A brief history of forensic services in Tanzania: Current challenges and mitigation efforts

ABSTRACT

In this article we review the history of forensic science in Tanzania from the British colonial era to post independent Tanzania. We interrogate the objectives and the use of forensic services during the colonial time and how that differs from with the present forensic service in Tanzania. Step-by-step we report and describe how the Tanzania Police Force, as an intelligence service organ, established various scientific investigation sections to cater for the changing forensic demands over time. This article portrays the administration and operational structure of the forensic bureau of the Tanzania Police Force, legal framework, the admissibility of forensic evidence, and provides some relevant examples of present-day forensic challenges and mitigation measures under consideration. Furthermore, we illustrate the problems facing the forensic service of Tanzania by highlighting the most important issues while considering some solutions. In summary, we present the history of scientific criminal investigation in one of the countries of East Africa, illustrating their origin, their current state, and their future. We hope that this article will shed some light on future forensic science for researchers from Tanzania and East Africa in general.

1. Introduction

Endowed with magnificent national parks and rich culture, the United Republic of Tanzania is located on the coast of East Africa. It is surrounded by the great lakes to the west and to the east by the Indian ocean, the magic islands of Unguja and Pemba which make up Zanzibar, and the Comoros Islands [1]. To the north the country is bordered by Kenya and Uganda, to the west by Burundi, Rwanda, and the Democratic Republic of the Congo (See Fig. 3). Tanzania boasts a population of about 55 million people in an area of 945,087 km² [2,3]. The country is made up of people from 120 ethnic groups with different languages and cultures. The national language is Swahili and is the only language that unites these people [4]. Physiographically, the country is characterized by mountains, volcanic highlands, valleys, rivers, and three major lakes namely Lake Victoria, Lake Tanganyika, and Lake Nyasa. Furthermore, the country features some of the greatest wildlife parks such as the majestic Serengeti National Park, mountains such as Mount Kilimanjaro, the tallest on the African continent, and fertile valleys and many mineral-rich areas with diamonds, gold, natural gas, and Tanzanite. The country is also easily accessible by water, air and land transport [2,3]. Due to its beauty, the country attracted the colonists short after the industrial revolution in Europe with intentions to invest in agriculture and extractive mining [5]. After a scramble for Africa by the imperialists, the 1884 Berlin conference finally turned Tanganyika into a German colony. From the 1890s the Germans established the mercantile administrative company in Tanganyika (Deutsche Ost Afrika Gesellschaft), which was a precursor to Germany colonial rule in Tanzania which was met by resistance from many African chiefs. During that time, the country experienced many wars between the Germans and many African chiefs from several ethnic groups [6], who were not ready to be colonized by imperialists. The most intense anti-colonial war was fought from 1905 to 1907. This war is popularly known as the “Majimaji War”. Historians have reported that more than 280,000 people died in the war [7]. Eventually the Germans conquered and ruled Tanganyika [5]. The colonialists’ disputes with each other, going on in Europe and around the world, resulted in the outbreak of World War I in 1914. From 1914 to 1917 Tanganyika witnessed intense German-British fighting, both involving the help of their allies. Finally, the Germans were defeated [8], and the British took over the colony as a Protectorate [9].

The history of the judicial system in Tanzania mainland and Zanzibar can be traced back to the pre-colonial era (1861). The history developed gradually depending on the political and economic organization of the society. The application of forensic science in the administration of justice in Tanzania has not received its proper attention. The account of forensic science in Tanzania is not different from that of other countries where investigative science originated in police departments. After the British ascended to power in Tanganyika in 1914 following the defeat of the Germans at the end of the First World War, various administrative systems were revitalized, and new institutions were established to serve the colonialist and ensure that their empire and rule was maintained. In maintaining colonial power, law and order, the British government established the Police Force in 1919 known as the “Tanganyika Police Force and Prisons Service”. It was officially established on August 25, 1919 with an announcement in the British Government Gazette Vol.1 No.21-2583. The responsibilities of the Police and Prisons Service were to perform police duties, prison duties, national security activities, and conduct judicial and administrative activities in areas where there were no executive officers and district commissioners [10]. It was also responsible for conducting prosecution activities that today are carried out by the Director of Public Prosecution (DPP), and immigration activities in the country now under the Tanzania Immigration Department. All the Criminal investigation and evidence collection work on crime incidents and national security currently carried out by the Tanzania Intelligence and Security Service (TISS), Criminal Investigation...
Department (CID) and Forensic Bureau (FB) during the British rule were carried out by the Tanganyika Police Force in the Directorate of Criminal Investigation [11]. This article aims at providing a brief overview of the development of forensic science in Tanzania. The article would be a useful and interesting addition to the literature as the development of forensic science outside the Northern Hemisphere is not well understood.

2. Scientific Investigations

In Tanzania like many other countries in Africa, the history of Forensic Science and Criminal Investigation Departments (CID) is intertwined with the colonial history of the world. The history of Forensic Investigation in Tanganyika (Mainland Tanzania) began as a Criminal Record Unit in the criminal investigation department during the colonial era in 1954. However, the actual use of forensic science in criminal investigation preceded the establishment of the department. According to Jambo Leo newspaper published in January 1950, fingerprints collection and record keeping of suspects in murder cases, especially those convicted and sentenced to death was introduced in 1948. The first reported case of fingerprinting criminal for record-keeping was that of Mufuruki Komwishwa, who was sentenced to death on October 25, 1948, for the murder of Petro Kasigwa. He was hanged in Bukoba prison on the morning of March 2, 1949. This was followed by the case of Mahiga Mlungu, who was also sentenced to death on November 20, 1948, for the killing of Mshasha Sangan by slicing him with a knife. Mahiga was hanged in Tabora prison on the morning of March 10, 1949. Record-keeping remained a responsibility of prison services because there were no centralized fingerprints databases at that time. In all these cases mentioned above, there is not any report or evidence suggesting how fingerprints were collected or used to support the prosecution of the cases. It should also be noted that all the work of the current ministry of home affairs back then was done by the Police Force whose structural reforms later were subsequently divided from the departments of prisons, immigration and fire brigade [13,14].

On mainland Tanzania fingerprint evidence was first introduced in the judicial procedures and become admissible before the court of law on October 20, 1948, in the murder trial of Milimo Mvwalila. Milimo Mvwalila was a primary suspect in the murder of Munyanondwa binti Semulenga in Dodoma. There was no crime scene report detailing how the incident occurred, where the fingerprints were obtained, and how they were collected. Yet, the records of that time stated that fingerprint evidence was provided by a police sergeant whose name was not mentioned in the police and court documents. The verdict in the case was reached on October 28, 1948, where Milimo was found guilty and sentenced to death. He was hanged in Dodoma prison on the morning of March 12, 1949. In this case history was recorded as it was the first time that scientific evidence was admissible in the court of Tanzania mainland, formerly Tanganyika under the British colonial rule [1].

The idea of setting up a centralized criminal record unit was conceived in 1953 by the then Inspector General of Police (IGP) R.E Fouler as a response to increases in incidence of prisoners and inmates escaping from jails or detention centers. Many suspects or arrested escaped from jails or detention who were re-arrested pleaded not guilty and claimed to have no history of being convicted for any crime [15]. To counter such claims, the British colonial police force introduced a centralized criminal records unit to solve that challenge. One of the most important data on the criminal record database of that time was fingerprints, therefore, a special section responsible for collecting and comparing finger impressions was established. Police documents point out that the Forensic Bureau of Tanzania Police Force was established in 1954, and it was known as the Identification Bureau (IB) with only two sections, namely fingerprint and Criminal record. The fingerprint laboratory was exclusively involved with fingerprint collection, searching, and comparing prints. Later the unit’s roles expanded and currently they include vetting and analysis of fingerprints leading to the identification of criminals, while the criminal record section deals with archiving of all records of convicted criminals with their respective particulars [16].

In 1960 four more sections were introduced, they included the Photographic, Questioned Document, Crime Scene Management and Ballistics. The crime scene section became responsible for processing crime scene evidence including identifying, collecting, preserving, sketching, and transportation of evidence to laboratory facilities. This was introduced due to the rising political struggle for independence which were deemed to be state crimes, especially actions related to political mobilization by the then Tanganyika African National Union (TANU). It was in those days of anti-colonialism and the demand for independence that the ballistic section was set up to control gun ownership for many Tanganyikans in the fears that there might be a coup d’état if the way to peace was to fail in the struggles for independence. Many of TANU members were arrested, charged, and imprisoned; their records were taken in the form of fingerprints and photographs. Unique books like an album were made to store passport-sized pictures of people charged in police stations or imprisoned across the country. Beside those pictures, colonial police placed prisoner’s details including age, tribe, crime committed and date or year of commission in the books. In fact, the then police chief G.S. Wilson discovered that some educated Tanganyikans used letters to exchange information for independence struggle and prepared for possible armed struggle if the peaceful means of securing independence failed. By that time those key players in the struggle for independence were regarded as criminals in the imperialist’s perspectives. This led to the introduction of a forensic document examination section to intercept all types of correspondence to combat the freedom fighters and help in solving other political related cases.

Today, the Questioned Document Laboratory (QDL) of the Forensic Bureau of Tanzania Police Force has evolved, advanced, and modernized to deal with blue-collar crimes including handwriting, signatures, forgery, counterfeits, rubber stamp marks, paper marks, ink analysis and restorations of erased documents in combatting crimes and providing evidence before the court of law. Furthermore, the current ballistics section has developed, and it has become highly specialized. Most of the work conducted in the ballistic section involves examining and identifying firearms and explosives; comparison of bullets, cartridges, and weapons’ serial number restoration in combating armed crimes. Furthermore, major changes have been introduced in the photo-section and it is currently responsible for scene photography, video and voice analysis, photographic examination, and motor vehicle number restorations.

In 2005 six new sections were introduced. They included the Chemistry, Biology/DNA, Toxicology, Trace Evidence, Pathology, and Cybercrime. It was during that period that the name Identification Bureau (IB) was officially renamed to Forensic Bureau (FB) after major improvements were made to add new sections of the IB. The upgraded FB laboratory was officially launched on April 23, 2005 by the then President of the United Republic of Tanzania, the late Benjamin Mkapa. In the 2000s, mobile phone companies in Tanzania introduced banking systems such as Tigo-Pesa and M-Pesa. At the same time cybercrime became so rampant that a cybercrime section was introduced with intent to collect all electronic and computer-related evidence in cybercrimes. The three units of biology, chemistry, and toxicology, which are currently working in collaboration with the State’s Chief Chemist’s Laboratory, were also equipped with state-of-the-art equipment and highly trained experts. These units have been certified to run any analyses due to non-compliance associated with the general infrastructure. Currently, these sections work to collect forensic evidence samples and send them to the State’s Chief Chemist’s Laboratory for analyses. They are essentially specialized units for the collection of the different forms of evidence before submission to the Government Chemist Laboratory. The chemistry and toxicology sections were introduced purposely to deal with analysis of drugs, sometime urine, and blood to determine presence of drugs or toxic substances in the body of
the suspect or victims of crimes. Considering that Tanzania is the main gateway to the East African Indian Ocean commercially and its porosity, many criminals have taken advantage of the current state and they use it to smuggle drugs. Due to the rapid increase in the illicit drug trade in the country in 2005 the chemistry and toxicology section was set up specifically to address the problem. The biology section operates on DNA sample collection and analyses of different biological samples in cases such as rape and Disaster Victims Identification (DVI), and many other cases involving genetic testing.

The pathology service section was established to cope with murder cases. It is charged with examining corpses to determine the cause and manner of death in collaboration with Government Hospitals. The unit was then expanded by the introduction of the forensic archaeology and anthropology section in 2016 comprising a junior staff, a detective, and a police officer. The forensic archaeology and anthropology section focuses on establishing the identity of unidentified skeletonized human remains by setting up biological profile; age sex, race, stature and trauma, and skeletal pathologies in most cases (Jilala et al., 2021). The section also deals with recovery, tracing missing persons, ante-mortem data collection and cold case murder investigations (Jilala, 2021) (see Fig. 1).

The structure of the Forensic Bureau of Tanzania is defined in terms of its operating system. Its chief of staff is the Director of Forensic Bureau, who is also the Police Commissioner in charge of Scientific Investigations. The police commissioner is assisted by a staff officer and two other chiefs of the Department of Natural Science and one of documents and cyber-crime. Fig. 2 below illustrates the Department of Natural Science which comprises of the sections of: crime scene; photography and analysis; ballistic; toxicology; DNA/biology; pathology; and anthropology. The Documents and Cyber-crime department includes the sections of criminal records, fingerprints, questioned documents, the Cyber-crime section, printing, and the police gazette. Even though the Forensic Bureau of Tanzania is under the control of the Police Force, it has a mixed staff of civilians and police officers, and it also collaborates with other civil society organizations in its performance of functions. It collaborates with universities and other governmental and non-governmental institutions such as the Office of the Chief Government Chemist. Through staff within the Police Force, this laboratory operates nationwide to collect samples from the Districts through the Regions up to the Central Investigation Laboratory located in Dar es Salaam. This laboratory operates nationwide to collect samples from the Districts through the Regions up to the Central Investigation Laboratory located in Dar es Salaam. Therefore, in every Region and District with Police offices, a special Forensic Bureau section has been established to collect evidence. The office transports the samples collected for examination to the Central Laboratory in Dar es Salaam under the chain of custody and all other standards for collecting various investigative samples. In July 2018, FB was officially formalized as the new Directorate and moved from the Directorate of Criminal Investigation (DCI). Since then, the FB directorate has been an independent commission to conduct its investigative activities within the Police Force under Police Commissioner (CP), Shaban Mrai Hikki (CP) who is currently the Director of Forensic Bureau.

The Forensic Bureau Laboratory is also home to the Police Gazette which is heavily involved in reporting on the activities of the Police Force including forensic services, missing, and wanted persons. It is in this gazette all wanted people are reported. First, there is a list of people the Tanzania Police Force and INTERPOL are looking for who have committed crimes within and outside Tanzania. The second group is those who their loved ones want after they were reported missing for non-crime reasons at police stations in the country. For example, disappeared school children due to mishap. The gazette also works to collect and publish information on found and unclaimed properties for investigation purposes. Another unit within the Forensic Bureau is the Printing unit, which deals with the production of various Police Forms and Registers, including forms used in Forensic Laboratory investigation purposes.

Fig. 3. The Map of Tanzania.

The Government Chemist Laboratory Authority (GCLA) was established under the Government Chemist Laboratory Authority Act No. 8 of 2016. The GCLA Act establishes the Authority as the supreme and referral laboratory on all matters connected to forensic science and DNA service area, product quality and chemicals control., This was an important attempt to curb various crimes taking place in the country, especially those involving the use of chemicals as weapons in assaulting people. In addition, the service of genetic testing is a very important tool in supporting many cases that are being prosecuted in the country and the issue of disaster victim identification. The FB Scientific Investigation has co-operative relationships with other Institutions in particular the Government Chief Government Chemist Laboratory, Health authorities.

Fig. 1. An Assistant Inspector of Police Wilson Jilala holding a human cranium and explaining morphological traits for forensic identification to the Inspector General of Police Simon Sirro in the Forensic Bureau of Tanzania Police Force.
especially Hospitals that provide Forensic Medicine and Universities
where many specialists are located, and various studies are conducted
on the forensic service of Tanzania. The government financially supports
all criminal investigations, the police send diagnostic samples to the
relevant trustworthy agencies, these agencies conduct analyses and in-
vestigations where all costs are covered by the government and pay-
ments are made directly to the service provider. There has never been
any complaint of unpaid investigators because they are all attached to
the institutions that manage them to get their compensations on time. In
general, the relationships between the FB and other institutions are
good. Some institutions have signed a memorandum of understanding
for cooperation with FB to further improve the relationship and service
provision between the institutions.

3. Legal framework

The Forensic Bureau operates in accordance with the following
Regulatory frameworks:

a) The first regulatory framework is: Tanzania Criminal Procedure Act
   CAP. 20 [RE 2002], which regulates the Power to prepare reports by
   the Government analyst, Fingerprint experts and handwriting ex-
   perts [17].

b) The second regulatory framework is: The Tanzania Police Force and
   Auxiliary Service Act CAP 322 [RE: 2002]. This Act established the
   Tanzania Police Force to perform the following duties: preservation
   of peace, maintenance of law and order, prevention and detection of
   crime, the apprehension and guarding of offenders, and protection
   of property; and for the performance of all such duties and shall be
   entitled to carry arms [18].

c) The third Regulatory Framework is the: Tanzania Evidence Act CAP
   6 [RE 2002]. This law acknowledges the use of expert opinions and
   so do Forensic Bureau experts [19].

d) The fourth Regulatory Framework is the: Tanzania Cyber Crime Act
   No. 14 of 2015. This Act empowers Police Officers to conduct search
   and seizure of computer system and an application to the court for an
   order to authorize the use of forensic tools [20].

e) The fifth Regulatory Framework is the: Tanzania Drug Control and
   Enforcement Act of 2015, a legislative rules for efficient and effective
   control of Narcotic drugs and psychotropic substances; provide for
   the establishment of the Drug Control and Enforcement Authority for
   the prevention and control of drug trafficking; to repeal the Drug and

---

**Fig. 2. Shows the administrative and operational structure of the forensic bureau of Tanzania police force from the district, regional to national level.**
f) Government Chemist Laboratory Authority Act No. 8 of 2016. An Act that provides for the establishment of the government laboratory agency and its power and function; and to provide for matters related to forensic services [22].

g) The Human DNA Regulation Act of 2009 (Act No.8 of 2009). This is an Act to offer guidelines for the administration and bylaw of sample collection, packing, transportation, storage, analysis, and disposal of sample for Human DNA; disclosure of genetic data and research on Human DNA and to be responsible for associated matters [23].

Another principle, which guides the Forensic Bureau of Tanzania Police Force, is the code of conduct “Police General Order” (PGO). This order governs the Forensic Bureau to work and perform its responsibilities within the boundaries of the Tanzania Police Force. It regulates forensic activities from the management of crime scene; investigation of exhibits, proper chain of custody, identification of convicted person and issuing of Clearance Certificate for those with no previous conviction. Also, it acknowledges the role of the Government Analyst and the Pathologist.
4. Admissibility of forensic evidence

It is well known that in any country governed by the rule of law, the Law of evidence is the guideline that decides which evidence should be presented in court, and which evidence to be received or rejected. The Tanzania Evidence Act 1967 revised as Evidence Act, Cap. 6 R.E of 2019 and the definitions of the Penal Code Cap .16, R.E of 2019 dictate all evidence ranging from burden of proof, admissibility, relevance, weight, and sufficient forensic evidence that should be admitted into the record of legal proceeding to both civil and criminal proceedings. Scientific evidence in Tanzania is referred to by various names as expert evidence or witness and referred to as expert opinion or scientific observation in some references. According to Section 47 of the Tanzania Evidence Act such expert evidence may be photographer, medical personnel or pathologist, ballistic expert, forensic anthropologist, fingerprint expert, toxicologist, artist, cyber and computer scientist, DNA evidence or any scientific examination test from a legally recognized institution. So, generally scientific evidence is admissible before the court of law only if the criteria and conditions for collection, chain of custody and analysis are compliant.

5. Contemporary challenges and mitigation measures

In practice, the forensic discipline in Tanzania has encountered many challenges such as Disparities in the Forensic Science Community, Lack of Mandatory Standardization, Certification, and Accreditation, the broad range of Forensic Science disciplines, lack of expert, mishandling and misinterpretation of Forensic Evidence, lack of forensic infrastructure, lack of advanced equipment for analysis of samples, and lack of sound policies. For so many years Tanzania has had numerous numbers of forensic related issues that went unnoticed due to lack of enough experts assisting in professional investigation, analysis, and reporting. Various cases that required forensic attention had been reported in wildlife, banking institutions, media industry, academia, and many other numerous sectors. Below are few examples of cases that required forensic expertise:

i. On May 21, 1996, Lake Victoria passenger ship 'M V Bukoba' capsized 30 minutes before reaching Mwanza port. About 700 passengers onboard were reported dead in that tragedy, only 53 people survived. The rescue team from Tanzania, South Africa, Kenya, and Zanzibar tried to search for the drowned bodies, but their efforts were halted by the rate of decomposing bodies from the wreck, which posed a health hazard to the divers. As a result, only 392 bodies out of 700 reported were recovered from the tragedy. Such a decision solely based on a public health justification would not professionally be acceptable today. Due to lack of enough forensic experts for quick identification of the decomposed bodies beyond recognition, the government was forced to order a mass burial at Igomawanza to avoid any possible outbreak of public health hazards. The bereaved families, friends, and the community missed an opportunity to provide their last respect to their loved ones [24]. The Forensic Bureau of Tanzania Police Force, University of Dodoma, Archaeology Department at the University of Dar es Salaam and its collaborators still believe that the state sanctioned mass burial could be re-excavated in the future and the comingsleeves remains properly identified using modern DNA techniques like that were used in Spain and Chile, and proper final rest to the victims of the accident provided where families could have a closure. This could be achieved in collaboration with living family members if they will demand closure to the loss of their loved ones, the community particularly with the encouragement of religious leaders, the Government Chemist Laboratory Authority with its current DNA lab, the Forensic Bureau with its newly established laboratories, and many various government and non-government institutions.

The University of Dodoma has established a forensic field school system that could be mobilized to provide training in exhumation procedures and human remain identification to those involved in re-excavation and proper burial of victims of mass disaster in mass graves in the country.

ii. Dar es Salaam being the focal point for African colonial liberation has several cemeteries interning war fighters from different parts of Africa. It is estimated that Dar es Salaam War Cemetery contains 1764 Commonwealth burials of the First World War with 60 unidentified burials. Furthermore, reports indicate that there are 112 war graves of non-commonwealth nationals in Dar see Salaam. The cemeteries are well spread in other parts of Tanzania including the Solomon Mahlangu campus of Mazimbu (Morogoro) which housed ANC freedom fighters during the apartheid regime in South Africa. South Africa through its well-established forensic services bureau, has conducted several projects re-excavating remains of the bodies of their war fighters from different regions both within the country and outside. Attempts to move the Solomon Mahlangu campus of Mazimbu (Morogoro) cemetery to South Africa have been in the pipeline since 2014, however, due to lack of well-established excavation procedures, policies and forensic experts, this effort has been futile [24]. Such a move requires well established forensic institutions with experts who can assist with the identification of the remains. The University of Dodoma has seen this as an available opportunity to render forensic services across the borders of Tanzania and is currently establishing working-relationships with other institutions in Africa, Europe, and the US.

iii. Wildlife trafficking and poaching has been a critical problem in Tanzania and many parts of Africa threatening wildlife populations such as elephants, giraffe, rhino, primates such as baboons, corals, and shells as trophies. The management and protection of wildlife is said to be hindered by widespread corruption between the managers and the poachers. Bringing the illegal poachers and a consequent conviction of offenders is reported to the riddled with difficulties in collecting evidence, lack of forensic experts and flaws in the criminal justice system [11, 24]. The recent case of the death of “FARU JOHN” in Tanzania was the first wildlife forensic case that exposed many technical problems and demonstrated the inadequate forensic resources and expertise needed in forensic identification. The investigation of the death of Faru John involved genetic analysis of multiple samples acquired from the carcass, bones, horns, blood, skin, and dried stool which could not be analyzed within the country. Instead, the University of Pretoria, South Africa, laboratories were used for the analyses under the supervision of a team of experts from the Office of the Chief Government Chemist in Tanzania [15]. If at all there were well-established centers in Tanzania, the identification could have been done within the country, and this could have saved the nation such needed funds. Forensic wildlife barcode databases can be used to track all endangered animals within Tanzania’s National Parks and Game Reserves. So, the chief government chemist is already working on it by setting up a specialized laboratory to address wildlife genetic barcoding.

iv. With the growing technological advancement in Information and Communication Technology (ICT) the world has experienced robust changes technically. Logically, the changes have shown both positive and negative consequences in information management and human resources development. In Tanzania, like many parts of the developing world, the adoption of computer technology has been a driving force for many sectors, however, it has equally exposed major risks from emerging threats with cyber-attacks costing many institutions each year. This has resulted in a call for a need to establish a strong and robust cyber-forensic section in Tanzania. Great efforts have been made by the police force to
encourage more institutions that use online systems to be aware of cyber criminals and develop data protection plans and to ensure that they employ cyber and digital forensic experts who meet the criteria to work in the country to assist in the fight against crime [25]. Most cases of online money laundering are controlled, the method used is to ensure that all people who use these mobile electronic transfer services for sending and receiving money are registered in a special electronic system that recognizes all users.

v. Illicit drug use cases have been a chronic problem in Tanzania for so many years. The government of Tanzania has initiated a war against the businesses and the use of illicit drugs. However, the efforts have not been so successful, they have not been able to curb the use and trading in illicit drugs particularly in producing substantial evidence required in courts. Lack of certified forensic professionals has led to cases being thrown out due to lack of sound scientific evidence that can help to convict or acquit the culprits. The government has set up a special Anti-Drug Commission in the country which is an independent commission with full powers to investigate and prosecute those suspected in engaging in the illicit drug trade and has been adding to its police special training guidelines on how to deal effectively with drugs. Most of all it has enhanced the capacity of the state’s chief chemist in forensic chemistry and toxicology and has made it easier for experts to produce evidence in court using scientific evidence. The budget to support forensic chemistry and toxicology has increased tremendously, including special allowances for anti-drug forces.

vi. Rape is another area that has been facing a huge challenge due to lack of well-established forensic DNA system in Tanzania. Besides the efforts made by the government and NGOs in gender-based violence awareness, the prosecution of sexual violence crimes is still difficult due to improper evidence collection, analysis, and interpretation of the results to secure any conviction for rapes. There have been several rape cases reported in Tanzania, women are raped and strangled to death but most of the criminals are going free due to lack of forensic DNA that could tie them to the victim or crime scene. To address this challenge the government has set up a special desk for cases of sexual and especially sexual harassment in the country. It has also provided them with specialized equipment as well as training on how to better collect forensic DNA evidence in cases of sexual assaults. Many police officers now can collect body fluids, fibers, fingerprints, and even other circumstantial evidence that tie suspects to the crime by filing charges against criminals. More and more doctors in various parts of the country have been empowered to perform forensic pathology especially on rape cases and incidents of sexual assaults. Still more work is needed to combat this problem that is still rampant in the society.

vii. Tanzania has experienced acid attack events in recent years, however the evidence on the culprits has heavily relied on circumstantial evidence. This has in many cases resulted in the conviction of wrong persons. However, with expertise of forensics sciences, these crime events will be solved in the future, and the real perpetrators of crimes will be convicted. The government has reviewed and improved the import and export control law by enacting other sub-laws to increase efficiency and to address the current challenges. Even more is the effective use of Forensic chemistry in the identification of various chemicals that have been detected to harm human life or the environment and other living organisms. The state’s chief chemist’s laboratory has been operating quite efficiently in the area.

viii Management and protection of natural resources has been an area of public interest in Tanzania in the recent years. The resources were initially viewed with very little interest in the past due to lack of proper understanding on the real wealth and a crucial role they play in the future development of the country. The government has made some efforts of combat illegal trafficking and looting of natural resources. Historically, the war on protection of natural resources has taken a big step with big industries taking responsibilities for their illegal trafficking of enormous number of natural resources out of the countries natural reserves. With the strict supervision and regulation of natural resources, natural resource forensic measures are highly needed to expedite and eliminate the possible escape from the crimes against the natural resources.

6. Conclusion

Generally, the biggest challenge facing Tanzania’s forensic science services is lack of access to its own accreditation services to help forensic units meet local and international accreditation standards. Thus the Laboratories avoid providing services that are not accredited because its credibility becomes questionable and often not accepted in Court. This has led to many laboratories not being able to provide services, and not being ISO compliant and accredited. Many laboratories located in universities and other government and non-government institutions can provide forensic services if they are approved, empowered, and provided with accreditation. There is also a need for forensic services to be deployed in all regions and districts by establishing forensic units in relevant areas. At present all forensic services are provided in Dar es Salaam in the laboratories of the Tanzania Police Force and the Government Chemist Laboratory Authority (GCLA) (see Fig. 3). Furthermore, other forensic fields have very few experts, for example forensic pathology, archaeology, anthropology, chemistry, toxicology, molecular genetics and ballistics. The only fastest growing forensic area in Tanzania is forensic cyberspace and digital informatics because these fields of studies have been established at the University of Dodoma. Therefore, it has become very easy for Tanzanian students to enroll in such programs because they are affordable and are offered in the country where school fees are cheaper when compared to similar courses offered abroad. Forensic studies have also been unattractive to many people since employment is also limited. Some forensic science fields have not been widely used in the fight against crimes, and this perhaps is due to the lack of support or recognition as new and emerging professions. It is best to use community engagement policing techniques to educate the Tanzanian public on the various uses of scientific evidence in the fight against crimes and especially in criminal cases. At present, forensic fingerprints and documents evidence provided by the Forensic Bureau of Tanzania Police Force are the leading ones in that most scientific witnesses are presented in court, followed by DNA and illicit drug experts in many cases. Another issue is that forensic science has been used only when there is more serious crime than in small incidents, which makes this profession less visible to most people and its services remain accessible by very few people as well.

Conflicts of interest

In this article there is no any conflict of interest.

Acknowledgements

The authors would like to thank the three anonymous reviewers and their constructive and encouraging comments and suggestions. Furthermore, we would like to thank the Tanzania Police Force, particularly the Commissioner of the Forensic Bureau and his team for providing us with some archived material from the colonial era. We are indebted to Prof. Charles Musiba at the University of Colorado Denver for his encouragements, constructive comments and time spent editing our manuscript. Special thanks to Dr. Isaac Onoka of the Department of Chemistry at the University of Dodoma for his comments that helped improve this article. We are also grateful to the National Museum of
Tanzania Library for affording us access to some archived newspapers and other relevant colonial documents. Lastly, we would also like to thank the University of Dodoma’s School of Natural Sciences and mathematics for supporting and allowing one of us (WJ) to run the archaeology forensic field school program.

References

[1] Leo Jambo, Jambo Leo. Dar Es Salaam : Tanganyika, 1948.
[2] National bureau of statistics, National Population Projections. Dar es Salaam 1 (2018) 1.
[3] Tanzanias, JAMHURI YA MUUNGANO WA. Katiba Ya Jamhuri Ya Muungano Wa Tanganyika, Dar Es Salaam, 1977 s.n.
[4] O.H.N. Iliffe, Tanganyika under German Rule. London, Cambridge University Press, 1969.
[5] R. Moyo Michelle, The Organization of the Maji Maji Rebellion, Cambridge University Press, 2009 s.l.
[6] R. Moyo Michelle, Maji maji Uprising (1905–1907), s.l, https://doi.org/10.1002/9781444338252.wbeow381, 2011.
[7] Anne Samson, The end of the 1914-1918 war in Africa. s.l : Anglica an international, J. Engl. Stud. (2018), https://doi.org/10.7311/086o-5734.27.3.05.
[8] Moses Ochonu, African colonial Economies: land, labor, and livelihoods. s.l, 11/2, History Compass (2013) 91–103, 10.1111/hic3.12031, 2013.
[9] Said Mwema, Jeshi la Polisi Tanzania: Kutoka Ukoloni Hadi Uhuru 2006, dar es salaam : tanzania police force (2006).
[10] Rashid Jonh, Forensic Scientist. [interv.] Wilson Jilala, january 10, 2021.
[11] Leo Jumbo, Leo, Dar Es Salaam : Tanganyika, June 1949.
[12] Leo Jumbo, Leo, Dar Es Salaam : Tanganyika, January 1955.
[13] Juma Shabani, Retired Police Officer. [interv.] Wilson Jilala, January 18, 2021.

Wilson Jilala

Forensic Anthropology Section, Forensic Bureau, Tanzania Police Force, P.O Box 9094, Dar es Salaam, Tanzania

Noel Lwoga

National Museum of Tanzania, Shaban Robert Street, PO Box 511. City, Dar es Salaam, Tanzania

* Corresponding author.

E-mail address: jilalawilson@gmail.com (W. Jilala).