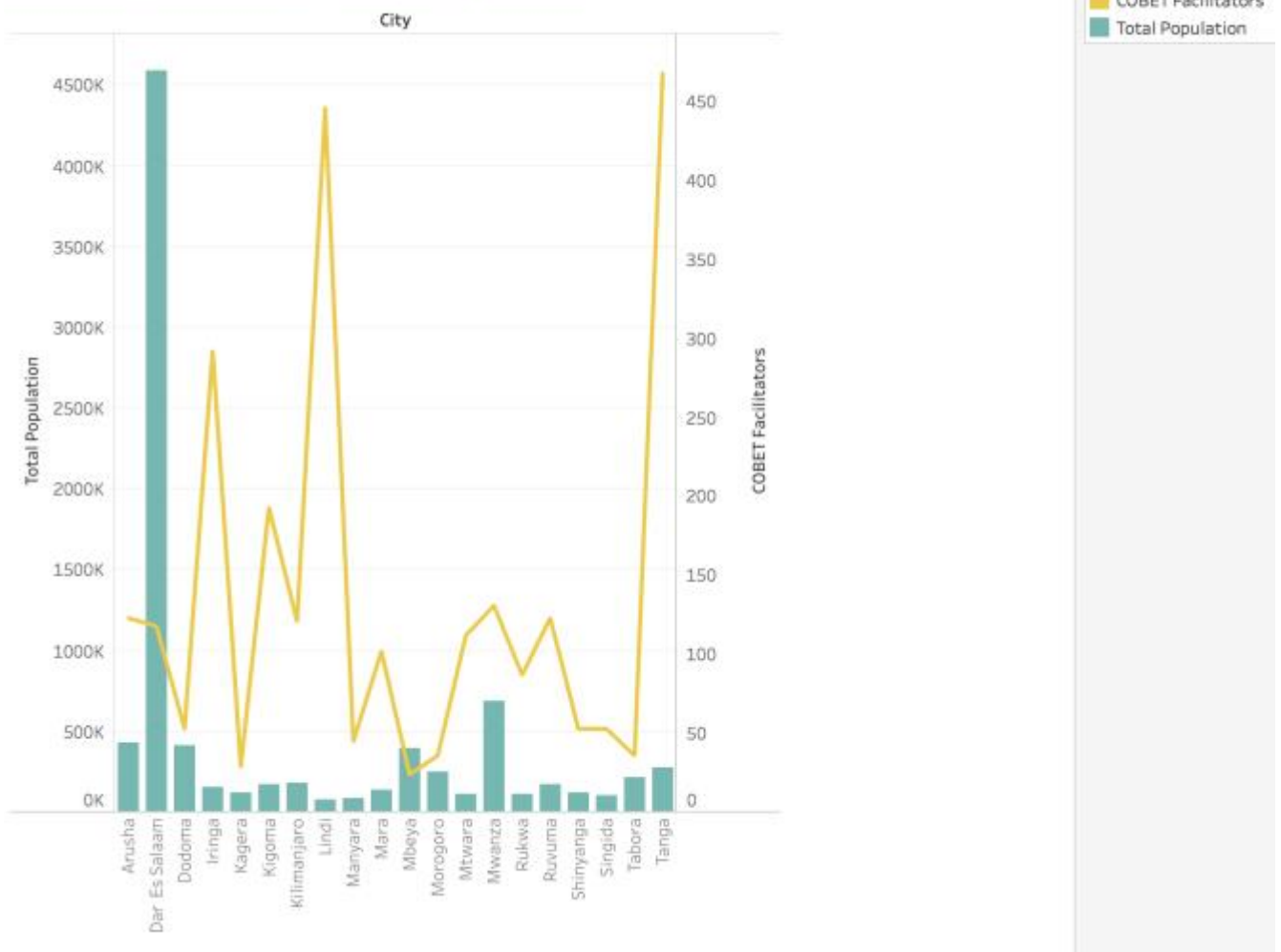
In the region of Rukwa, the number of ICABE facilitators is less when compared to other regions. In the region of Dodoma, the ICBAE facilitators are more even though the population is less. Dar es Salaam region needs more ICABE facilitators as the population living there is high. Shinyanga is the region with a second highest number of ICBAE facilitators. The population in this region is 122,609 with 2725 facilitators.

ICBAE Facilitators Vs Total Population

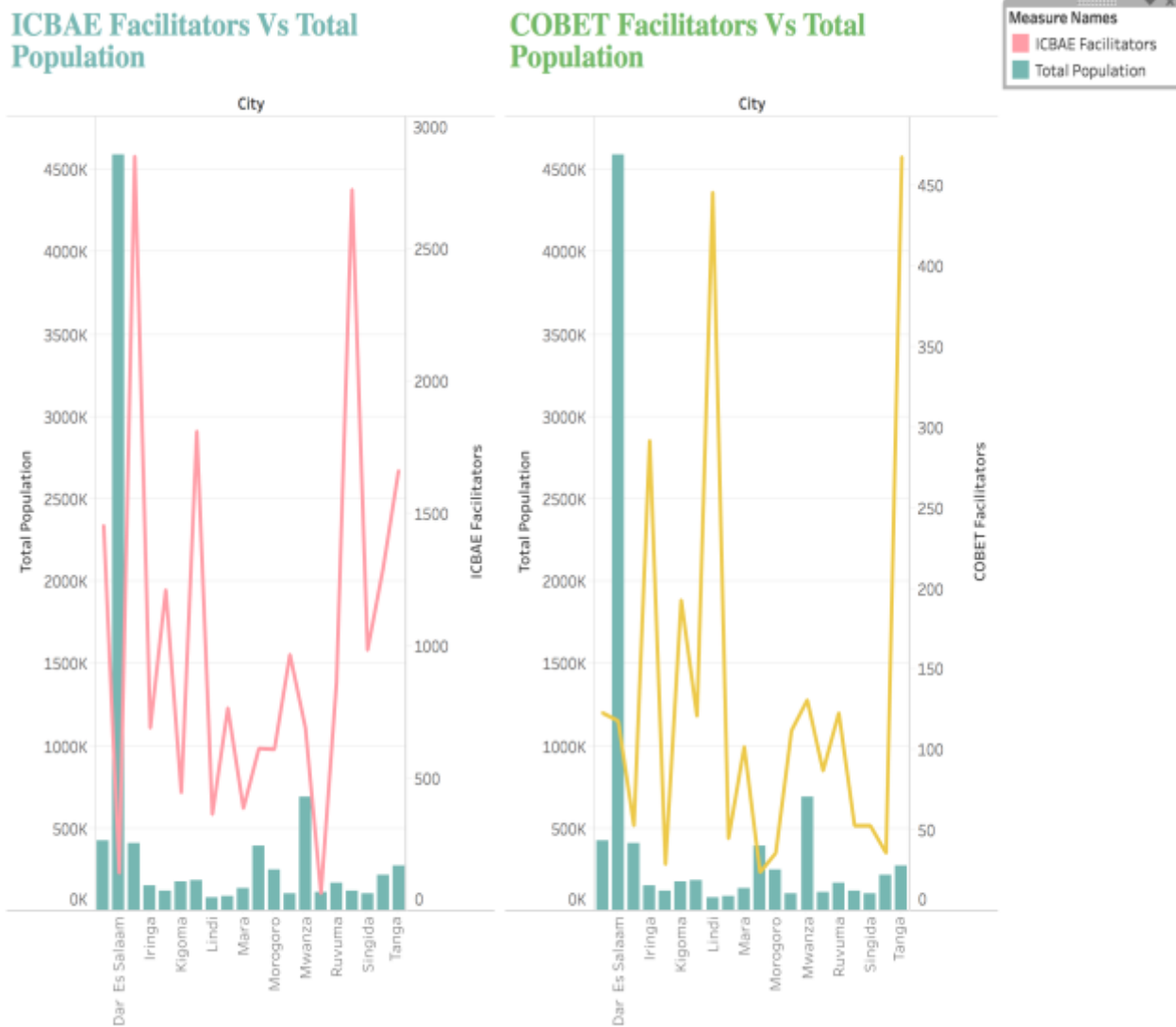


The number of COBET facilitators are less when compared to ICABE. Tanga is the region with more number of COBET facilitators. Dar es Salaam region needs more COBET facilitators as ICBAE. The number of COBET facilitators in Arusha and Dar es Salaam are almost same. Though Mbeya is the region with fewer COBET facilitators, the population of Mbeya is also less. So, this not impacts on the education.

COBET Facilitators Vs Total Population

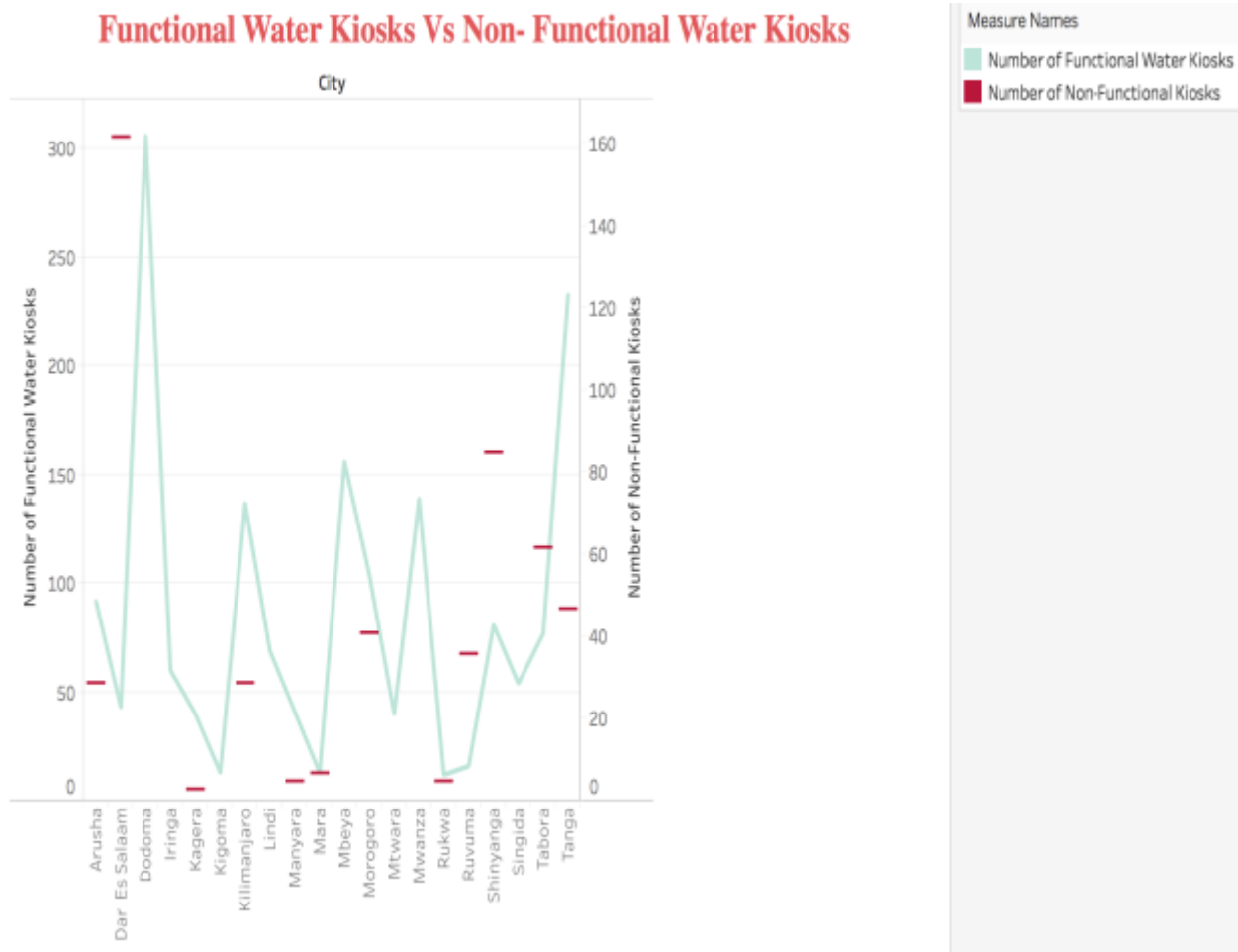


The figure below is a dashboard that shows the proportion of the population to COBET and ICABE facilitators. The number of ICABE facilitators is more when compared to COBET. In the region of Dar es Salaam, the COBET facilitators are more. But when compared to the total population all the regions need more facilitators.



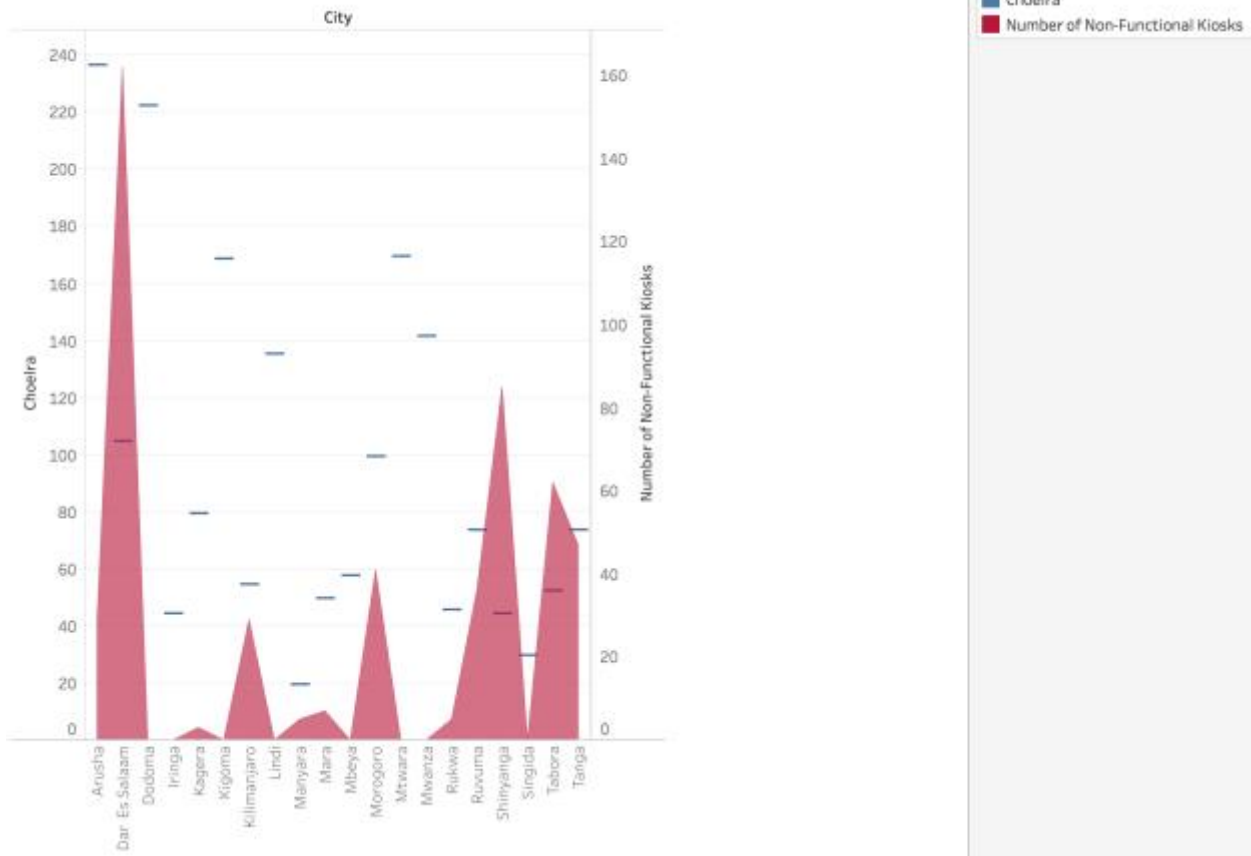
3) How can tableau be used to create a dashboard of water coverage, diseases rates and education in the region of Tanzania?

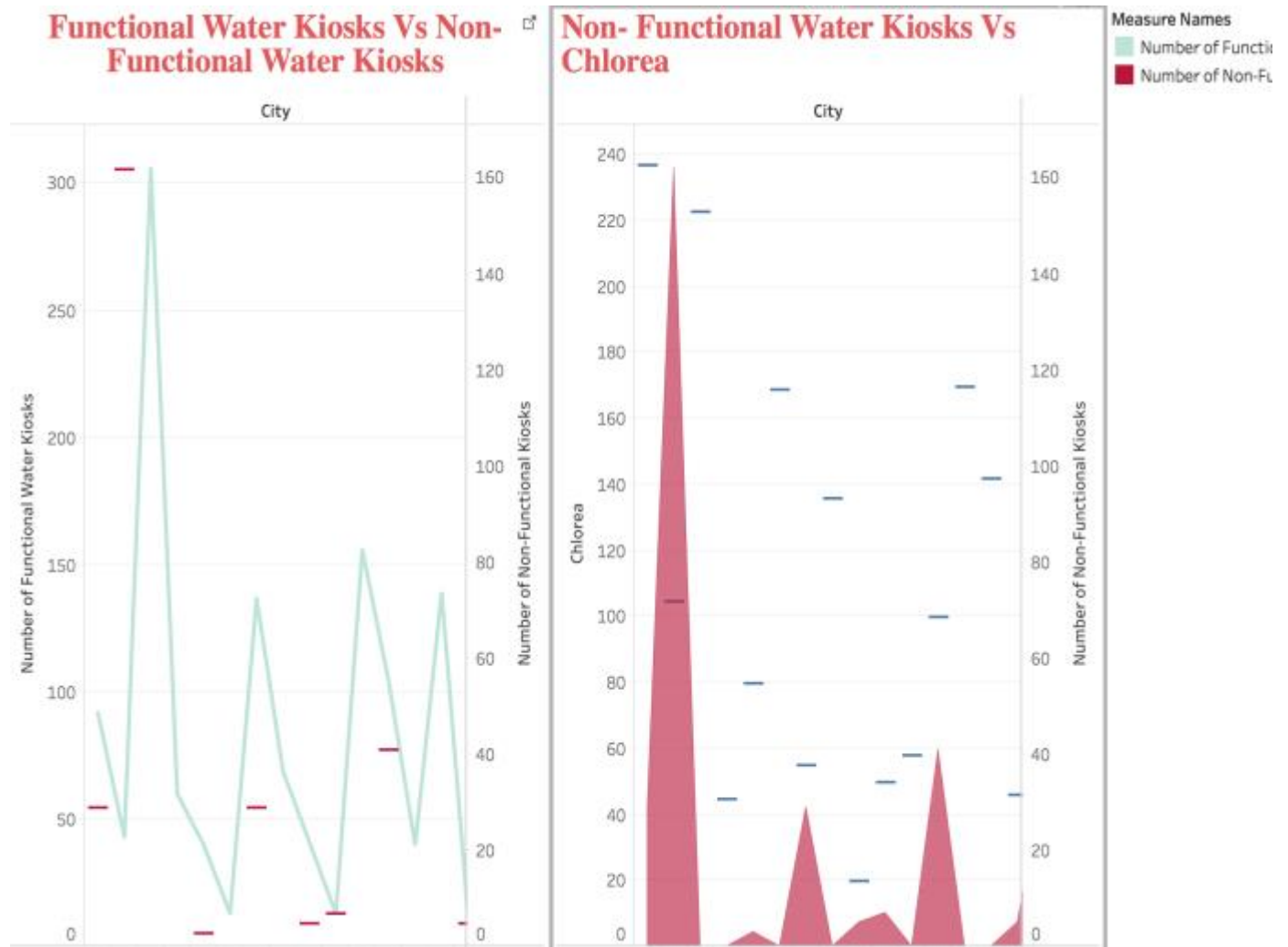
The number of non-functional kiosks is more most of the regions. Dodoma is the region with highest of 306 functional kiosks and Rukwa is the lowest with only 12 functional kiosks. Dar es Salaam is the region with 162 non-functional kiosks and kagera region has only 3 nonfunctional kiosks. The water coverage mainly infects the people. In Arusha region, most of the kiosks are not functional causing factor for cholera.



Cholera mainly occurs due to poor water facilities. The people in Arusha region are mostly affected due to cholera. A total of 237 people was died in Arusha region in the year 2013 due to cholera. The non-functional kiosks are more in Dar es Salaam region and 162 deaths are due to cholera. Thus, water coverage is the main cause of cholera. Cholera outbreak occurred in the year 2016 in most of the populated regions of Tanzania. The cholera death cases were decreased from the year 2012 to 2013. The non-functional kiosks were repaired and thus there was decrease in cholera death cases

Non- Functional Water Kiosks Vs Cholera



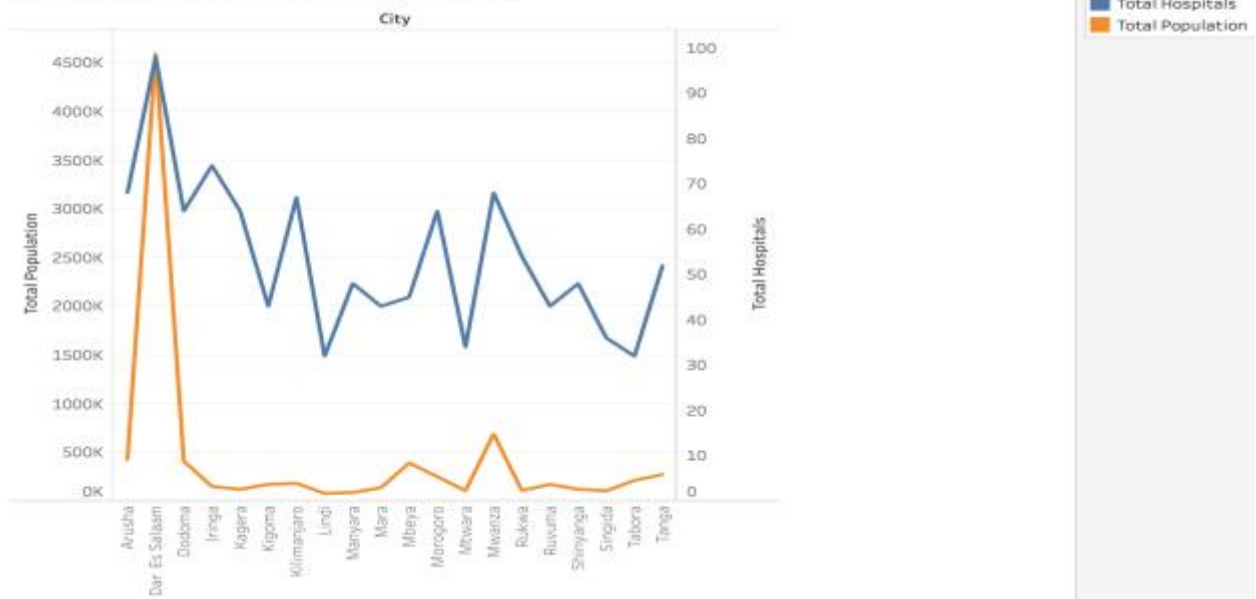


The dashboard above explains how the water coverage was correlated to cholera and the regions that are mainly affected with cholera. It shows the data of various regions of Tanzania’s with functional and non-functional kiosks and the number of death due to cholera. The non-functional kiosks are represented in the red color and the death due to cholera are shown in blue color.

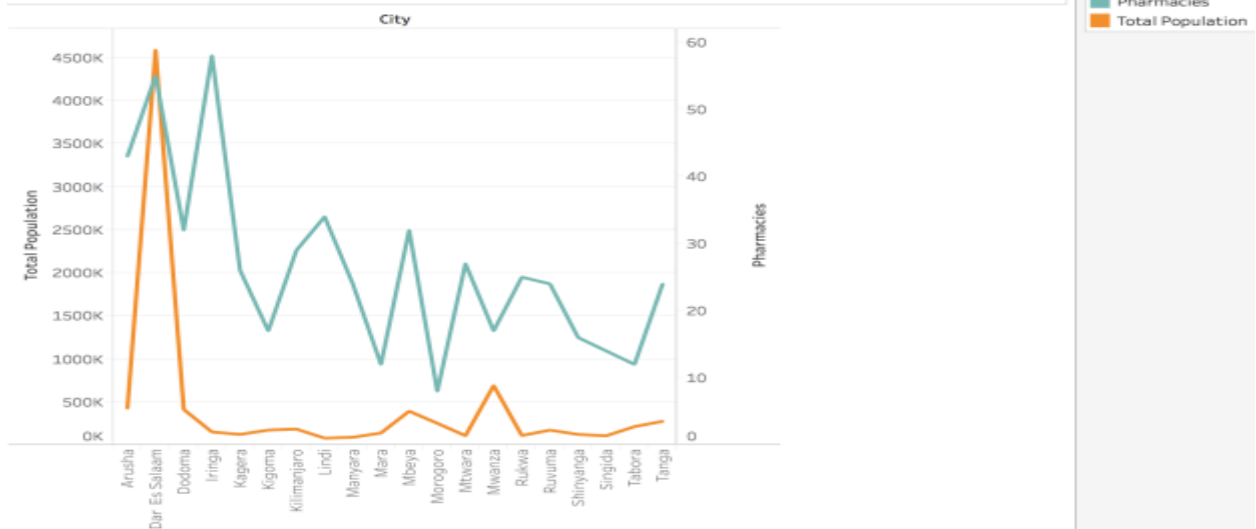
4) How does disease rate correlate with the availability of hospitals and pharmacies in Tanzania?

The images below represent the total number of hospitals and pharmacies to the total population. Dar es Salaam has more hospitals and pharmacies when compared to other regions of Tanzania.

Total Population Vs Total Hospitals



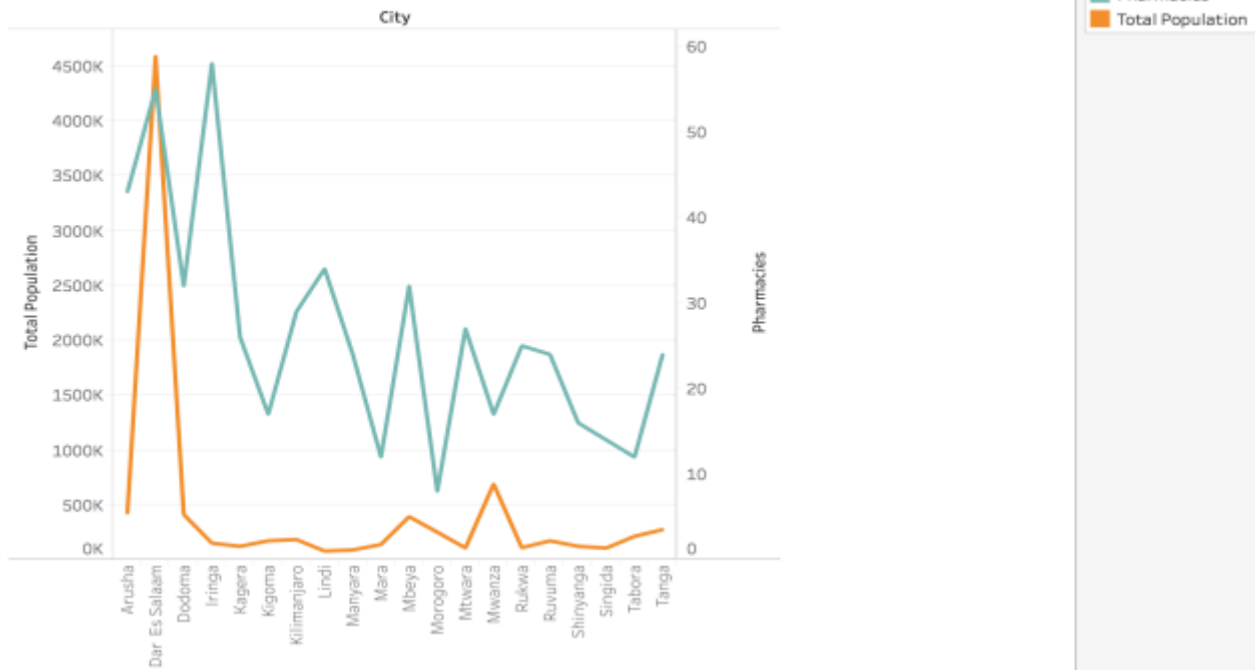
Total Poulation Vs pharmacies



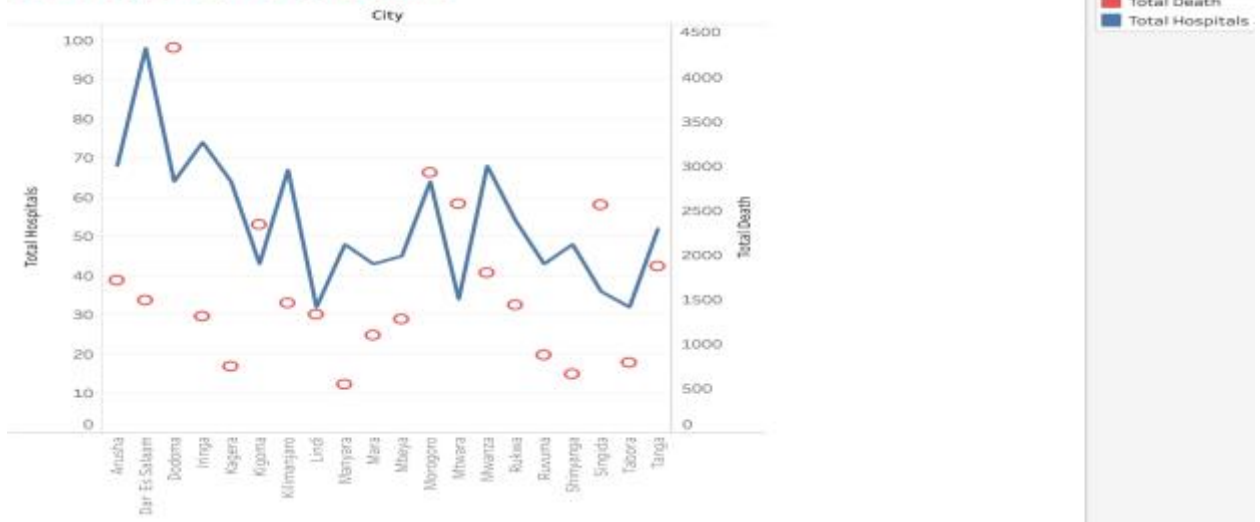
The death is more in all regions as the availability of hospitals and pharmacies is less.

The death rate has been increased due to the lack of proper facilities in the hospitals.

Total Poulation Vs pharmacies



Total Hospitals Vs Total Death

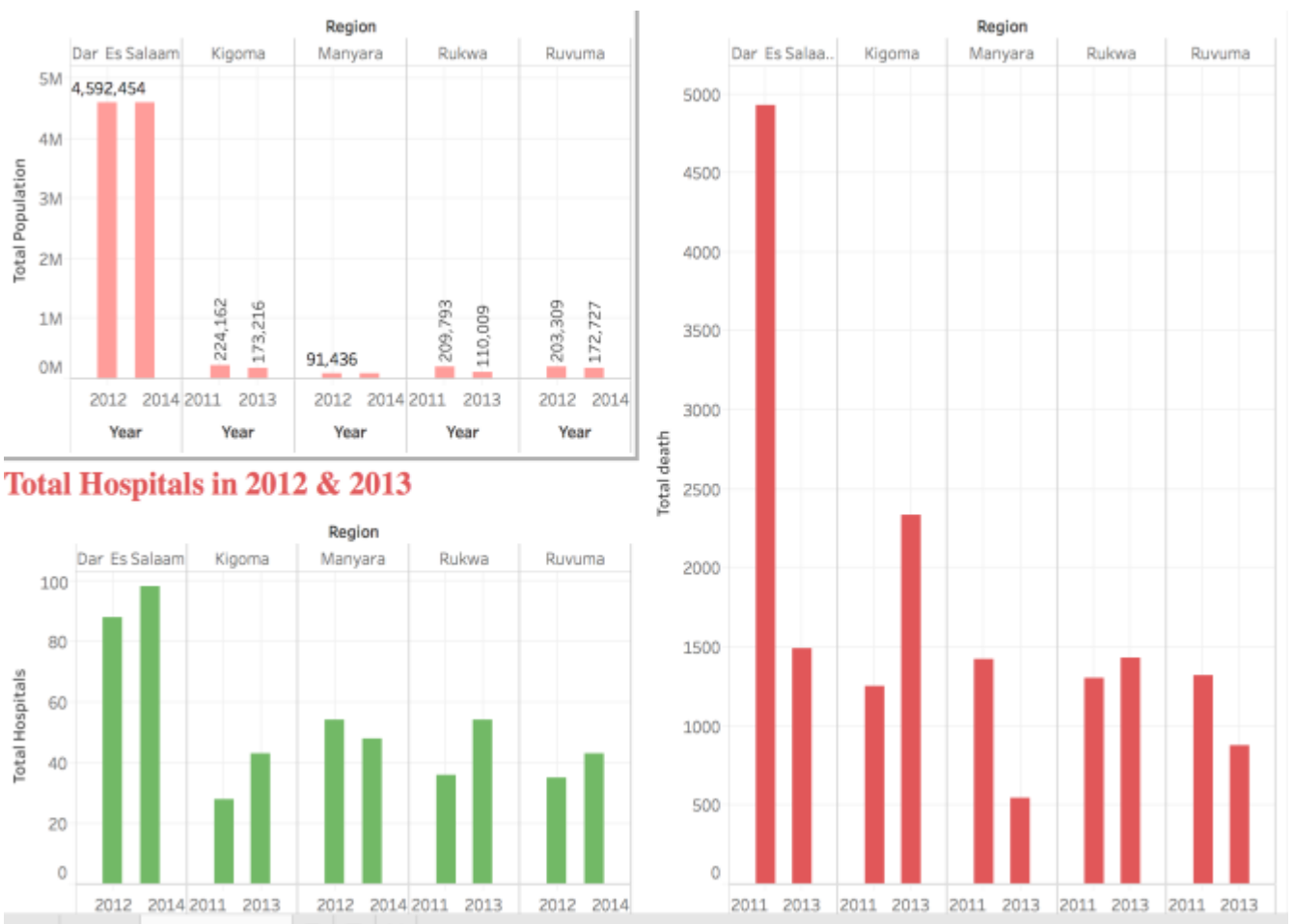




The dashboards above represents the availability of pharmacies and hospitals and the death due to the lack of facilities from the hospitals. The Dodoma is the region with more death rate and fewer hospitals and pharmacies. Thus, availability of hospitals and pharmacies is affecting the death rate on various regions of Tanzania.

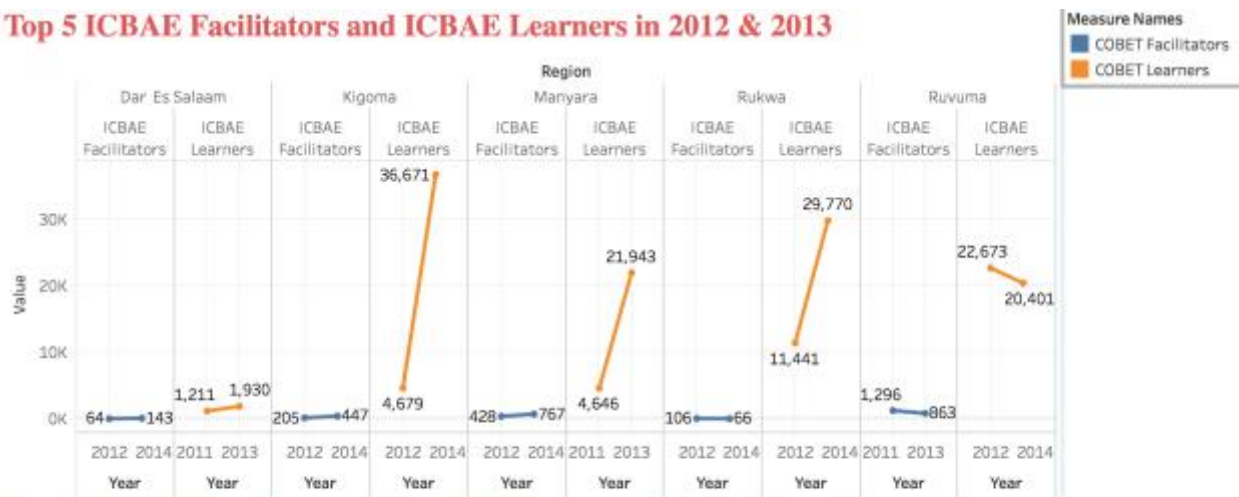
5) Comparison of various factors that affect Tanzania's Death rate for the years 2012 and 2013.

Here I am comparing the top 5 populated regions of Tanzania. In the Dar es Salaam region the population was almost same for the years 2012 and 2013. The death rate was decreased in Dar es Salaam region as the availability of hospitals was increased from 2012 to 2013. Thus, the death rate correlates to the availability of hospitals.

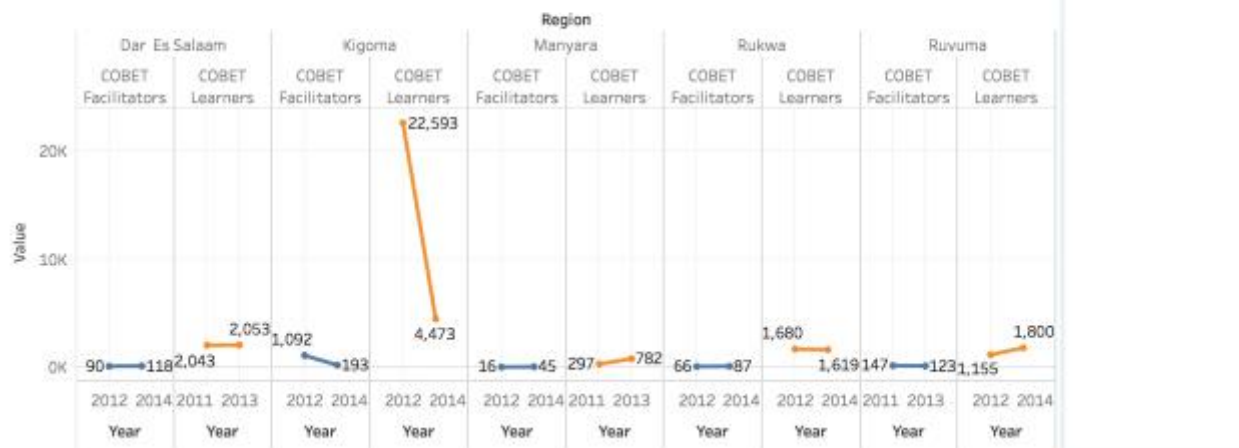


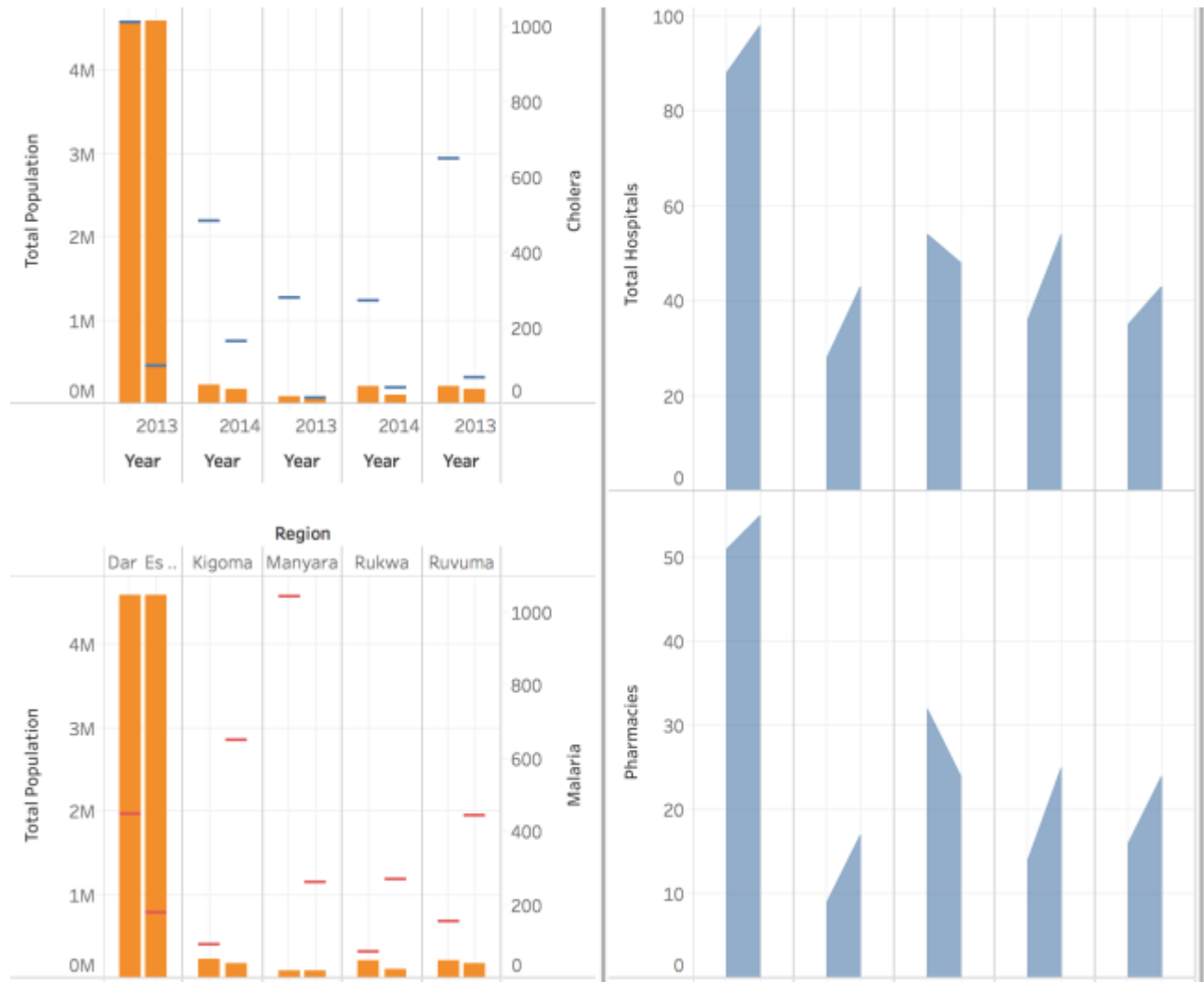
There was an increase in the number of ICBAE and COBET facilitators in almost all regions from 2012 to 2013. The number of COBET learners was greatly decreased in Kigoma region from 2012 to 2013. The COBET learners decreased from 22,593 to 4,473. The COBET and ICABAE facilitators were represented with blue and learners were indicated with orange. Due to the awareness created with the help of these programs, the death rate was decreased and more children started going to schools.

Top 5 ICBAE Facilitators and ICBAE Learners in 2012 & 2013



Top 5 COBET Facilitators and COBET Learners in 2012 & 2013





The number deaths due to cholera and malaria were decreased from the year 2012 to 2013 due to increase in the number of pharmacies and hospitals. In Dar es Salaam region the death due to cholera are decreased randomly as the awareness was created among people about the education and water sanitation methods.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

5.1 Recommendations

Creating dashboards can be tedious sometimes. The following are the

- In tableau, if we hide fields before creating incremental or after creating extract, the fields remain hidden even though and will not be removed physically. At any time, the fields can be unhidden.
- Tableau attempts to preserve the source data's case sensitivity. For example, string comparisons are case insensitive by default in SQL Server where as they are case sensitive in oracle.
- It is essential to confirm whether the disk space of backgrounder is enough or not to store the tableau extracts in a tableau server environment.

5.2 Conclusion

over the last 20 years, 90% of the data has been generated and 2.5 billion GB of new data is generated every day. With the help of data visualization tools like Tableau huge amounts of data can be visualized easily. I think Tableau is one of the best BI tools that helps to visualize data easily. From this project, I gained a lot of knowledge about visualization techniques and at the same time, I came to know how water coverage, education, and hospitals affect the death rate. With the help of tableau, dashboards can be created by correlating all the factors.

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