PRESERVATION AND CONSERVATION PRACTICES AT KENYA NATIONAL ARCHIVES AND DOCUMENTATION SERVICE

BY

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DEDICATION

This work is dedicated to my family.Thank you for your support, encouragement, love and understanding.

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ABSTRACT

Kenya National Archives and Documentation Service as the official custodian of public archives has a responsibility to acquire and preserve public archives and make them accessible to users.The public archives form a valuable part of Kenya's documentary heritage and preservation which involves conservation is the means by which their survival is ensured for enduring access.However, it has been observed that some of the archives when acquired are already old and in poor condition while most of the archives which are acquired in good condition deteriorate when in the custody of KNADS due to ineffective preservation and conservation practices. The aim of this study was to assess the preservation and conservation practices at KNADS with a view to developing a strategy for promoting a systematic approach to preservation and conservation of archival materials for long-term usability.The specific objectives of the study were to: establish the diversity of archival materials and their formats at KNADS; establish the effectiveness of preservation and conservation practices at KNADS; determine appropriateness of methods and tools for preservation and conservation at KNADS; identify challenges encountered in preservation and conservation of archival materials at KNADS andPropose a strategy for promoting a systematic approach to preservation and conservation at KNADS. The study was informed by the delta plan model of preventive conservation and the simple property-oriented threat model for risk assessment.The study employed descriptive research design and adopted a qualitative approach with purposive sampling technique being used to identify respondents. Data was collected from a sample size of 45 respondents using interview method and observation as data collection methods.Data analysis was done and presented descriptively using descriptions and explanations in form of text. The findings of the study were that: KNADS collection comprised of a diversity of archival materials in various formats; preservation and conservation practices were insufficient and inadequate leading to deterioration of archival materials; preservation and conservation infrastructure was inadequate and inappropriate. This was mainly attributed to inadequate funding which contributed significantly to lack of important and crucial resources.The study concluded that preservation and conservation practices at KNADS were not effective in protecting archival materials for enduring access. The study recommends that KNADS should: seek for adequate funding; modernize the conservation section; establish best practice standards; undertake annual stocktaking and preservation surveys. The study has also developed a strategy, which if adopted by KNADS should improve preservation and conservation of archival materials.

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LIST OF ABBREVIATIONS AND ACRONYMS

KNADS	-	Kenya National Archives and Documentation Service
ICT	-	Information Communication Technology
GOK	-	Government of Kenya
UNESCO	-	United Nations Education, Social and Cultural Organization
NDS	-	National Documentation Service
CD	-	Compact Disk
DVD	-	Digital Versatile Disc
IFLA	-	International Federation of Library Associations
ISO	-	International Organization for Standardization
NARA	-	National Archives and Records Administration

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

Archival institutions are treasure houses of information and knowledge about a country.They are not only of value in studying the past but are also relevant to people's lives as they seek information about their rights. Archives comprise of different collections which include public, private, and corporate that are used by a wide variety of users.They contribute to the greater understanding of anation's history and heritage.

Archivesare collection of historical records as well as the place they are located. Bellardo and Bellardo (1992) define archives as; the 'non-current records' of an organization or institution preserved because of their continuing value; the term 'archival records' or 'archival materials' signifies any physical medium which is employed to transmit information, such as paper, photographs, audio or video tape, computer tapes or disks, among others. The 'agency or program' responsible for selecting, preserving and making availlable archival materials; also referred to as an 'archival agency.'The 'building', or part of a building where such materials are located. Archives, unlike books are unique documents and records. The information they contain are often primary source information that may have been accumulated over the course of an individual's or organization's lifetime as the only evidence of event. Their physical format, order and nature also provide important evidence of the condition and period they were created and used. They are records that have been selected for permanent or long term preservation because of their enduring cultural, historical and evidentiary value. The study and practice of organizing, preserving, and

providing access to information and materials on archives is called *archival science* or *archivy*.

Recordsare information created, received, and maintained as evidence and information by an organization or individual in pursuance of legal obligations or in the transaction of business (ISO 15489-1, 2001). InternationRecords Management Trust (IRMT, 1999) defines a record as a "document regardless of form or medium created, received, mantained and used by an organization (public or private) or an individual in pursuance of legal obligations or in the transaction of business, of which it forms a part or provides evidence." The long treks of records into archives are all attempt to preserve and conserve them because of their enduring value.

The US National Archives and Records Administration (NARA) developed the concept of the records life cycle to model how the function, uses and responsibility for records change as records get old and move from the control of the creator to the physical custody of the archivists. The life cycle or the journey of records to archives passes through three stages: –

The current/active stage. In the first phase of this model called primary use, the documents or records are newly produced or procured and are highly demanded by administrators, managers and individuals;

The semi- current/semi-active stage. As records get old they gradually become less heavily referenced and finally become inactive. This is a stage when the frequency of their demand has reduced or died. At this stage of the model, record managers, and or archivists schedule how the records are arranged for systematic elimination or permanent retention or transfer to the archives.

And *the non current/inactive stages*, a stage when they are no longer being demanded. At this period these documents are appraised and if they are adjudged worthy of permanent preservation, they are transferred to the archives. When they enter the archives, they are physically and intellectually integrated to ensure preservation. These heritage materials are jealously preserved because they are rare, special, may have only a copy and cannot be sold in the market or purchased from vendors or inside bookshops. Therefore, keeping the original materials in good condition is an important aspect of the work of professional librarians, archivists and records managers.

1.2 Background Information on Preservation and Conservation

Preservation and conservation are two related concepts that are used interchangeably by people outside the library, archives and records profession. Though they have the same objectives to achieve, they are two related variables.

ISO (2009) defines preservation as "processes and operations involved in ensuring the technical and intellectual survival of authentic records over time" (ISO, 2009). Harvey defines preservation as "the actions which enable the materials in archives– either physical media themselves or the information they contain– to be retained for as long as they areneeded" (Harvey, 1993). Nottinghamshire Archives (2007) defines preservationas the use of passive non- interventative measures for the protection of an archive through providing appropriate environmental conditions, storage facilities and suitable packaging materials and not by physically altering the fabric of the archive by the use of chemicals or repair techniques.

Conservation on the other hand has been defined as the use of active physical measures to prevent the further deterioration of an archive, i.e using chemicals and

professional repair techniques. Such physical measures are carried out to at least the minimum required and do not alter the integrity of the archive.Thus preservation is the retention and maintenance of materials over time and when applied to archives it encompasses“all managerial and financial considerations including storage and accommodation provision, staffing levels, policies, techniques and methods involved in preserving of archive materials and the information contained therein” as attributed by Mirjam (2001).

Conservation is an aspect of preservation and understanding of the conservation policy and philosophy fit into the broad preservation policy. This is in agreement with Hadgraft (1991) who says that conservation is the active intervention in the repair of items, which are in a deteriorated or degraded condition. In the same line Feather (1991) maintains that conservation is one aspect of preservation activity that normally implies the active use of preventive measures or processes of repair of damaged material, to ensure the continued existence of individual items. Muhammed and Rowshon (2008) says that conservation is the use of chemical and physical procedures in treatment or storage to ensure preservation of books, manuscripts, records and documents.

In appreciating the crucial element of preservation in a records management programme, Millar and Roper defined preservation as “the totality of processes and operations involved in the protection of records and archives against damage or deterioration” (Millar & Roper, 1999). According to Patkus, preservation is about preserving the information content of an item while conservation is about preserving the artifact itself. That is, preservation involves “the activities associated with maintaining library and archival materials for use either in their original physical form

or in some other usable way", while conservation is "the reactive or proactive treatment of materials to strengthen them physically or stabilize them chemically thus sustaining their survival as long as possible in the original form" (Patkus, 2003).

From these definitions the term preservation in this study refers to the totality of processes and operations involved in the stabilization and protection of documents against damage or deterioration and in the treatment of damaged or deteriorated documents and may include the transfer of information from one medium to another (Millar & Roper, 1999) while conservation is the active intervention in the repair of items, which are in a deteriorated or degraded condition (Hadgraft, 1991).

The aim of preservation is to increase the longevity of achival materials through application of intervention measures to protect archives and slow down the deterioration process. Poor storage can encourage moulds, insects, rodents, structural defects and aging of archives and records.

While we are still able to read some written heritage preserved from several thousand years ago, the digital information created merely a decade ago is in serious danger of being lost and thereby create a digital dark age. The US Library of Congress (2003) reported that 44% of the websites available on the internet in 1998 had vanished after one year and has created a stumbling block for preserving digital information.

Through digitization and reformatting, preservation librarians are able to retain materials while at the same time adapting to new methods. In this way librarians, archivists and records managers can adapt to changes in users' needs without changing the quality of the materials. Through preservation efforts, patrons are rest assured that although materials are constantly deteriorating over time, the library itself will remain a stable, reliable environment for information needs.

Preservation and conservation of information resources in the pre-electronic age

Though, modern preservation and conservation as a formal profession in libraries, archives and records management dates back from the twentieth century, its philosophy and practice has its roots in many of the earliest tradition in the profession. For example, in many ancient societies, the approach was for the archivists or the librarians to appeal to "the heavenly protectors to preserve the books, scrolls, and manuscripts from insect, fire and decay" (Ritzenthaller, 1993). In the ancient Babylon (now Iraq), Hindu, Arabic and Eastern societies, their belief was that the gods and goddesses are the inventors of the alphabets, authors of knowledge, wisdom and writing and the patron of the scribes, librarians, and archivists. Therefore, these gods were called upon to preserve the cultural artifacts.

Similarly, in some Christian Monasteries, prayers and curses, called "book curse" were placed at the end of books to prevent theft, or to damn the thieves saying, "For him that stealeth a book from this library, may it change into a serpent in his hand and rend him. May he be struck with palsy, and all his members blasted. May bookworms gnaw his entrails …" (Drogin, 1983). This level of preservation has been supplemented over the last century with the professional practice of preservation and conservation. Today preservation and conservation is more than maintaining and restoring of books, archives, and records in libraries. It includes theoretical, environmental, structural, technical, and electronic preservation strategies.

In library and information science, preservation is treated as an active and intentional process as opposed to the passive sense of preservation that was applied in the ancient days. Intentional preservation in libraries and archival institutions encompasses both remote and immediate approaches. The immediate approach may be regarded as conservation, while preservation is the remote plan.

Electronic preservation of archives and records

Apart from traditional practices of preserving archives and records, there is an electronic approach being adopted today because the contents of records and archives is becoming more of electronic than analogue in recent times. It is taking a digital form. This is a process of taking a physical archival or records material and taking photographs of them or scanning the items and transferring the photographs into a digital medium. Electronic preservation also includes preservation of born digitals in the repository.

Around the world, libraries and archives and many other institutions and individuals have increasingly found themselves faced with the information materials preservation and conservation dilemma. Despite the general recognition that records and archives form a valuable part of our heritage, and the recognition of the challenges to preserve them, there are often precious little resources devoted to their preservation. Technological, organizational, legal, and physical barriers must be successfully managed in order to ensure that they are preserved and can be made availlable to users.

Recordsin many public offices in Kenya are housed in conditions that leave much to be desired. A large portion of records in most public offices are kept in basements and information recorded on them about important events and people has routinely been lost at the slightest occurence of a disaster like flooding from water pipes, invasion by insects and moulds. Unless something is done to stop the process, records deteriorate and will continue to deteriorate. Therefore, preservation and conservation of these materials is necessary. KNADS as the official custodian of public archives has a responsibility to acquire and preserve public archives and make them accessible to usersin good condition. The public archives form a valuable part of Kenya’s

documentary heritage and preservation which involves conservation is the means by which their survival is ensured for enduring access.

1.3 Background to Kenya National Archives and Documentation Service

According to KNA/1/71, the Kenya National Archives and Documentation Service (KNADS) is a department in the Ministry of Sports, Culture and the Arts. It was established by an Act of Parliament, the Public Archives and Documentation Service Act Cap.19 (PADSA) of the Laws of Kenya, in 1965.

The department was established with a mandate to offer consultative records management services to the public service; acquire and preserve valuable public and private records that form part of the national documentary heritage and ensure timely accessibility of these archives to users. The archives service therefore, preserves all public archives which constitute the memory of the nation.

The responsibility for the acquisition, arrangement, storage, preservation and management of both public and private archives of historic importance to the nation lies with the Kenya National Archives and Documentation Service (KNADS).

The department has the responsibility of; ensuring proper housing, control and preservation of all public records and public archives; examining any public records and advising on the care, preservation, custody and control; acquiring and transferring of any public records with archival value for permanent preservation; compiling, making available and publishing indexes and guides of archival records preserved; regulating the conditions under which members of the public may inspect the public archives; authenticating of copies of extracts from the public archives, for use as evidence in legal proceedings; authorizing the destruction or disposal of records that are no longer required for the day to day business or that are in excess or duplicated; providing a records

management service to public/state offices on advisory basis; making arrangements for the separate housing of films and other records which require to be kept under special conditions; acquiring or accepting gifts or testamentary bequests or loan of any document, book, record or other material of any description of historical or other value, or any copy or replica which needs to be kept in the National Archives; taking steps to acquire and have returned to Kenya any public records or records of historic value to Kenya which may have been exported outside kenya before independence; lending any public archives for display at commemorative exhibitions or for other special purposes; approving any institution, whether private or otherwise, as a place wherein may be deposited, housed or preserved either permanently or temporarily any public archives, records, or records which have been declared historical records.

1.3.1 Archives Management Programme

KNA/1/71 shows that Archives management programme consists of:-

Repository Section

The repository section provides custody to archival informationand facilitates access to this information through performing the following activities: retrieving files and reshelving files; replacing worn out archival boxes; replacing worn out file covers; stocktaking and reappraisal; reorganizing repositories; replacing shelve labels; digitizing; undertaking any project that is in support of custody and access of archival materials.KNADSholding can be classified as:

Pre-colonial historical records: These are records on the history of east africa and its people, their origin, immigration, settlement and intertribal relations.

Colonial historical records*:* These records contain information on the history of Kenya during the colonial era. Examples of such records include; A collection on British armed

punitive expeditions against kenyan tribes; Colonial Land Policy; World War I; Acquiring and concentration of land by the white settlers; Workers uprisings against colonial exploitations.

Post-colonial records: These are records acquired from Government offices after Kenya attained its independence. They include: annual reports, research and development reports, reports on staff establishments among others.

Microfilming Service

This is the unit that deals with conversion of textual records into microfilm through the filming process to enable the original records to be preserved while users access the records in the film format. In this way original documents are protected from wear and tear through frequent handling by researchers, hence ensuring longevity of the original records. In their microform format, records can last for about five hundred years.

Besides microfilming the section has the responsibility of retrieving all those records on the history of Kenya that were taken to Britain by the colonialists before independent. This was done through a migrated archives programme.

Audio Visual Service

This is a unit that is concerned with the preservation of archival materials in audio and visual format. Examples are video shows on historical events in the country such as the coming of the white man, maumau uprising, state of emergency, detention and release of the late MzeeJomo Kenyatta, the first president of the country. Others include audio tapes on oral history and traditions of different ethnic groups, photographs of national significance events, place, personalities among others.Other media preserved by the unit includes maps, historical photographs, slides and optical media.

Conservation Service

Some of the records that are acquired from public offices are normally in poor condition and damaged by the various agents of paper destruction. Others which are acquired in good condition deteriorate when in archives during access and use due to heavy usage, wear and tear and effect ofenvironmental conditions in the repositories. KNADS carries out restoration of damaged documents through the application of various repair techniques. This is done through a specialized unit called conservation. A mong the activities carried out in the section includes:-restoringand preserving historical records such as paper documents, books, reports, maps, manuscripts among others; supervising and assisting government ministries and departments in mantaining proper preservation conditions of their records and documents; binding of books and magazine of historical and research value; survey and inspection of records storage areas in public offices.

Information Communication Technology (ICT)

ICT deals with the automation of finding aids such as lists, guides and catalogues of archival holdings, digitization of archival records, office automation and facilitation of online communication internally and externally. The unit is in the process of reformatting the archival collection through digitisation with a view of enhancing accesss and preservation.

Searchroom Service

This is the contact unit between the department in terms of service delivery. Access of archives to the public is facilitated through this unit in line with the requirements of Cap 19 of the laws of Kenya and the laid down regulations. One of the requirements is to avail equal access of archives to all users, so long as the records accessed have been in existence for thirty (30) years from the date they were created. The

department's performance to its customers is judged through this section as it is the window through which the departments is viewed by the public.

Murumbi Art Gallery

The department has a permanent exhibition gallery on the ground floor of the archives building. Among the materials on display is the famous Murumbi collection which was acquired through purchase by the Government in 1977. Murumbi was Kenya's second vice president during the early years of post independence period. This unique collection was collected from various parts of the world especially Africa. The collection mainly depicts the diversity of culture in the continent of Africa. The gallery has items of artefacts and material culture from the Murumbi collection.Also among the Murumbi collection are rare books (books published before 1900) and other publications and correspondence files which are kept in National Documentation Service.

In addition, there is a photo gallery which is located on the first floor of the building where selected photographs depicting the various stages of the country's political development are on display. There are photographs depicting the precolonial period way of life of different communities in the country. There are also photographs on the colonial period especially during the struggle for independence andphotos of prominent personalities especially those who played a key role in the struggle for the country's independence.

1.3.2 Records Management Programme

In addition, KNA/1/71 file explains that records management is simply summed up as the provision of the right records in the right format, at the right time, to the right

officer for the right purpose, to enable making informed and timely decision or action to be taken for effective and efficient service delivery.

Records management is a field oriented service, aimed at advising on ideal records management practices in public offices.This is to enable those offices deliver efficient and effective services to their customers.

In their advisory role to the public offices, the records management division ensures that, registries which are central to efficient operations of any organization have ideal working records management systems that can facilitate ease and faster retrieval of records when needed for action taking. The division also sees to it that the registries are well staffed and equipped; records are well preserved and maintained. The division advices on the staffing level required in the registries, with regard to professional qualifications, skills and competencies required based onthe size of the registry and its workload.

Workshops and seminars on records management are also held to educate the public officers on the benefits of having ideal records management working systems as a way of facilitating faster retrieval of information.

Records management service is discharged throughout the country through the six Records centres situated in Nairobi, Mombasa, Nakuru, Kakamega, Kisumu and Nyeri as follows:

Nairobi records Centre: This centre was established in 1980 and has the responsibility of advising on proper records management practices in Nairobi, Eastern and North Eastern regions. The Records centre is housed at the CO-operative bank house.

The centre also identifies and acquires valuable records for permanent preservation, processes the records and prepares lists for those records that assist users in the search room to identify specific documents that meet their information needs. All the other record centres have the same responsibilities.

Nakuru Records Centre: established in 1980, the centre caters for entire Rift Valley region.

Mombasa Records Centre: established in 1981, the centre serves the entire Coast region.

Kakamega Records Centre: was established in 1982 to serve the entire Western region.

Kisumu Records centre:established in 1989 to cater for Nyanza region.

Nyeri Records Centre:this is a newly established centre which was opened in 2013 to cater for the Central region.

1.3.3 National Documentation and Information Retrieval Service

National Documentation andInformation Retrieval Service (NDS) is a division charged with the responsibility of collecting both published and unpublished public materials that relate on and aboutKenya. It also has the duty of establishing Documentation Link Centres (Information Resource Centers) in various government ministries and departments to assist action officers get access to relevant information.

1.3.4 The Building Facilities/Accommodation

The present National Archives building which houses KNADS headquarters was constructed as from 1928 and completed in1931 as the headquarters of the National Bank of India. When Grindlays Bank was merged with National Bank of India,

National and Grindlays bank emerged, and it built the current building now housing the Kenya National Archives and Documentation Service.

The archives building is not a purpose-built structure and, therefore not ideal to house the national archives. Further, the archives building, having been built in 1930, requires constant maintenance. The building stands between two major roads in addition to being surrounded by very busy feeder streets. The area around the building is also heavily polluted with dust and exhaust fumes which is a major challenge to the long-term preservation of archival information materials. Further, the noise levels around the building pause a challenge as users are inconvenienced (KNA/1/71).

1.3.5 Preservation and Conservation Facilities

Preservation and conservation facilities are provided through the following sections as mentioned above; Repository, Microfilming,Audio visual, Conservation, Information Communication Technology, MurumbiArt Gallery,National Documentation and Information Retrieval Services.

1.4 Statement of the Problem

KNADShas the responsibility to acquire and preserve for posterity, archival materials in all formats.KNADS has in its custody archival materials in various formats. Unfortunately some of these archival materials when acquired by the department are already old and in poor condition. According to the Conservation Register (2010/2011), 1600 records of the Draft Constitution of Kenya 2010received from Committee Of Experts by KNADS in November 2010, were already soaked and damaged by water.

A survey of Kisumu records centre repository revealed a total of 1047 records acquired by the centrewere in poor condition, some brittle, breaking and discoloured due to acidity, others with torn spines and missing file covers (Survey Report March 2011). A similar exercise carried out at Mombasa records centre revealed 17,709 records acquired were in bad condition, some brittle, breaking and discoloured due to acidity, others with torn spines and missing file covers (Ibid 2011). A survey in Nakuru records centre revealed that 4750 records acquired were in bad condition (Survey Report 2012). In Kakamega records centre, 1709 documents acquired were in poor condition, some brittle, breaking and discoloured due to acidity, others with torn spines and missing file covers (Ibid 2012). After acquisition, records centres process the records and transfer them to KNADS headquarters and since these centres do not have preservation and conservation facilities, the records are transfered in the same poor state they acquired them.

Some of the archival materials which are acquired in good condition deteriorate when in the archives during access and use due to the fact that environmental conditions in the repositories at KNADS are not regulated. This is illustrated by the fact that the number ofdeteriorated records in paper formats has been increasing over the years. According to the Conservation Register and Annual Reports (2007 to 2012), the number of conserved records has increased from 1300 in 2007/2008 financial year to 2257 records in 2008/2009, 4334 in 2009/2010, 4340 in 2010/2011 to 4385 in 2011/2012 financial year. The figure could even be higher since not all deteriorated documents have been conserved due to inadequate funds, skilled manpower among other factors. In view of challenges in preservation and conservation of archives and prevailing situation in records centres, this study was conceived to assess preservation and conservation practices at KNADS and propose solutions.

1.5 Aim of the Study

The aim of the study was to assess preservation and conservation practices at KNADS with a view to developing a strategy that promotes a systematic approach to preservation and conservation of archival materials for longterm usability.

1.6 Objectives of the Study

The objectives of the study were to:

i. Establish the diversity of archives and their formats at KNADS

ii. Establish the effectiveness of preservation and conservation pratices at KNADS

iii. Determine appropriateness of methods and tools of preservation and conservation at KNADS

iv. Identify challenges encountered in preservation and conservation of archival materials at KNADS

v. Propose a strategyfor promoting a systematic approach to preservation and conservation practices at KNADS

1.7 Research Questions

In order to address the specific objectives, the study sought to answer the following research questions:-

i. What is the diversity of KNADS collection?

ii. What are the preservation and conservation practices at KNADS?

iii. Are methods and tools of preservation and conservation at KNADS appropriate?

iv. What are the challenges encountered in preservation and conservation of records at KNADS?

v. Does KNADS have a strategy for preservation and conservation of archival materials?

1.8Assumption of the Study

The study was informed by the following assumption:-

Given the continuing threat to information materials proposing a strategy for preservation and conservation may provide solutions to current challenges in preservation and conservation of information materials for long-term usability.

1.9 Significance of the Study

The study is significant in the following manner:

1.9.1 Theoretical Significance

The findings of the study add to the existing body of knowledge useful in the field of preservation and conservation of archival materials.

1.9.2 Practical Significance

The study was able to address challenges faced in the preservation and conservation of archival materials at KNADS and provided practical solutions which would impact positively on the role and mandate of the department. It hasalso led to findings upon which a strategy that will help KNADS in the preservation and conservation management was developed and proposed for improving preservation, conservation and accessibility of archival materials at KNADS.

1.9.3 Policy – Related Significance

The study results inform policy formulation on preservation and conservation of archival materials at KNADS and other public offices.

1.10 Scope of the Study

The study covered preservation and conservation practices applied to records and archives in all formats which included paper, audio-visual, microfilm and digital formats. It was confined at KNADS headquarters because that was where the conservation unit and preservation facilities were located and therefore provided a good environment for assessment of preservation and conservation practices.

1.11Limitation of the Study

The Conservation Section was staffed by a total of six employees, four of whom in spite of their technical proficiency, held low academic qualifications and were therefore not able to express themselves clearly in technical conservation issues. This curtailed or affected effective communication between the researcher and this group of employees. To deal with this limitation, the best interview skills were employed when administering the interview schedule specifically defined for this group of respondents.

1.12Definition of Operational Terms

Record: a document regardless of form or medium created, received, mantained and used by an organization (public or private) or an individual in pursuance of legal obligations or in the transaction of business, of which it forms a part or provides evidence

Archive: The ‘non-current records’ of an organization or institution preserved because of their continuing value; the term ‘archival records’ or ‘archival materials’

signifies any physical medium which is employed to transmit information, such as paper, photographs, audio or video tape, computer tapes or disks.The ‘agency or program’ responsible for selecting, preserving and making availlable archival materials; also referred to as an ‘archival agency.’The ‘building’, or part of a building where such materials are located.

Preservation:the totality of processes and operations involved in the protection of records and archives against damage or deterioration.

Conservation: the active intervention in the repair of items, which are in a deteriorated or degraded condition.

Effectiveness: the capability of producing a desired result: when something is deemed effective, it means it has an intended or expected outcome: it is about doing the right task, completing activities and achieving goals: it is alsodefined as the degree to which something is successful in producing a desired result or the degree to which objectives are achieved and the extent to which targeted problems are solved.

Deterioration: the process by which information materials lose their value to appoint to which they cannot fulfill the functions for which they were intended.

1.13 Chapter Summary

This chapter focusedon Kenya National Archives and Documentation Service as a custodian of public records in Kenya. It gave the general overview of the study as it covered the background of the study, explained the problem statement of this study as well as presented the research objectives, research questions,assumptions, significance of the study, scope and limitations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review is a summary of what has been published on a specific topic. It's a recap and re-organization of important information related to a given topic. It allows the researcher to gain insights on the current knowledge in the current field of study. Boote and Beile (2005) note that "A thorough, sophisticated literature review is the foundation and inspiration for substantial, useful research."

The review of related literature involves the systematic identification, location and analysis of documents such as articles, abstracts, reviews, monographs, dissertations, books, other research reports and electronic media which contains information related to the research problem. The major purpose of reviewing literature is to determine what has already been done that relates to the research topic so as to avoid unintentional duplication, provide understanding and insights necessary to develop a logical framework.

There are several ways in which literature review is organized. These are chronological, methodological or thematically (Baron, 2018). Chronological is where literature is organized along progression of time, that is, materials are analyzed according to when they were published. Methodological on the other hand, is where materials are analyzed based on the method used in the literature being reviewed. Finally, thematic reviews are organized around topics or issues. The current study adopted thematic analysis in organizing its literarure review.

This chapter focuses on empirical studies related to the research topic, theoretical framework and literature relevant to the study. The literature review in this study was

focused on key themes of the research topic derived from the objectives of the study. These included diversity of archival materials and their formats; preservation and conservation pratices; methods and tools of preservation and conservation; challenges facing preservation and conservation of archival materials; preservation and conservation strategy.

2.2 Review of Empirical Studies on Preservation and Conservation

KNADS has the responsibility to acquire and preserve for posterity, archival materials in all formats. KNADS has in its custody archival materials in various formats. There is astudy done by Henry Kemoni in 1996 which discussed factors that have contributed to ineffective conservation of archival materials in Kenya. The study mentioned a few factors and a few conservation methods which were applied at KNADSbut did not explain how these methods were ineffective; Neitherdid the study explain or give evidence of any records that were deterioriated and were not conserved because of the ineffectiveness of conservation methods. In addition the study did not cover assessment ofthe preservation practices at KNADS but focused on factors that have contributed to ineffective conservation, the study also did not provide evidence that those preservation practices were unable to preserve information materials instead the studeygives just ageneral view. Furthermore, the Kemoni's study did not develop or design aframework, apolicy or strategy within which preservation and conservation of archival materials could be done systematically to enhance or ensure effectiveness.

On the other hand, this current study that asssees preservation and conservation practices at KNADS gives in details the preservation and conservation practices at KNADS, identifying gaps in those practices, explaining why and how those practices

needed to be done, evidence interms of figures that preservation practices are ineffective leading to deteroriation of archival materials in large quantities and that conservation practices were ineffective leading to alot of deteroriated archival materials (in figures) not being conserved/restored. This current study unlike Kemoni's study develops and proposes astrategy for promoting asystematic approach to preservation and conservation of archival materials at KNADS thus filling the gaps in Kemoni's study.

2.3 Theoretical Framework

Research theories and models are formulated to explain, predict and understand a phenomenon (Abend, 2013). Theories that gain recognition in a discipline shape the field, help define the scope of practice and influence the training and socialization of its professionals.

Some of the theories and models that have been propounded to explain issues of preservation and conservation include; Model for Preparation of Conservation Plans for Environment and Natural Resources (1991), TheLogic Model for Managing TheDocumentary Heritage of Interest to Canada (2009), The Delta Plan Model of Preventive Conservation Strategiesand The SPOT Model for Risk Assessment.

Model for Preparation of Conservation Plans for Environment and Natural Resources (1991) was not relevant to the study because it didnot apply to archival materials. The Logic Model for Managing The Documentary Heritage of Interest to Canada (2009), defines preservation but does notprovide detailed information on preservation and conservation practices.Therefore the study adopted The Delta Plan Model of Preventive Conservation Strategiesand The SPOT Model for Risk Assessment to guide the study.

2.3.1 The Delta Plan Model of Preventive Conservation Strategies

The delta plan model was initiated by the European Community and initially adopted by the Netherlands to maximize minimum economic resources for funding disaster prevention for natural resources, and subsequently adapted to cultural resources. Key to the success of the "Delta Plan" is a pragmatic insistence that museums, libraries and archives expeditiously develop mission statements to justify their collections, and conduct assessment surveys to safeguard them. Similar pragmatic strategies were discussed and developed by North American Libraries and Archives Associations at the "Seminar on Preventive Conservation in Latin America leading to evolution of the delta planmodel of preventive conservation strategies in North America in 1993.The Delta Plan modelis a model for linking the preventive care strategies of cultural and natural resources. The aim is to forestall costly interventive care through maintenance programs. Under this model, cultural resources are assessed by ranking collectionsbased on relative factors such as value (intrinsic, evidential, and/or informational), use (exposure), and risk (condition). By evaluating and ranking collections according to these factors, large numbers of cultural materials can be systematically categorized and prioritized quickly and economically.

The model advocates for multi-phased approach to preventive care which enables improvement in access and care of collections through manageable, discrete, but integrated steps intended to inspect, detect, connect, and correct problems. The multi-phased approach include:

a) Formulating new preservation policies, guidelines and procedures. This involves writing policies and guidelines on:handling procedures for staff and users, incorporating information on environment, the nature and deterioration of materials;

appropriate materials and techniques to be used for storage; framing and packing procedures; disaster prevention, preparedness, management and response.

b)Undertaking assessment surveys to determine collection needs including: environmental surveys, which can assess, prioritize and address the preservation needs of the host facility, its structure, storage and environmental controls, security, emergency preparedness and emergency planning policies; identify needs and costs for short-, mid- and long-term improvement in protection and accessibility of materials through reformatting,storage and treatment provisions;

Preservation priority surveys, which can prioritize groups of collections by comparing factors such as their relative values (intrinsic, evidential, and/or informational), use, conditions, and risks;

random sampling surveys, which can assess and quantify the resource needs of individual collections byevaluating the size, condition, storage housing, and nature of the collection to determine whether new storage housing is needed, and if so, the type and quantity; item-by-item surveys, which can assess individual needs of collection material for treatment.

c)Initiating collections maintenance procedures including; improving accessibility of collections by preventive care storage or by duplicating or reformatting fragile or damaged material by photocopying, microfilming or making a facsimile, model or replica;cleaning collections lightly where appropriate; reinforcing or supporting damaged materials;removing and replacing harmful materials such as inappropriate fasteners on paper documents.

removing and replacing harmful housing or storage techniques such as acid envelopes and rehousing with stable materials and techniques to protect the collection from poor handling and the environment.

d) Development of preservation programs including: new conservation treatment prototypes to facilitate resource management and initiate research designed to develop and evaluate new preventive care approaches, in addition to measuring the effects of conservation treatments on properties and aging of materials.

2.3.2 Relevance of the Delta Plan Model to the Study

Relevance of the Delta Plan Model to the current study is that it hasthe four componentsthat guided the study, the four componentsrepresent some of the preservation and conservation practices that the study is assessing and these components addressed two objectives of the study: establish the effectiveness of preservation and conservation pratices and determine appropriateness of methods and tools of preservation and conservation at KNADS. The four components are:

a) Formulating new preservation policies, guidelines and procedures. This refers to having a written preservation and conservation policy at KNADS to support preservation and conservation practices and guide members of staff.Lack of such a policy will lead to staff not being familiar with the preservation and conservation practices they are required to implement because the policy, which is supposed to act as a reference point is lacking. Lack of apolicy will further make it impossible to hold staff to account for any oversights or misdeeds. This agrees with Popoola (2003) (cited in Olatokun (2008) that the only antidote to the problem of rapid degradation and decay of information materials in African society is the formulation and implementation of sound preservation and conservation policies and programmes on

African information resources.Therefore it is important that KNADS has written and documented preservation and conservation policy to ensure effective and efficient preservation and conservation of archival materials.

b) Undertaking assessment surveys to determine collection needs, risks and hazards using innovative and streamlined survey techniques such as environmental surveys, preservation priority surveys, random sampling surveys anditem-by-item surveys.This refers to undertakingeffective preservation assessment surveys and annual stocktaking at KNADS to ensure effective preservation and conservation of archival materials.According to IRMT(1999) preservation surveys are done to examine all facilities, programmes and materials to determine needs and establish priorities. The surveys entail examination of the archives building, storage conditions, condition of materials and maintenance procedures. Annual stocktaking on the other hand should be undertaken in order to keep a check on misplaced or missing archives and their state toensure the safe return and storage of archival materials;assess the physical condition of the archival materials for signs of insect infestation, mould growth or physical deterioration.

c)Initiating collections maintenance procedures including; improving accessibility of collections by preventive care storage, duplicating or reformatting fragile or damaged material by photocopying, microfilming or making a facsimile, model or replica;This refers to effective reformatting of archival materials at KNADS to enhance preservation and accessibility. Reformatting offers many advantages with preservation benefits. Firstly, having more than one copy gives added security in case of accidental damage, especially when the copies are stored in more than one location. It minimizes the possibility of losing the materials altogether. Secondly, accessibility

is enhanced because more users, in multiple sites, can use the materials simultaneously.

According to Shep (2006), the use of reproductions is a preservation strategy to make objects available when the originals are too fragile or would be subject to undue deterioration or loss. In acknowledging the benefits of reformatting, Jefcoate noted that “the British Museum library, saw multiple benefits in reformatting: it obtained preservation copies of key collection works; it achieved a conservation benefit by being able to restrict access to many originals; it reduced presssure on its facilities by making its collections availlable as photographic facsimiles at libraries abroad; and it received royalties on the sales of its materials’’ (Jefcoate, 2003).

The value of reformatting in archival institutions is also clearly brought out by Heslop, Davis and Wilson when they state that, “National Archives of Australia selects, maintains and preserves government records of enduring value and makes them available for public acesss 30 years after their creation. These materials are created in single copies and any loss or damage will result in the loss of the information altogether, and therefore such materials are usually a priority for reformatting” (Heslop et al, 2002).

There are a number of methods of reproduction or reprography, including microfilming, photocopying onto permanent paper, photography using archival quality black and white film, and imaging or scanning materials into an electronic form, that is digitisation.

Cleaning collections lightly where appropriate; reinforcing or supporting damaged materials;removing and replacing harmful materials (such as inappropriate fasteners on paper documents) that is advocated for by this model refers toeffective

conservation practicesthat should be applied at KNADS to repair and restore damaged or deteriorated archival materials. Conservation practices have their challenges but they retain a significant position in archival institutions because the wear and tear of records and archives can only be minimized but cannot be eliminated. As aresult there is room for repair of damaged archival materials.

Removing and replacing harmful housing or storage techniques (such as acid envelopes) and rehousing with stable materials and techniques to protect the collection from poor handling and the environment. This refers to appropriate housing, environmentcontrol and providing appropriate protective packaging at KNADS to prevent detrioration and destruction of archival materials. A records repository exists to preserve and protect records stored within it. The environmental conditions within the building, particularly the storage area, need to be appropriate to preserve the archives and protect them from environmental extremes. Therefore, planning for preservation requires that an archivist identifies and lessens the causes of deterioration. This would include providing an appropriate environment for storage of records while keeping away pests that are known to damage records.In order to provide appropriate housing and environment, the ideal situation is to maintain stable levels of temperature and relative humidity by installing a well-designed air-conditioning system. Such a system will control both the relative humidity and the temperature and moderate their rates of change. According to Patkus, “research has shown that large and frequent fluctuations-such as those that occur if the climate controlsystems are turned off greatly accelerate paper deteriation” (Patkus 2003).

There are a number of benefits in the use of protective packaging. Enclosures and the environment around them act as a buffer zone to slow down the rates of change in temperature and relative humidity levels. They provide protection from light, dust and

airborne pollutants, water, smoke, heat and other destructive agents. Enclosures provide good physical protection, absorb or neutralise harmful gaseous emissions, be free of deleterious chemicals or products and allow the removal and replacement of materials without any damage (IRMT, 1999). KNADS being a public office taking care of public records and archives, it is expected that paper records are filed in file folders, which actas the protective cover for the papersand kept in acid-free boxes.

d) Development of preservation programs including: new conservation treatment prototypes to facilitate resource management and initiate research designed to develop and evaluate new preventive care approaches, in addition to measuring the effects of conservation treatments on properties and aging of materials.This refers to writting a preservation plan and undertaking research into preservation and conservation practices and trends byKNADS.On research into preservation and conservation practices and trends, it was expected thatKNADShasa well established,equiped modern research laboratory/section where tested and known methods and meansof research are used to undertake research into chemicals and materials of preservation and conservation and address preservation and conservation problems encountered or anticipated

2.3.3 The Simple Property-Oriented Threat Model for Risk Assessment

Developing a successful digital preservation strategy amounts to accounting for, and mitigating, the impact of various threats to the accessibility and usability of digital materials over time. Typologies of threats are practical tools that can aid in the development of preservation strategies.The Simple Property-Oriented Threat (SPOT) Model for Risk Assessment is a model for identifying threats to successful digital preservation. The model was developed in New Zealand in September 2012 by Sally Vermaaten, Brian Lavoie and Priscilla Caplan.It defines six essential properties of

successful digital preservation and identifies a limited set of threats which, if manifested, would seriously diminish the ability of a repository to achieve these properties.

Digital preservation threats can be divided into two categories: threats to archived digital content, and threats to the custodial organization itself. For example, technical issues relating to the ingest, storage, maintenance, and dissemination of archived content tend to fall into the first category; on the other hand, economic issues relating to the ongoing availability of sufficient resources for the repository to meet its long-term goals, and legal issues which may limit the actions a repository can take to preserve digital content, tend to fall into the second category.

The purpose of the model is to develop a lightweight framework for assessing threats arising from the technical operations associated with preserving digital objects. The six essential properties of successful digital preservation defined by the model are availability, identity, persistence, renderability, understandability and authenticity.For each of these properties, a set of threats is identified which, if manifested, would seriously diminish the ability of the repository to achieve the preservation of property in question. The threats are described at a high-level and focus on the outcome: that is, the aspect of the threat that impacts the preservation property with which it is associated. As such, the SPOT Model is an outcome-based typology of threats that individual custodial institutions can use in evaluating their own situational risk and risk mitigation strategies. The SPOT Model outlines the nature of the threat in terms of its impact on its associated preservation property; this can then serve as a starting point for repository staff to consider which causations are most likely and which aspects of their local digital archiving system are most susceptible to this threat.

The model is based on a widely-accepted list of properties characterizing well-preserved digital objects; each of these properties is then associated with a small set of high-level threats. Threat assessment consists of identifying factors in the local environment that could potentially manifest these threats. Risk management can then focus on reducing the likelihood or impact of these factors. This process reduces the complexity and resources required to undertake a risk assessment procedure.The model is intended to be a practical tool for repository staff. Its application would simplify and improve existing risk assessment procedures. It offers a simple yet comprehensive list of primary threats that a trusted digital repository should guard against.

i. Availability

Availability is the property of the digital object being available for long-term use. In order to ensure availability, the digital object must be ingested into, and subsequently maintained by, a preservation repository. While there could be physical barriers to this, more often it is a question of the priority that decision-makers attach to its long-term value or the permissions granted by those who control the intellectual property rights associated with the object.

The major threats to availability reside in pre-repository care, selection policy and rights management.

ii. Identity

Identity is the property of being referencable. Identity distinguishes an object from other objects in a group and allows an object to be discovered and retrieved. A limited amount of metadata (e.g. name, unique identification number, date, version number, creator) is often all that is required for the purposes of identification and

disambiguation, as opposed to more extensive information that may be necessary to support understandability. Identity is contextual: some objects are associated with information that allows identification only within a limited context (for example, an object may be uniquely identified only within the context of objects residing on the same server), while others have enough information to make them globally identifiable (for example, a global identifier such as ISBN). Creation of sufficient metadata to support identity may be the responsibility of the repository or of other agents, such as the creator of the object.

The major threats to identity come in pre-repository care and generation and maintenance of descriptive and structural metadata.

iii. Persistence

Persistence is the property that the bit sequences comprising a digital object continue to exist in a usable/processable state, and are retrievable/processable from the medium on which they are stored. All digital objects exist as a series of bits stored on some form of physical medium, such as magnetic tapes, optical discs such as CDs and DVDs, or hard drives on servers or personal computers. In order for the digital object to remain useful over time, it is essential that the bit sequences are not corrupted in any way, and that they can be read in their entirety from the physical media on which they are stored. Persistence is achieved when these two conditions are met.

The major threats to persistence reside in physical media management, media refreshment policy, hardware migration policy, and data security policy.

iv. Renderability

Renderability is the property that a digital object is able to be used in a way that retains the object's significant characteristics. Human and machine use of a digital

object depends upon interpretation of the bitstream by an appropriate combination of hardware and software. An appropriate hardware and software environment allows users to interact with (view, listen, query, etc.) the object in a way that retains characteristics of the original object that are deemed important by stakeholders. For example, if the only software available to open a particular image file is a text editor, the object cannot be considered renderable, as a text editor rendering of the object would not preserve a characteristic likely to be important for nearly all users of an image — its appearance. Content, context, appearance, and behavior are common categories of stakeholder requirements for digital objects.

While the bits of an object might change due to preservation actions such as migration, the object is still renderable if it can be used in a way that preserves its significant characteristics.

The major threats to renderability reside in format management workflows and policies, including preservation strategies and repository knowledge of its stakeholder community.

v. Understandability

Understandability requires associating enough supplementary information with archived digital content such that the content can be appropriately interpreted and understood by its intended users. Good metadata is one way to ensure understandability, although it is important to keep in mind that the metadata needed to establish understandability often goes well beyond what is required to establish identity. For example, a data file of survey results may be adequately identified by its title, dates conducted, date of publication, sponsoring agency, and key number. However, for the data set to be understandable to future users, the entire associated

codebook or equivalent information is required. The codebook, in turn, may require additional metadata and/or supplementary material to be understandable itself. The goal should be to archive enough metadata and other materials to make archived content understandable to members of its designated community.

Major threats to understandability lie in the repository's knowledge of the characteristics of the community of current and future users, and metadata capture and retention policies.

vi. Authenticity

Authenticity is the property that a digital object, either as a bitstream or in its rendered form, is what it purports to be. It is important to assure current and future users that the digital object managed and disseminated by the repository is a faithful replica of the digital object that was originally ingested into the repository; or alternatively, that any modifications to the original digital object that have occurred since ingest have been carefully documented. Information pertaining to a digital object's authenticity is often contained in the metadata bundled with the object, and might include documentation of: the contents of the digital object; the digital object's provenance, including the object's original source/creator and the chain of custody prior to ingest; and any alterations that have been made to the digital object during the period of archival retention.

The major threats to authenticity reside in metadata collection and management practices, security procedures and workflow documentation procedures and policies.

2.3.4 Relevance of the SPOT Model forRisk Assessment to the Study

In conceptualizing the Simple Property-Oriented Threat (SPOT) Model for Risk Assessment to the current study, the six essential properties of successful digital

preservation which are availability, identity, persistence, renderability, understandability, and authenticity represent the properties of successful digital preservation that KNADS should apply to preservation of digital archives,the threats or risks to these six properties representthreats or agents of deterioration to digital archival materials at KNADS and therefore the six properies/components provided guidance to the study in the area of preservation and conservation practices applied to digital or electronic archival materials. They addressed three objectives of the study which were: establish the effectiveness of preservation and conservation pratices at KNADS; determine appropriateness of methods and tools of preservation and conservation at KNADS and identify challenges encountered in preservation and conservation of archival materials at KNADS.

Digital information is often referred to as content or, to be precise, digital content. Digital content may take the form of text, such as documents, multimedia files, such as audio or video files, or any other file type which follows a content lifecycle which requires management.According to Cornell University Library (2005), information created and stored digitally is at risk for loss in two important ways: Obsolescence and physical damage. Obsolescence can affect all facets of the archival storage function, including hardware, software and even the arrangement of the data in astored file. Digital information is also vulnerable to physical threats. Like obsolescence, physical damage can occur to multiple components required to create, store, and access digital information, namely hardware and media. Preservation and conservation practices atKNADS has to guard against these threats as guided by the model.

2.4 Diversity of Archival Records and their Formats

According to IRMT(1999), the variety of records, archives and information materials found in records offices, records centres and archival institutions is astounding.Materials include monographs, serials, newspapers, films, audio recordings, maps, videotapes, letters, diaries, account books, photographs, documents, slides, posters, leaflets/brochures.Many institutions will have records or archives in several different media; each of these media types requires particular storage and handling.

IRMT (1999) define a record as a "document regardless of form or medium created, received, mantained and used by an organization (public or private) or an individual in pursuance of legal obligations or in the transaction of business, of which it forms a part or provides evidence" while term archives isdefined by Bellardo and Bellardo (1992) as; the 'non-current records' of an organization or institution preserved because of their continuing value; the term 'archival records' or 'archival materials' signifies any physical medium which is employed to transmit information, such as paper, photographs, audio or video tape, computer tapes or disks. The 'agency or program' responsible for selecting, preserving and making availlable archival materials; also referred to as an 'archival agency.' The 'building', or part of a building where such materials are located.

Fromthese definitions it is clear that archival collection comprises of a diversity of archival materials in various formats ranging from paper, audio visual, electronic to microfilm. The study sought to establish diversity of records and archival materials and medium atKNADS because this informationformed the basis for assessment of preservation and conservation practices applied to various media and formats of

records and archives at KNADS and the effectiveness of these practices in ensuring longevity of the records and archives.

2.5 Preservation and Conservation Practices

Under this theme, the literature reviewed included literature on the concept of preservation and conservation, agents of deterioration, preservation practices, conservation practices and effectiveness of preservation and conservation practices.

2.5.1 The Concept of Preservation and Conservation

There is no universally accepted definition of the terms preservation and conservation. However, various authors and organizations have attempted to define the terms. Nottinghamshire Archives (2007) defines preservationas the use of passive non-interventative measures for the protection of an archive through providing appropriate environmental conditions, storage facilities and suitable packaging materials and not by physically altering the fabric of the archive by the use of chemicals or repair techniques.On the other hand the itdefines conservation as the use of active physical measures to prevent the further deterioration of an archive (using chemicals and professional repair techniques). Such physical measures are carried out to at least the minimum required and do not alter the integrity of the archive.

IRMT (1999) defines preservation as the totality of processes and operations involved in the protection of records and archives against damage or deterioration.It involves four related activities: maintenance which is thedaily care of records and archives, particularly in the current and semi-current records environment, when they are housed in offices or records centres, maintenance ensures the general protection of records against environmental hazards or other physical dangers; examination-the preliminary procedure taken to determine the original materials and structure of an

item and to determine the extent of its deterioration, alteration or loss; conservation-the intrusive protection of archival material, by the minimal physical and chemical treatments necessary to resist further deterioration, which will not adversely affect the integrity of the original; and restoration-the repair of an item when aesthetics and reproduction of the original appearance is more important than the preservation of the integrity of the item.

Mirjam (2001) defines preservation as the retention and maintenance of materials over time thus when applied to archives it encompasses “all managerial and financial considerations including storage and accommodation provision, staffing levels, policies, techniques and methods involved in preserving of archive materials and the information contained therein”.

Hadgraft (1991) defines conservation as the active intervention in the repair of items, which are in a deteriorated or degraded condition. In the same line Feather (1996) maintains that conservation is one aspect of preservation activity that normally implies the active use of preventive measures or processes of repair of damaged material, to ensure the continued existence of individual items. Muhammed and Rowshon (2008) explain that conservation is the use of chemical and physical procedures in treatment or storage to ensure preservation of books, manuscripts, records and documents.

From these definitions, the term preservation in this study is a broader term than conservation and it refers tothe totality of processes and operations involved in the protection of records and archives against damage or deterioration while conservation is the active intervention in the repair of items, which are in a deteriorated or degraded condition.

2.5.2 Agents of Deterioration

The need for preservation and conservation is because deterioration of archival materials has been recognized as a problem for many centuries. Kleifield (2007)indicates that this problem is more acute today due to a combination of factors such as the age of the materials in our archives, the change in manufacturing processes leading to decline in the chemical and physical strength of the materials and the dramatically increasing use of computer and electronic records leading to changes in record keeping practices, raising a whole new set of preservation concerns.

In addition, Davis states, “digital records are no longer a rarity. Individuals, governments, businesses and institutions routinely create and capture digital information. The technical challenges posed by digital records themselves, require the National Archives to explore new ways of preserving and maintaining them (Davis, 2004). Apart from being fragile, electronic records are dependent on software and hardware and therefore a victim of technological obsolescence.

InternationRecords ManagemetTrust (IRMT,1999) explains that preservation planning is essential to good records and archives management.It is better to focus on preventive preservation measures and ensure adequate environmental and physical controls than to focus on conservation treatments for one object to the exclusion of others in the institution.Further, preservation should operate as part of the overall management of the institution and preservation policies and plans need to be coordinated with other organisational requirements. On the other hand, Ndung’u explains that information materials are preserved and conserved because of the value they posses (Ndung’u, 2004). However, these materials are threatened by different factors in the environment and within themselves, which if left unchecked leads to deterioration.

Deterioration being the process by which information materials lose their value to appoint to which they cannot fulfill the functions for which they were intended, agents of deterioration can be categorized into three main groups which according to Kathpalia (1973) are chemical, physical and biological agents.

Chemical agents of deterioration cause chemical reactions into the materials, which eventually lead to destruction of those materials, examples, include;**Oxidation/ageing/acidity:**This is a chemical reaction that occurs when paper reacts with oxygen in the atmosphere. Oxidized paper materials become weak and cannot live for long. This process is catalyzed by moisture, heat and light. Long-term oxidation burns the paper materials making them brittle. The presence of acidic substances in paper causes chemical degradation causing discoloration of paper to yellow, brown. Sources of acidity include; acidic compounds introduced in paper during manufacture such as addition of chlorine as a bleaching agent; lignin- a substance that forms 25-30% of wood composition. It is very acidic and therefore if not completely removed during paper manufacturing process;it is oxidized to form an acid; inks used for writing if acidic also introduce the acid onto paper; acidic contaminated storage containers like archival boxes affect documents through acid migration (Ibid, 1973). When archival materials are acidic to begin with, poor environmental conditions can easily affect their stability and longevity. In order to address the problems of acidity in papers and sizes, the International Standards Organization (ISO) has issued standards for the permanence of paper. The standard identifies the ideal composition of paper in order to ensure it will last as long as possible with minimal deterioration (IRMT 1999).

The physical agents of deterioration as explained by Kathpalia (1973) are agents which cause physical damage to documents for example, high temperatures which

increase the rate of chemical reaction activity in documents. In the presence of low moisture, high temperatures will lead to brittleness of information materials. In presence of high moisture high temperatures will lead to chemical breakdown of information materials. In absence of moisture, information materials will lose adhesive (glue) which in turn will lead to breakdown of bonding on the spine and collapse of bound volumes.

According to IRMT (1999) temperature is the level of heat or cold in a substance, body or environment. It is a general rule that the higher the temperature, the more quickly archival materials will deteriorate. This is because higher temperatures speed up the chemical processes that cause deterioration. Ideally, archives should be stored in an environment with a lower, rather than higher, temperature.

Relative humidity refers to amount of water in a given volume of air at a given temperature. Lack of moisture will lead to partial breakdown of inter-fiber bonds making documents dry and weak, such documents become brittle and disintegrate easily when handled. Excessive humidity weakens the tissue and promotes growth of micro-organisms which in turn feed on the cellulose fibers, paste/glue, it also makes paper to become swollen and leads to growth of moulds (Opcit 1973).

IRMT (1999) explains that high relative humidity, particularly when coupled with high temperatures, accelerates the chemical deterioration of materials. High relative humidity can cause some inks to feather: that is, to spread, sometimes well across the page, damaging the material. If relative humidity is too low, and therefore the air is too dry, materials will become brittle and may crack or split. If the relative humidity is too high, materials can absorb the moisture and so swell and warp. High relative

humidity can also promote mould growth, which is highly dangerous to records and archives.

Changes in relative humidity will cause materials to expand or contract, causing stress and weakening the physical structure of the items. Indeed, fluctuations in temperature and relative humidity are more damaging than consistently high or consistently low levels. For example, if air conditioners are turned on during the day but turned off at night, the fluctuations can negate any benefits brought by the air conditioners: the repeated increase and decrease in temperature and relative humidity will likely make the situation worse (Ibid 1999).

The ideal combination is a low temperature and relatively low relative humidity: ideal levels are temperature at 18-20˚C and relative humidity at 35% to 40%. Temperature should not exceed 20˚C and relative humidity should not exceed 50%. Some materials, such as photographs, microfilms and magnetic tapes, are best stored with a lower relative humidity and temperature, as they are particularly susceptible to the effects of heat and moisture (Ibid 1999).

It is also difficult to monitor or stabilise temperature and relative humidity if the building itself is not designed to house records or archives. In many instances, records centre or archival institutions may be in buildings originally used for another purpose; consequently, air circulation may not be adequate.Further, the temperature or other environmental systems might be under the control of some authority outside of the records office, records centre or archival institution.In such instances, it is best simply to be aware of the environmental conditions of the facility and seek ways to improve those conditions whenever possible (Ibid 1999).

Light; all natural vegetable fibers gradually loose strength when exposed to light for too long. This is because of the ultra violet element of sunlight which has radiant energy which in turn causes colour changes in maps, pictures and spine of books (Kathpalia 1973). IRMT (1999) adds that light speeds up the oxidation of paper, causing materials to deteriorate faster. Light also has a bleaching action, causing coloured papers and inks to whiten or fade.At the same time, light can increase the chemical activity in paper, causing changes in colour.It also generates heat which can speed up the process of degradation of materials.

Ultraviolet light is the most harmful light, because the particular wavelength of ultraviolet light is very active, generating more radiation.High levels of radiation can increase chemical deterioration.Ultraviolet light is found in sunlight and fluorescent light, so both these types of light need to be controlled in the archival institution (Ibid 1999).

Dust; dust is made up of small particles which are angular in shape. They also consist of small acid molecules and metallic ions which causes degradation in documents. Dust particles have an abrasive action when they come between information materials causing physical damage. They also have high affinity for water which in turn dirtifys documents making them unhygienic and stained (Opcit 1973).

IRMT (1999) further explains that air pollution can be a serious hazard to records and archives, particularly in urbanized or industrialized areas.Industrial gases, chemicals, car exhaust and other toxins generate pollution.Gaseous pollutants include sulphur dioxide, nitrogen dioxide and hydrogen sulphide.Ozone also causes oxidation, which is damaging to materials by promoting their deterioration.Air pollution can also appear within a building; photocopiers, cleaning supplies, paints, untreated wood and

certain plastics and adhesives all contain gases that can pollute.Pollution can also be found in water, such as tap water, or even sea water for areas close to the ocean.These pollutants can also damage equipment and materials. Dust and other particles are also pollutants, and they can absorb gaseous pollutants, which then penetrate materials and promote chemical and physical deterioration.Pollutants can also come from paper products themselves, especially those made with poor quality materials, such as newspapers.As these types of materials age they generate dust particles that damage not only the items themselves but also any materials in the vicinity. Gases, exhaust, dirt, dust and other pollutants come in the form of particles that float in the air.They are acidic and abrasive, and when they come in contact with materials they can 'eat' through the item causing it to deteriorate.Pollutants can cause metals to rust or wood products to chip and break.With paper-based materials, films or tapes, or other items found in archives, the particles become imbedded in the surface of the materials; since they are abrasive and acidic they weaken the materials through physical and chemical action.If particles settle on an item and then become moist through high relative humidity or water damage, they can leave permanent stains (Ibid 1999).

Fire; fire is a serious threat to archival materials.If lost in a fire, records are lost forever.Equally, water – 100% relative humidity – can cause great damage to records and archives. Ironically, the best way to reduce the damage from fire is to put the fire out, and that is usually done with water.Consequently, the damage caused from a fire is usually water damage. Paper-based materials in particular absorb water very quickly; when damaged by water, inks can run or dissolve, mould can grow and stains can appear.Papers may stick together and glues will soften and run.Water also raises relative humidity in an environment, leading to mildewing and warping.Water

damage can come not only from putting out a fire but also from leaks, floods or heavy rains (Ibid 1999).

Biological agents include fungi, bacteria, and insects amongothers. Because of their minute size, fungi/moulds are referred to as microscopic plant organisms. Most of them do not have the green colouring matter - chlorophyll that is used for food manufacturing hence survive as parasites causing damage to information materials. They normally grow from spores which are found in the atmosphere. As a result of the fungi growth, the cellulose fiber of paper becomes soft and weak. The fungi also introduce dampness into information materials making them fragile. They produce some acidic substance that accelerates acidic reactions in books. Debris left by fungi life cycle is quite filthy and cause some chemical reactions in documents (Opcit 1973).

Mould, insects and rodents can all damage records and archives.Their presence can be encouraged by high relative humidity, high temperatures, a complete absence of light and the availability of nutrients.

The spores or seeds that cause mould to grow are always present in the atmosphere and can never be eliminated completely from the environment.However, mould needs nutrients to grow, such as paper, leather, glues and adhesives, dust and moisture to enable it to absorb the nutrient.As access to the nutrients cannot be restricted, the growth must be inhibited by controlling the environment.Mould grows best in an environment with high relative humidity.When the relative humidity exceeds 70% and the temperature reaches 25^{o} C or more, mould growth speeds up considerably.Mould growth is exacerbated when the air is still; non-ventilated areas may be more susceptible than areas with ceiling fans or ventilators (IRMT, 1999).

Insects; they include bookworms, cockroaches, termites, book lice. Damage from insects occurs when they use information materials as food. They produce some chemical wastes which are acidic in nature hence trigger chemical reactions in materials. They disfigure valuable documents by feeding on the edges left for long time without use (Kathpalia 1973).

Insects are attracted to the nutrients found in paper-based products, particularly adhesives and starches.Insects are also attracted to damp, dark and dirty locations.While the occasional insect in a repository is common, a large number can mean an infestation, which may require extermination (IRMT,1999).

Rodents; Rodents such as rats and mice can eat archival materials and use papers to build nests.They also chew electrical insulation, which can result in short circuits and fires. Rodents are attracted to warm, dark environments; they also gain easy access if there are passageways to the outside, such as cracks or holes in walls.The presence of rodents is indicated if papers or boxes appear chewed or damaged; rodent faeces may be found in corners; and sometimes noises can be heard from rodents nesting or moving about (Ibid 1999).

Abuse and Mishandling; sadly, people can in fact pose the most serious hazard to archival materials.Intentional and accidental abuse can damage records and archives and lead to the loss of valuable information. Damaging activities include; rough handling of paper; excessive pressure on bindings or folders; poor photocopying practices; placing materials on permanent exhibit, perhaps exposing them to extreme conditions; poor retrieval and filing practices, causing materials to be torn, folded or damaged; inappropriate storage of oversized materials; faulty or inappropriate equipment for transporting materials from place to place; excessive use of materials;

writing on documents, particularly archival materials; spilling food or drink on records and archives; spilling ashes on materials; inappropriate mending or repair work; tearing or folding papers; handling fingers with dirty hands; licking or wetting fingers before turning pages; poor cleaning or housekeeping; deliberate acts of vandalism; theft of materials; inappropriate stacking or boxing of records and inadequate security (Ibid 1999).

Disasters; even when all precautions are taken to reduce the risk of hazards, earthquakes, fires, floods, hurricanes and other natural disasters can cause severe damage, including damage to records and archives.The risk of loss from disasters is great, and it can be difficult if not impossible to protect against all emergencies (Ibid 1999).

Risks/threats to digital information/content; Content management is aset of processes and technologies that support the evolutionary life cycle of digital information. This digital information is often referred to as digital content. Digital content may take the form of text, such as documents, multimedia files, such as audio or video files, or any other file type which follows a content lifecycle which requires management.

According to Cornell University Library (2005), information created and stored digitally is at risk for loss in two important ways: Obsolescence and physical damage. Obsolescence can affect all facets of the archival storage function, including hardware, software and even the arrangement of the data in astored file. Digital information is also vulnerable to physical threats. Like obsolescence, physical damage can occur to multiple components required to create, store, and access digital

information, namely hardware and media. These are further described by Cornell University Library (2005) under these categories:

Technological obsolescence; rapid obsolescence of computer hardware has been a signature characteristic of the industry since its inception over 50 years ago. A one or two order of magnitute improvement in power, speed, efficiency or cost per value has occured every several years in areas such as CPU speed, memory chip density, storage device capacity, video processing rate and data transmission rate. Such monumental changes have a powerful obsolescent effect. New computers replace older ones not just because they are quantitatively faster, more productive, or higher in capacity (though those impacts alone provide considerable incentive to upgrade), but because they enable qualitative changes in the function of the device. Thus new computing hardware opens the door to new and improved software, leading to software and file format obsolescence. The new software will not run on old hardware, further exacerbating hardware obsolescence. At the same time, thenew hardware introduces other new technologies such as peripheral connections (such as USB keys and CD drives replace floppy disks). These changes force older peripherals into retirement along with their compatible computers.

Software dependence; file formats and software; computer files, the objects normally thought of as the main target of digital preservation, are presented according to pre-defined structural and organizational principles, those principles, usually referred to as a file format, are typically laid out in adocument called a format specification. A format specification provides the details necessary to construct a valid file of aparticular type and to develop software applications that can decode and render such files. The actual specifications may vary considerably in length, from well under pages to well over 1000, depending on the complexity of the format. File

formats can become obsolete for a number of reasons: software upgrades fail to support legacy files; the format itself is superseded by another or evolves in complexity; the format “take up” is slow or industry fails to create compatible software; the format fails, stagnates, or is no longer compatible with the current environment; software supporting the format fails in the marketplace or is bought by a competitor and withdrawn.

File formats pose a challenge to digital preservation, anumber of factors have contributed to the challenge presented by digital file formats. During the early decades of computing, the threat of file format obsolescence to the long-term maintenance of digital objects was not widely recognised. No systematic efforts were made to collect software documentation or file format specifications. Without proper documentation, the task of trying to interpret an old file, or even determine what format it was written in becomes daunting. Thousands of file formats and their variants have been created. Only recently has an effort been made to catalog them, document them and understand their relationships and variations. Tools are beginning to emerge to automate the process of identifying and characterizing files by their formats.

Most software is upgraded on a regular basis. Although most applications can read files created with the previous version and perhaps the one before that, the ability to read older versions is often dropped.Files that have not been migrated may not be readable by the latest version of the software and the older version software may no longer be available, or may not run on a current computer, or under a current version of the operating system (Ibid 2005).

Storage medium deterioration; the nature of the physical media on which digital data is stored presents a major challenge to the preservation of digital content. The great variety of media types, their often rapid obsolescence from technological change and their vulnerability to physical degradation all contribute to the problem. There are three commonly used categories of digital storage media: disk, tape and solid state. Within each category are many levels of subcategories, representing both integrated storage (drive and media as a single unit) as well as removable media. One of the major challenges of preserving digital content is the obsolescence of media on which it is stored. Although the media may be able to physically survive for hundreds of years, the technology to read and interpret it may exist for only a brief time (Ibid 2005).

Physical threats; computer components and media canphysically fail due to human error, natural events and even just the passing of time. Digital storage media and hardware are subject to numerous internal and external forces that can damage or destroy their readability such as: material instability; improper storage environment (temperature, humidity, light, dust); overuse (mainly for physicalcontact media); Natural disaster (fire, flood, earthquake); infrastructure failure (plumbing, electrical, climate control); inadequate hardware maintenance; hardware malfunction; human error (including improper handling); sabotage through theft, vandalism (Ibid 2005).

Competing stakeholder interests whereby producers, users, owners, managers, and others have varied and sometimes conflicting interests and desires regarding digital objects. The organization needs a clear and explicit commitment to the establishment of a digital preservation program and an accurate definition of the scope and purpose of the program that balances the interests and priorities of stakeholders. Communication and outreach play an important role in engaging stakeholders'

participation. Stakeholders include content creators or provides designated and future users, and digital preservation managers.

Organizational and legal issues; digital objects can be complex, with shifting or poorly-defined boundaries. They can be ephemeral or can mutate. Their long-term value can be hard to predict. Organizations are investing in the future of the digital assets they select for preservation. These decisions should be well-informed, consistent, reevaluated over time and documented. Selection protocols should be developed to assess the value of the digital objects to the organization.

Ownership and copyright are not simple in the digital preservation world, where migration copies, archival copies, derivative versions and othe states of an object exist, changing over time. Meeting legal requirements for preserving digital objects requires careful, comprehensive, ongoing approaches that avoid risk to the organization or objects and that enable effective mitigation as concerns arise. Thorough procedures, protocols, and documentation strategies provide the most effective organizational response for legal issues (Ibid 2005).

Resource requirements; the organization needs to ensure that its digital assets are safe and secure but at the same time, a digital repository must enable the identification and delivery of digital objects to users. This balancing act between security and ease of access is dificult to mantain. Organizations need to regularly evaluate security requirement based on new threats, new security regulations, technology developments and evolving archival needs. The security requirements provide a checklist to evaluate security measures, identify gaps, respond to new threats and enhance security measures to meet changing needs (Ibid 2005).

2.5.3 Preservation Practices

The current approach to archives preservation combines several practices. These include a wide variety of tasks to ensure permanence of the intellectual content found in an archival collection. These were environmental control, providing appropriate protective packaging, precautions in use and handling, reformatting and addressing presevation implications and need for records of likely archival status at the point of creation (Schwirtlich, 1993).

According to IRMT (1999), preservation encompasses many activities, including;conducting a preservation survey to assess the present state of care of records and archives; transferring and accessioning selected records; storing material properly; maintaining environmental conditions suitable to the material stored; providing accurate and detailed means of access to avoid over handling of archival materials; handling materials carefully; maintaining good housekeeping; deciding whether damaged materials should be copied in some way or sent to conservation; maintaining disaster control plans. The preservation practices reviewed in this literature include:

(a) Conducting a preservation survey; according to IRMT(1999), this should be done to examine all facilities, programmes and materials to determine needs and establish priorities; Steps include survey of the archives building, storage conditions and materials, maintenance procedures, the holdings themselves.

Surveying the archives building

It is important to examine the physical surroundings and the structure of the building and storage locations within it.If problems or dangers are identified, steps can be taken to correct or minimise the problems and protect the facility and its irreplaceable

holdings.When surveying the building, it is important to consider the surrounding area.The neighbouring building can cause as much damage to records and archives as the institution's own facility.For example, a neighbouring building can house flammable liquids, posing a fire hazard, or it can hold food, which might attract pests or rodents.

Surveying storage conditions and materials

Thissurvey should consider the following; if there are temperature and relative humidity controls and if they work properly, if air circulate well throughout the building, particularly in storage areas; if the windows are shaded or curtained to reduce ambient light, prevent illegal entry and protect against pests; if there are air conditioners in place and they work adequately; kind of storage containers in place, their chemical stability.

Surveying maintenance procedures

The following should be considered; if all storage, reference and office areas are cleaned and dusted regularly and thoroughly and the dust removed from the premises; if collections are monitored regularly and checked for physical changes; if the temperature and relative humidity are checked regularly and the findings documented on charts or logs; type of monitoring equipment used.

A physical and environmental monitoring survey report form may be useful for standardising the process of monitoring the conditions in the archival institution.The aim of the report is to document the existing physical and environmental conditions under which records and archives are kept in the institution.The purpose is to provide a general status report of any situations or problems that could put the holdings or facility at risk.

Surveying Holdings

The next step is to conduct a conservation assessment of the records or archives themselves.It is important that, whatever the survey technique, the methodology is documented and repeatable.This will allow for the records to be surveyed again at a later date and the rate of deterioration assessed. A conservation assessment identifies the physical condition of specific records and archives.

Such a survey is important because it is not possible to provide complete conservation treatments for all materials in an archival institution.Copying and repair of archival materials is expensive.The establishment of standards helps ensure the materials used to create records and archives are of the best quality possible.In situations where there are no such standards, or where decisions must be made about older materials, the task of preservation can be challenging.It is important to recognise that decisions will have to be made about what to spend resources on and what will receive more passive care.

Some materials may not receive any conservation treatment beyond good storage.Indeed, some materials may not require any more complex treatment.However, if a series of records appears to require some particular conservation attention, the first step is to conduct a conservation assessment for those records to determine the needs and concerns.This assessment can then form the basis for determining conservation priorities. Completed conservation questionnaires from the assessment establish a firm basis for setting priorities and for projecting funding requirements for replacement, repair and copying work over the long term.

Establishing priorities

Once various materials have been assessed, it is possible to establish conservation priorities.These priorities will relate not only to the physical state of the material but also to its relative importance to the archival institution, its age, legal values and other concerns. As the preservation evaluation questionnaire indicates, there are a wide variety of possible actions that can be taken to preserve records and archives.Some actions require minimal effort and expense, such as replacement through purchase or photocopying.Other actions demand considerable resources, such as extensive treatment of originals or microfilming.

Responsible care usually requires a combination of copying and treatment since many archival materials must be retained in original form.It is also irresponsible to repair materials and then return them to the same environment that seriously damaged them in the first place. When considering preservation priorities, the following should be considered; the general condition of the records and archives, uniqueness of the documents intrinsic value, if the items will be heavily used and if they require major conservation work, the priority or level of use in the office, records centre, or archival institution,nature and extent of damage, how they are stored.

Some materials may be in poor shape but may not warrant treatment; for example, poor quality photocopies of records available in the original may not be worth conserving.On the other hand, original constitutional documents may be worthy of extensive preservation work.The decisions made will depend on the particular circumstances and needs of the archival institution and its sponsor agency.

Once priorities have been set, actual treatments can be undertaken as appropriate.Regardless of the treatments undertaken, records should be kept of the

work done.A conservation worksheet can be completed indicating the work done and any special remarks for future reference.

The study sought to determine whether KNADS conducted preservation or assessment surveys to examine all facilities, programmes and materials, archives building, storage conditions and materials, maintenance procedures, the holdings themselves so as to determine needs, establish priorities,formulate procedures for handling and holdings maintenance, as well as target areas requiring conservation research and treatment development.

(b) Writing a preservation plan, policies and guidelines

IRMT (1999) explain that once a preservation survey has been conducted, and once the organisation has determined the appropriate course of action, it is critical to create a written preservation plan.Such a plan outlines the general and specific actions that will be taken. Itincludes information about both policies and procedures. Policies should be established for: care and handling of materials; control of pests, insects or rodents; conservation treatments; access and reprography; security (who will have keys, who will have access to storage areas).

The policies indicate the institutions commitment to attempt to maintain stable environmental controls, adequate storage and good handling.The plan will prioritise the specific tasks that need attention.For example, the plan will identify what steps should be taken in the short term, what can be done in the medium term and in the long term.

The preservation plan should include the following elements: preservation objectives of the institution (what does it hope to achieve); current status; immediate priorities for action; short-term actions; medium-term actions; long-term actions; who is

responsible for what activities; how the plan will be implemented; how often the plan will be reviewed and revised.

The study sought to establish whether KNADS had written presevation plan/strategy, policies and guidelines with general and specific actions undertaken in preservation and conservation archival materials and how the institution ensured its policies were followed.

(c) Appropriate housing and environmental control

A records repository exists to preserve and protect records stored within it. The environmental conditions within the building, particularly the storage area, need to be appropriate to preserve the archives and protect them from environmental extremes. Therefore, planning for preservation requires that an archivist identifies and lessens the causes of deterioration. This would include providing an appropriate environment for storage of records while keeping away pests that are known to damage records.

(i) Appropriate housing and environment control

In order to provide appropriate housing and environment, the ideal situation is to maintain stable levels of temperature and relative humidity by installing a well-designed air-conditioning system. Such a system will control both the relative humidity and the temperature, and moderate their rates of change. According to (Patkus 2003), research has shown that large and frequent fluctuationssuch as those that occur if the climate controlsystems are turned off or if settings are altered when the building is unoccupiedgreatly accelerate paper deteriation.

Being organic materials, records and archives react to gaseous pollutants, dirt and dust. According to Clements “routine vacuuming is the first defense against such pollutants, while extensive control canbe achieved through controlled air filtration as

part of full-ducted air conditioning" (Clements, 1987). According to Smith, (1999) controlling storage environments to keep temperature and humidity levels consistent and at optimal settings retard the natural processes of decay such as photo-oxidation and acid hydrolysis.

Direct light is harmful to records. The effect of light is cumulative and therefore, light levels must be kept as low as practical in storage, reader and exhibition areas. According to Patkus "many simple means can be taken such as use of blinds or shades or use of ultra violet filters on windows and exhibition cases to reduce light levels and heat gains" (Patkus, 2003).

According to IRMT (1999) maintaining the physical environment is one of the most important actions in providing physical care for records and, particularly, for archives is to house materials in the best environment possible.If the physical environment is not adequate, it is not likely that the defect can be made up by other means. The institution needs to ensure its basic storage facilities are acceptable. Ensuring the environment is stable is one of the most important preservation actions an institution can take.

The best modern archival facilities are purpose-designed and built, providing a safe physical environment for the materials held within them. The building's temperature and relative humidity are stable and within acceptable limits.Dust and pollution particles are at a minimum because of good quality filter systems.Lighting is suitable to the particular needs, whether they be storage, reference or office use.In successful buildings of this kind, the basics of environmental preservation occur naturally.The main duty of archives staff in this situation is to monitor the building to see that no defects develop, and that there are no areas that do not conform to the general

standard. Controlling the environment can dramatically improve the state of records and archives.

In instances where such a building is not available, it is necessary either to provide an artificial environment by using air-conditioning and filter systems or to use natural means of ventilation to improve air circulation and control temperature and humidity levels.Backup systems are important; if the archival institution relies on air conditioners to control the temperature and humidity, it may be necessary to have emergency backup equipment, which can take over if the main equipment fails(Ibid 1999).

(ii) Space and Accommodation

Space is one aspect that is highly important as it ensures information materials as well as people handling the materials are well accommodated. Provision of adequate and appropriate space for the information materials by extension promotes access and security of the same.

According to Acker and O'Connell (2010)an archives and record storage building must have working environments that are safe, secure, healthy, comfortable, durable, aesthetically pleasing and accessible. Administrative office space, archival and preservation office space, and permanent storage space for the stored archival and record materials must be accommodated.

(iii) Pest Control

Biological agents can cause irrepairable damage to archival material. Biological substances such as fungi- mould or mildew- grow in damp and dark places and can harm archival material as well as people. Pests such as insects and rodents can also be aproblem/. Dust, dirt, clatter, food, drinks and cellulose (the major component of

paper) are a food sourcefor a number of living things and attract vermin. Measures such as chemical fumigation have traditionally been used to control biological pests in archives, but such chemicals have been recognised as being harmful to humans (Clements, 1987). However, a policy on 'integrated pest management' is currently considered more effective (Harvey, 1993).

An integrated pest management programme would include: regular inspections to locate problems as early as possible; environmental control to maintain temperature and relative humidity at levels that do not attract biological pests; good housekeeping to remove dust, dead insects and similar food and water sources for biological pests; alteration of features of the archives building and storage areas that attract pests e.g. stagnant air pockets, or outside lights positioned where they attract insects into the building; removing affected materials and treating them by such methods as freezing, irradiation or placing them in a low oxygen atmosphere and establishing a quarantine area where affected material can be treated from to avoid infecting tthe rest of the collection (Ibid, 1993).

Musembi, the former Director of KNADS noted that: " providing appropriate housing for archives has remained a major challenge. We do not havea purpose-designed archives building. It is an adapted one. And the building is located right in the city centre, which is also fairly polluted. However, all attempts have been made to keep it clean. Attempts to provide an appropriate environment for preservation of records have remained futile...to reduce the dangers of pollution in the storage areas, which house sensitive materials, air conditioning facilities have been installed" (Musembi, 1999). This study sought to establish the status of KNADS building, its effects on preservation and conservation practices, measures that have been put in place at

KNADS to control the storage environment and pests/insects, in order to ensure appropriate housing for records and archives.

(d) Protective shelving and enclosures

Another preservation practice is the choice of storage equipment and enclosures for archival materials. According to Ogden (1999), some materials can produce by-products that react to form acids and other damaging chemicals in the presence of moisture and oxygen. This can be aserious problem in closed furniture like map cases, file drawers, locked bookcases, or exhibitcases, where pollutants can build up.

The enclosures commonly used for paper-based materials include encapsulation for single sheet items, folders for unbound documents, boxes for larger items and bound items whose bindings have been damaged. Non-paper materials such as microfilm reels can be housed in boxes. On the importance of proper storage of records, Walsh states that: “The important point to grasp is that it will always be far cheaper to invest in good storage than spend money trying to rescue the results of poor storage”(Walsh 2006).

There are a number of benefits in the use of protective packaging. Enclosures and the environment around them act as a buffer zone to slow down the rates of change in temperature and relative humidity levels. They provide protection from light, dust and airborne pollutants, water, smoke, heat and other destructive agents. Materials used for the enclosures should be mechanically and chemically stable so that they do not damage the materials they are supposed to protect. Paper and board should ideally be ‘permanent’, acid free and alkaline buffered. Harvey observes that: “It is better to enclose boxes made from board that does not meet this standard than not to provide any protection at all” (Harvey, 1993).

In order to ensure materials are safely stored on shelves, IRMT, (1999) recommend that, all shelving units in the repository should be identified and coded.Bays and shelves should be clearly labelled with the bay number and shelf letter, such as 43A, referring to Bay 43, Shelf A.At each end of each row of bays there should be a label showing the range of bay numbers there.It is wise to establish a formal process for shelving materials, to ensure materials are retrieved and replaced quickly and safely.

Enclosures are the paper folders, boxes or plastic sleeves used to hold records and archives. they are storage containers, specifically archival-quality containers such as acid-free envelopes, folders or boxes, used to hold records or archives and protect them from hazardous elements. Professional conservators are always testing and reviewing archival enclosures to ensure they meet adequate environmental and archival requirements. Ideally, enclosures will provide good physical protection, absorb or neutralise harmful gaseous emissions, be free of deleterious chemicals or products and allow the removal and replacement of materials without any damage (Ibid 1999).

Whether or not archival-quality enclosures are used, all paper archives should be boxed to protect them against the usual causes of deterioration: water damage, light damage, predators and dirt.Boxes used to store or transport food should not be used to house records or archives as there may be residual food particles in the boxes that might attract insects or rodents.

Maps and plans should be placed flat in chests if possible.If this is not possible, they should be rolled over the outside of a cardboard tube and secured with cotton tape.Reels of microfilm or cine film should be kept on plastic spools, inside custom made archival quality card, plastic or rust-proof metal boxes.Photographs may be kept

in albums, or in individual acid-free folders, and then in boxes (Ibid 1999).KNADS being a public office taking care of public records and archives, it is expected that paper records are filed in file folders, as is the practice in public offices in the country for official correspondence to be filed. Therefore, all the paper records acquired for preservation should be filed in paper folders, which act as the protective cover for the papers exept for books and other publication in the National Documentation Service. Once processed, the records should be kept in paper folders and kept in acid-free boxes. Hence, the study sought to assess the packaging and shelving practices at KNADS to determine if they provided effective protection of records and archives in all formats and media.

(f) Reformatting

Reformatting is copying of material from one medium to another, usually a more durable medium. According to Shep (2006), the use of reproductions is a preservation strategy to make objects available when the originals are too fragile or would be subject to undue deterioration or loss.

Reformatting offers many advantages with preservation benefits. Firstly, having more than one copy gives added security in case of accidental damage, especially when the copies are stored in more than one location. It minimizes the possibility of losing the materials altogether. Secondly, accessibility is enhanced because more users, in multiple sites, can use the materials simultaneously.

In acknowledging the benefits of reformatting, Jefcoate noted that “the British Museum library, saw multiple benefits in reformatting: it obtained preservation copies of key collection works; it achieved a conservation benefit by being able to restrict access to many originals; it reduced presssure on its facilities (atleast in theory) by

making its collections availlable as photographic facsimiles at libraries abroad; and it received royalties on the sales of its materials'' (Jefcoate, 2003).

The value of reformatting in archival institutions is also clearly brought out by Heslop, Davis and Wilson when they state that, "National Archives of Australia selects, maintains and preserves government records of enduring value and makes them available for public acesss 30 years after their creation. These materials are created in single copies and any loss or damage will result in the loss of the information altogether, and therefore such materials are usually a priority for reformatting" (Heslop et al, 2002).

IRMT (1999) explain that, when archival materials are extremely fragile, heavily used, deteriorating or highly valuable, it is common for archival institutions to reproduce the materials and make the copies available for research use.The originals are then kept in safe storage or sent for conservation treatment. There are a number of methods of reproduction or reprography, including microfilming, photocopying, photographic reproduction and digitisation.At present, four types of copying are considered suitable in an archival environment.These include microfilming, photocopying onto permanent paper, photography using archival quality black and white film, and imaging or scanning materials into an electronic form.

Whether it is photocopying, microfilming or digitization, reprography should not be done as an adhoc process.Rather, it should be part of a well-planned programme that addresses management as well as technical considerations.

Prior to copying by any method, records managers and archivists must ensure that the proposed copying meets the requirements set out in copyright and any other relevant laws or regulations, such as evidence acts, or that are embodied in administrative

documents, such as donor/depositor agreements. While making one static preservation copy on paper or film is usually permitted, the production of more copies or easily duplicated electronic ‘copies’ could constitute infringement of copyright.Such would certainly be the case if the institution plans to post the material on the Internet or sell the copies to researchers or to other research institutions.

It is wise when considering a copying programme to contact appropriate legal experts on evidence and copyright for current advice on the viability of proposed copying projects. If donors or depositors have forbidden or restricted copying, try to amend the agreement with them or their heirs to permit duplication for preservation (Ibid, 1999).

Reformatting options include microfilmimn, digitisation and photocopying.

(i)Microfilming

According to Roberts, “archivists are likely to use microfilming for one or more of the following purposes: to prolong the life of documents; to make material more widely available; to reduce high cost storage; to protect the security of vital original records” (Roberts, 1993).Despite increasing interest in new technologies, preservation microfilming remains an established and valued strategy. Properly produced and stored microfilms have a lifespan of about 500 years.

According to IRMT (1999), microfilming is one of the major means of reproducing and preserving records and archives.Microfilming is also a valuable way to provide security or reference copies of recorded information, either in offices or in archival institutions.

Microfilming concentrates information into a compact and relatively easy-to-use form, so that information from many records may be stored in a small space and read using microfilm or microfiche readers.

As a preservation medium, microfilming has several advantages over photocopying and ordinary photography. First, it dramatically reduces (by up to 90%) the space required for keeping large collections of records, archives or information.Second, although it is not inexpensive to produce initially, microfilm is relatively low cost to duplicate and ship, making it an ideal medium for 'publishing' textual research materials. Third, a properly produced microfilm copy is recognised legally as an acceptable substitute for originals, protecting the records from unnecessary handling. However microfilming is a black and white medium, and it is difficult to copy colour originals effectively.

There are many other benefits to copying records and archives onto microforms.These benefits include:providing multiple copies of records within or outside the archival institution without damaging or risking originals; preserving the original order of records preventing disorder or loss of information; ensuring the safe preservation of information through the provision of security copies of documents; protecting original records by providing copies for research use; saving money, particularly in an office environment, through reductions on storage space, increase in speed of retrieval and improved security;

There are drawbacks to microfilming, including the following: poorly organised records will be more difficult to use on microfilm, as disorganised information is more difficult to retrieve; microfilming is costly and so, if poorly planned, can be a heavy expense without adequate benefits; in many countries, microfilm copies of

records may not be admissible in a court of law; the preservation of microfilm requires good quality environmental conditions, which can be difficult to achieve; microfilming requires high technical standards; if these are not achieved the benefits of microfilming are outweighed by the drawbacks of poorly produced or rapidly deteriorating films. it will be necessary for the archival institution to have readers or printers available for public and staff use; users often dislike microfilm as it can be difficult to use and can cause eyestrain and fatigue.

Given the benefits and drawbacks of microfilming, it is critical that any programme to film documents be well planned and organised(Ibid 1999).

The appropriate storage and preservation of microforms is critical to the success of a microfilming programme.Microfilms can also provide copies and so offer security against losses incurred through fire or theft.

Microforms should be stored at a temperature of between 18-20^{o} C, with relative humidity at 35%; it is particularly important to avoid fluctuations of temperature and humidity.At the very least the temperature and humidity should be within the range given for paper; if several types of film are to be stored in the same area, the recommended relative humidity is 30%.

Total darkness is ideal for storage.Microforms should be handled gently, with gloves, and without touching the surface.Microforms should be kept in a dust-free environment, in boxes or containers that keep out dust and light and, for microfiche, in acid-free paper enclosures or envelopes if possible.Master microforms should be considered ‘originals’ when it comes to storage and protection; the storage containers should be labelled clearly with the title of the materials, other relevant descriptive information and whether the film is a master negative, master positive or copy.

Once films have been made, copies produced and originals stored, the master negative and intermediate masters should be handled as infrequently as possible and always carefully.The equipment on which they will be viewed or copied should be kept clean and well maintained (Ibid 1999).

The study sought to assess how microfilmingof records and archives as a reformatting option and preservation practice is applied at KNADS.

(ii) Digitization

Wordnet (2009) defines digitization as "the process of conversion of any physical or analogue item into an electronic representation." The digital images are stored on media such as CDs, DVDs and DAT tapes. By converting the original copy and placing its digital copy on the computer, the files can be manipulated, stored and accessed with ease. Digital images provide alternative copies that can be accessed and thus help preserve the original copy. According to Walsh, in digital preservation, " the major goal of creating and maintaining a digital version of an object is that should the original item suffer any deterioration or damage, there is a digital copy which can act as a surrogate. If an item is already fragile, then the digital surrogate can be viewed instead of the original, thereby reducing the possibility of further deterioration." (Walsh, 2006).

Archival institutions have equally embraced digitization as a matter of necessity. According to davis, "digital records are no longer a rarity. Individuals, governments, businesses and institutions routinely create and capture digital information. Access to personal computers and the internet has fostered expectations of unlimited and perpetual access to records and information. These expectations and the technical challenges posed by digital records themselves, require the national Archives to

explore new ways of preserving and maintaining them" (Davis, 2004). As such, archival institutions have therefore embraced digitization since they have to deal with preservation of digital records emanating from the offices that create records.

One of the reasons that would have led archival institutions not to view digigtization as a preservation practice is technological obsolescence. However, reformatting within the digital arena seems to have resolved the problem. In addressing the issue of obsolescence of digital technology, Walsh notes that: "...in theory, this means that copying the content to another format when this one becomes obsolete is nothing more than pressing a button and leaving the computer to do the processing" (Walsh, 2006).

Considering the ease with which an institution can overcome the matter of obsolescence, it is noted that archival institutions have embraced digitization as one of the preservation strategies.

According to IRMT(1999),digitisation is not recommended without extensive consultation with experts in computer technologies, preservation and record keeping. Digitisation, the transfer of records or information into electronic form, is an increasingly popular activity in archival institutions in many countries.Document image processing systems allow for the conversion of materials from paper or other form, to machine-readable form, which allows them to be stored and viewed electronically, saving space and increasing accessibility.The preservation benefits of digitisation have yet to be proved.While electronic images certainly take up less room, their long-term stability is not guaranteed, so regardless of whether an archival institution or records office makes use of digital technologies for copying, it is likely to wish to retain the originals in safe storage.

Digitising is also an extremely expensive process.Not only are there costs associated with purchasing and using the equipment, but there are also hidden expenses, such as the need to review or, for textual materials, proofread and edit all digitised items to ensure their accuracy.If digitised materials are not acceptable in a court of law, originals will still have to be retained, putting into question the purpose behind digitising.And it is necessary to consider the long-term consequences of digitising.

Utilising new scanning and imaging technologies to make exact images of traditional records and archives is a very complex and fast changing area of study.There are many types of scanners and equipment for viewing and reproducing scanned images.However, like microforms, scanning projects must be well planned and the records carefully prepared, identified and authenticated to ensure a usable and legally admissible outcome.The important thing to remember is that, at present and for the next few years, there are no imaging or scanning technologies that offer the same extent of reliability, standardisation and quality assurance as micrographics.Records management professionals cannot yet trust the preservation of irreplacable documentary evidence to these technologies: scanned copies cannot 'faithfully reproduce' the integrity and full functionality of reliable and authentic source records (IRMT, 1999).

"...the national archives approach is to convert digital records into open preservation formats to guarantee access to their contents in the future" (Heslop et al, 2002).

The study sought to find out how digitization is done and its effectiveness in preservation of archival materials at KNADS.

(iii) Preservation photocopying

Photocopying is aprocess, which makes paper copies of documents and other visual images quickly and cheaply. According to Brown, “photococopying may bethe best alternative in situations where users prefer a copy that closely resembles the original form” (Brown, 2003). This option is available where financial resources do not allow microfilming or digitisation imaging as options for preservation. It is especially suitable for materials that are heavily consulted yet microfilming is less appropriate because it requires reading equipment and may encounter user resistance.

According to IRMT (1999), another method of reprography is photocopying.Photocopying has become such a common practice in many archival institutions and offices that the need for policies and procedures is often ignored.However, it is important when developing a preservation reprography programme to consider photocopying and to establish appropriate guidelines to ensure the physical quality of the originals and the copies is protected. Although photocopying is a daily practice, it is important to establish policies and procedures to protect both originals and copies.

Just as a microfilming programme depends on a clear understanding of the purpose, scope and nature of the work to be done, a photocopying programme should be well thought out.Photocopying is an excellent way to protect originals and provide reference copies, although the high light levels generated from copiers must be considered when copying fragile items.Many of the key issues involved with developing photocopying policies are the same as those for developing other reprographic policies.

Photography may also be used as a preservation tool, particularly for copying original photographs.Copy negative or prints can be made and used in place of originals, ensuring originals remain as secure and stable as possible.Photographic reproduction can also be used for documents and maps, although the benefits are sometimes outweighed by the costs of photography; in such instances, microfilming is often a better alternative.When developing a preservation programme, it is important to consider photography and determine an appropriate role for such technologies. Again, it is important to consult preservation experts about methods and quality control (Ibid 1999).

The study set out to establish if preservation photocopying and photography are part of the practices adopted by KNADS. It also sought to establish the reformatting practices applied and whether they promoted effective preservation of records and archives.

(g) Disaster management

The purpose of disaster management is to have a preparedness and response plan. It requires that an organization provides guidelines for the identification, storage and protection of vital records. It also provides a guide for the development of adisaster recovery plan to manage these records before and after a disaster and to ensure that the resumption of business of the organization can continue through a sound recovery system.

According to Harvey (1993) disaster planning is basically preventive and may include preventing disasters by planning (prevention); reducing hazards (preparedness); establishing procedures to cope with disasters (reaction); coping with a disaster by putting into practice procedures that are understood and have been rehearsed

(recovery).Implementing emergency preparedness strategies by equipping storage areas with water-damage protection and training staff in urgent response to catastrophes, manmade and natural, and by taking other similar steps, is arisk management strategy to print and non-digital research collections.

Adisaster management plan is vital for archival institutions. KNADS as an organization should have adisaster management plan that should also cater for other public offices. The study sought to find out disaster management measures in place at KNADS and whether KNADS had adisaster management plan covering records within the department and other public institutions.

(h) Security measures

IRMT (1999) explain that an important factor in protecting records and archives is the provision of adequate security measures, to protect the people working in the records office, records centre or archival institution and to protect the valuable records and archives housed in storage areas or repositories.A number of security measures can be implemented at little or no cost.The decision about what types of security measures are required and to what extent will depend on the particular needs of each institution.Regardless of the systems implemented, security measures should be based on good planning, to ensure budget and staff limitations are taken into consideration and the specific needs of the organisation are identified.

Before any security measures are put in place, it is important to assess the security needs of the institution and determine the possible effect of security procedures on staff, users, and archives.New security processes can be intrusive and disruptive and so need to be chosen with some consideration of how staff and users will accept the

changes.A first step in security planning is to examine existing systems and processes and the role of staff in their management, to determine gaps and needs.

Staff and users may pose security risks that should not be ignored. When investigating the security of staff and users in archival institutions the following should be considered: if there is a procedure for checking the background of potential employees to the records office, records centre or archival institution; the number of staff members with easy access to record storage areas or restricted zones and if all of them need this access; how long it has been since combinations or keys have been changed; if there is a staff member in the public or reference areas at all times; ifstaff has been trained in security management issues; if staff has been advised what actions to take in the event of thefts or damage; whether staff are required to wear badges or identity tags,if all persons without such identifiers are challenged in order to ensure their presence on the site is legitimate; the type of identification required for users; whether users, public or internal, are interviewed before they gain access to records or archives; whether users are advised of security concerns and reference rules; what users areallowed to bring into the reference areas of the archival facility, if their personal belongings are securely stored if they are not allowed in the reading room; what information is contained on retrieval documents in archival repositories or records centres; number of archival materials users are allowed to have at any one time; whether materials are kept in public areas when not in use or are kept behind the reference desk or in office or storage areas; if the reading room of an archival institution has been arranged so that users can be watched at all times; if users have access to storage, staff or restricted areas; whether users in archival institutions are allowed access to unprocessed materials; whether users' belongings are searched when they leave the archival institution (Ibid 1999).

Once a security assessment has been completed, the next task is to implement specific security measures, in order to reduce risk.The following steps should be taken to prepare staff: screen new employees carefully to ensure they are trustworthy and that they understand the importance of protecting the materials in their care;

Train staff on security procedures, including techniques of observation and appropriate methods of approaching users who may be mishandling or abusing materials;

Ensure all staff and contractors wear appropriate identity tags and challenge anyone not holding appropriate identification;

Consider identifying one or more individuals to serve as security officers, who will monitor the reference and storage areas and ensure that records, archives and individuals are safe and secure.

Security measures should also be applied to visitors to the institution.For example, all visitors should register upon arrival, and users of archival materials should read and sign a statement of rules and regulations. The institution may also choose to ask for identification before allowing users into the research area (Ibid, 1999).

It is critical to remember to lock areas securely whenever necessary, even when people are leaving the room or building only for an hour or so.No locking system will protect against theft if it is not used.There must also be a system for key security that ensures that only authorised persons have access to keys.

In addition to good locking systems, the institution may wish to consider installing alarm systems.The simplest alarm system is an alarm bell that goes off if a door, window or other entrance is opened when it should not be.It is possible also to install

surveillance equipment, such as closed circuit television cameras.Such equipment is very expensive and is usually only considered by agencies with extremely valuable materials or sufficient funds to warrant the cost.Not only is the equipment expensive, but it is also necessary to have someone or staff to monitor the television screens constantly, or else the cameras are of little value (Ibid 1999).

The study sought to establish the security measures put in place at KNADS, the gaps therein and ways of improving the security situation to protect staff, users, other stakeholders and documentary heritage for posterity.

(i) Establishing Standards

Another action according to IRMT (1999) that can be taken to improve the physical care of records and archives is to establish institutional standards for records creation and care.Standards that can be established include standards for; the type of paper used for original documents and for photocopying; the type of storage containers or shelving used; the types of file folders used; the types of staples or fasteners used; the types of equipment purchased, such as photocopiers and so on (for example, thermal fax paper fades very quickly; the image can disappear in a matter of weeks)

Identifying International Standards so as to improve preservation of records and archives can be done in reference to The International Standards Organisation (ISO) - a non-governmental organisation established in 1947; to promote the development of standardisation in order to help facilitate the international exchange of goods and services as well as to help develop cooperation in intellectual, scientific, economic and technical activities.The International Standards Organisation promotes standards in a range of areas, including records care. ISO has established many standards that affect the preservation of records and archives, particularly with regard to quality of

microfilm, photographic equipment, paper quality and so on.The study sought to determine whether KNADS had set or adopted or identifyed any international standards in preservation and conservation of archival materials.

(j) Annual Stocktaking

IRMT (1999) suggests that, in order to keep a check on misplaced or missing records or archives, and to check on the state of items in the repositories, there should be an annual stocktaking of the material held on the repository shelves.It may be necessary to suspend normal work programmes during it, and to limit access to records or close the search room for a period.Stocktaking should take place not just in the archival institution but also in the records office and records centre. Annual stocktaking is critical to ensuring the safe return and storage of records and archives.

Before the annual stocktaking each staff member in the entire organisation should be sent a list of records or archives that have been issued to them but have not yet been returned.Staff should be asked to return those records no longer needed.Any item still required by a member of staff should be inspected so that its whereabouts are confirmed.A new entry for the item should be made in the production register, with a cross-reference between the new and the original entries.

During stocktaking, staff should assess the physical condition of the material, looking for signs of insect infestation or mould growth or identifying any physical deterioration or damage.It is particularly important to identify archives according to different categories, so that resources may be allocated appropriately to their care: these categories include; in good condition: unlikely to need attention from conservators in the foreseeable future; weak but serviceable: would be better for attention but not in urgent need; unfit for production: must receive conservation

treatment before consultation; misplaced documents that need to be found and retrieved.

During the stocktaking, the following information should be noted on the stocktaking form: signs of mould growth; signs of insect infestation; documents not in place or in the wrong place; labels missing from shelves or boxes; boxes that need replacing; shelving or other equipment in need of repair or replacement; signs of damp or accumulations of dust in areas of the building; materials in need of repair.

Once the annual stocktaking is completed, the finished forms will form the basis for conservation planning for the next year (Ibid 1999). The study sought to find out whether KNADS undertook annual stocktaking exercise as a way of assessing the physical condition of the archival materials, looking for signs of insect infestation or mould growth or identifying any physical deterioration or damage so that affected records could receive conservation treatment.

2.5.4 Conservation Practices

Conservation practices retain asignificant position in archival institutions because of continuing deterioration of records through aging and other factors. Conservation involves a range of methods and techniques prescribed and applied to documents to repair them, make them usable and protect them from further damage, usually carried out in conservation laboratories. According to Harvey, " it is worth noting that mordern archives preservation has relegated traditional conservation as one of the possible strategies to be used in the total archives preservation programme" (Harvey, 1993). It is increasingly recognized that conservation activities carried out in the past were not appropriate because they were labour intensive and were often oriented towards treating individual documents or items. Musembi stated that: "document

repair is avery slow and labour intensive process, and as labour costs are becoming increasingly high, the cost of repairing archival documents and publications is increasing quickly (Musembi, 1999). From this information it is clear that conservation practices have their challenges but they retain a significant position in archival institutions because the wear and tear of records and archives can only be minimized but cannot be eliminated. As aresult there is room for repair of damaged archival materials.

According to Kathpalia, (1978) and Jayakumar, (2006) the various conservation methods are:

(a) Full-pasting: this kind of repair is done on those documents that have suffered from acid destruction and written on one side only e.g. maps, wall charts.

Materials and tools: Adhesives such as starch paste or glue for sticking the supporting materials on to the document; supporting material- which could be handmade paper or any other that is of higher quality; water for smoothening and relaxing the affected documents; smooth brush, pair of scissors, glass topped table and rollers.

Procedure: The document to be repaired is first prepared by spraying it with thin films of water uniformly (Since water is used, it is important to precede this by testing the stability of ink); a piece of material is cut to size that is slightly larger than the document and relaxed by immersing it in water and spread on a table with a glass top; it is smoothened with a soft piece of cloth and rolled lengthwise; the document is put facing down on glass top table and a coat of starch paste applied with a brush; rolled hand-made paper is put on the edge of the document and unrolled on the document;unrolled paper is pressed simultaneously with a dry piece of cloth or cotton

swab; the pasted document is removed from the glass top and dried under pressure with reinforced side downward; the oversize hand-made paper or cotton material is trimmed with a pair of hand scissors to the size of the document leaving a margin of 2-3 mm all round to safeguard the edges of the document when in use.

(b) Chiffon repair and tissue repair; this method of repair are suitable for very fragile documents in all stages of document deterioration. It is applied on documents written on both sides to strengthen them using chiffon material and Japanese tissue paper.

Materials and tools; Japanese Tissue paper or chiffon material which is transparent is suitable for repairing both sides of the document;adhesive such as carboxyl methylcellulose used for sticking; brush, weight rollers, a pair of scissors, water for relaxing the document.

Procedure: The sheet to be reinforced is spread on valeen paper/glass top table, sprayed with water and CarboxylmethylCellulose (CMC) paste is applied on it; tissue paper or chiffon material larger than the document size is placed on one side of the document and spread lightly from one edge of the document to the other; tissue paper or chiffon material is pressed with a wet cloth or cotton swab; the other side of the document is treated similarly.

(c) Solvent/hand lamination; this is a method that holds the document between tissue papers using an acetate film as an adhesive. It provides some strength to fragile documents written on both sides.

Materials and tools; Cellulose acetate which will act as an adhesive; acetone solution to dissolve acetate in preparation of adhesive;Japanese tissue paper to act as reinforcingmaterial; cotton swabs, glass topped table.

Procedure; A relaxed de-acidified document is put on a glass topped table; it is covered with a piece of cellulose acetate film which is larger than the document. This is used to stick the paper on the document; a tissue paper is put on top of the cellulose acetate film; a cotton swab is dipped in acetone and used to touch the corners of the assembly to make them firm; the assembly is turned over and the above exercise/ procedure is repeated; the cotton swab is put at the centre and spread sideways; the adhesive dissolves the acetate film in a semi-plastic condition to stick the tissue paper onto the document.

(d) Salvage of water damaged documents

Documents that have been exposed to flood or rain or rendered wet are likely to suffer damage due to rotting, attack of mildew or fungus, therefore should be treated as soon as possible.

First of all, the atmosphere of the room where these documents are located is treated with 10% thymol solution in methylated spirit to eliminate spores in the air; secondly, completely soaked documents are separated from slightly wet documents and brittle ones; wet papers are carefully separated from one another and kept individually between white blotting paper and spread on valeen papers in a well ventilated room; the blotting paper is changed as often as possible until documents dry.

Results;Documents that have clogged together separated;wet records dried and restored back to original status, original order of records and labels there unto maintained.

(e) Fumigation

This is defined as a process of exposing insects/fungi infested materials to fumes for the purposes of eliminating the invasion. This takes place in closed chambers or cupboard which is airtight. Vacuum fumigation with carbon dioxide is the most effective method of eliminating dangerous enemies of records (Jayakumar, 2006).

For small offices which may not be in a position to afford such expenditure, fumigation with crystals of Para-dichlorobenzene or liquid kiloliter may be adopted, continues (Ibid 2006). The procedure involves: Arrangement of records in the vacuum chamber in an inverted V-shaped position; close the entrance and seal it; remove air using a simple pump; introduce fumes from fumigants by pumping them from evaporating chemicals like hydrochloric acid gas methyl formate, carbon dioxide gas etc; allow materials to be exposed to the fumes for sometime; remove materials and clean them;

(f) Spraying with insecticides

In areas where insecticides are visible they should be sprayed using recommended insecticides in relation to ones documents. According to Jayakumar (2006), complete elimination of insects requires the use of poisonous dust powders, D.D.T (DichloroDiphenylTrichloroethane), pyrethrum, sodium fluoride etc. these poisonous powders and insecticide liquids are sprayed in places frequented by insects

(g) Deep freezing

According to KNADS conservation procedures manual, deep freezinginvolves putting documents which are affected to temperatures below the freezing point of water (below 0°) to kill insects, fungi and remove moulds. Documents are put in clear polythene paper, tied with apiece of rope and placed in a deep freezer for 48 hours.

This method is preferred to fumigation because does not involve use of chemicals (fumigants) which might be harmful to human beings.

(h) Binding; binding of information materials is undertaken to protect, repair and also restore those covers and pages fallen off from the spine. According to KNADS Conservation procedures manual, the following are some of the methods of binding that can be applied: velo binding, spiral binding, soft cover, case binding and flush binding

(i) Velo binding

Materials required; Two velo binding strips, Two binding covers (one clear, one cover) and Velo binding machine.

Procedure; This is done by use of two strips, one with holes and the other with spikes; the papers to bind are sorted out and punched together by using the bind punching machine including the covers with the clear on top and other at the bottom; the spikes are put through the holes of the paper; the strip with holes is put into the bind machine;the papers with spikes through are inserted through the holes of the other strip in the machine; the bind button on the machine is switched on; the pressure and heat from the machine fastens the strips together and trims the spikes that are out of the holes.

(ii) Spiral binding

Materials required; Spiral binding machine, spiral binding covers (clear and cover) and spiral of the required size.

Procedure; this involves use of the spiral binding machine to make perforations which are used to stick the papers together using the spirals. Perforated papers are put

between two perforated covers; a spiral of appropriated size is put through the spikes on the spiral binder machine and opened up by the same machine to allow inserting of the papers; papers are inserted and the spiral closed up and removed from the machine; the excess spiral is trimmed off to the right size at the edges of the document.

(iii) Soft cover binding

Materials and tools: Soft cover binding machine, Binding thread, Binding cloth and Binding glue.

Procedure; The papers to be bound are punched using the soft cover binding machine at the spine of the document; the papers are sewn together by passing of thread through all the sheets in the volume; the sewn spine is then clothed with the binding cloth using binding glue.

(iv)Case binding

Materials and tools; Binding glue, End paper, Strawboard, Brown paper and Binding cloth

Procedure;Papers to be bound are stuck together using binding glue on the spine; end paper is folded once and stuck on both sides of the document; a strip of brown paper is cut and put round the spine of the document; strawboard is trimmed into appropriate sizes and covered with the binding cloth using binding glue to make the cover of the document; this cover is then stuck to the document using binding glue.

(v) Flush binding

Materials and tools; Binding glue, Strawboards, End paper and manila paper

Procedure; End paper is folded once and stuck on both sides of the document and reinforced with brown paper on the spine; Light strawboard is cut into two pieces and

stuck at both sides and reinforced by the binding cloth; The original cover of the document is stuck on the appropriate sides using glue, if it came with the document if not available; Manila paper is used as the cover.

Lettering is done on the documents which cannot be easily identified because some of the binding processes and materials used can easily give the document some slightly different appearance from the original.

(i) Lamination; lamination adheres plastic to original materials, and this plastic can be removed only with great difficulty and with a high risk of damage to the materials within.An alternative to lamination is encapsulation, which encloses materials in a plastic container, which can be cut away and removed if necessary (IRMT, 1999).

(j) Encapsulation; according to IRMT (1999), encapsulation involves containing a document or item within sheets of polyester, which are sealed or joined at the edges.Commercial 'pockets' are available in varying sizes with one, two, or three sides sealed, or single sheets may be used and joined on all four sides.This process provides a physical support for fragile or brittle materials and allows handling of items without danger of tearing or other damage.Unlike lamination, encapsulation is easily reversed, simply by cutting off the edge seal holding the polyester sheets together and removing the item.The most efficient way to seal the edges is with the use of a small polyester welding machine.Heat- and ultrasonic sealers may also be used for encapsulation, but this involves the purchase, maintenance and use of the necessary equipment.If these technologies are not available the edges can be joined by sewing or by using double-sided tape.

Encapsulation protects materials but does not reverse the damage caused by acidity or degradation.As well, chemical deterioration will not be halted or slowed with

encapsulation.In an ideal situation, a document would be deacidified before it was encapsulated.However, this is not always possible; if the document to be encapsulated has not been deacidified, it is important to ensure that the edges of the polyester are not completely sealed, as this would increase the acid concentrations within the 'pocket' and speed the deterioration of the item.

Because a static charge builds up on the document once encapsulated, no documents should be so treated that have loose or flaky ink or writing, are made of pastels, charcoals, watercolours, or crayons.Major tears should be mended before encapsulation; smaller tears or fraying will be held in place by the encapsulation and will not tear further.Damp or mouldy material should not be encapsulated as this will encourage mould growth and deterioration.

Encapsulation is not an inexpensive process and is best used for highly valuable items with great intrinsic value, or items that are handled in their original form on a regular basis.It is important not to see encapsulation as a solution to broader preservation problems.Rather than spend funds on encapsulation of large quantities of material, money might be better spent on environmental controls or monitoring equipment.

To encapsulate materials, the following supplies are required: Archival quality polyester sheets (no other materials should be used; the polyester used should contain no coatings, UV filters or other added chemicals);grid to layout and measure sheets; double coated tape (ideally '3M Scotch' brand, which is the only tape recommended for this process); lint-free cotton cloth; weights; scissors; roller to flatten polyester over document (called a brayer); sewing machine or needle and thread.

To encapsulate a document, place a piece of polyesteron a grid, wipe it with the cotton cloth to remove any dirt and to set up the necessary static charge.Do not rub

hard, as the surface of polyester scratches easily.Then align the document on the polyester, aligning it on the grid so there is a one-inch margin of polyester around all four sides of the document.Once aligned, place a clean weight on top of the document to keep it in position.The ‘sandwich’ may now be sewn on all four sides, ¼" in from the edges using a sewing machine or needle and thread.

If double-sided tape is to be used apply the tape, apply the double-coated tape to the polyester, approximately ⅛ inch away from the edge; use the grid as a guideline.The tape is covered with strips of tape that cover the adhesive; do not remove the cover on the tape at this point, so that the tape can be adjusted before final sealing.Wipe a second piece of polyester with a cloth so it is clean and the static charge is set up, then place it clean side down onto the document, aligning it with the piece of polyester on the bottom.

Then remove the weight and place it on top of the new sheet of polyester to hold the entire package in place.Roll out excess air with the brayer or cloth, then remove the strips of paper from the tape on two sides and gently press down so that the two sheets of polyester adhere to each other.Be absolutely sure the document itself remains well within the polyester and is not touched by the tape.Again remove air pockets and then remove the paper from the other two sides, pressing down and removing air bubbles until the document is completely sealed.

Finally, trim the package with a paper cutter or blade, leaving approximately 3 centimetres (1 inch) inch away from the tape on all four sides. It is wise to round the corners of the package so they are not sharp; rounding reduces the chance that the edges will tear or damage anything else they contact.As mentioned above, some

experts recommend that corners should be cut off leaving a small unsealed area through which the document can ‘breathe’.

The level of acidity or alkalinity in something is measured on a pH scale, an arbitrary numerical scale ranging from 0 to 14. Neutrality – a state neither too acid nor too alkaline – is found at 7.0. All numbers above 7.0 represent increasing alkalinity; all numbers below 7.0 indicate increasing acidity. The scale is logarithmic, with each number representing a tenfold change in acidity or alkalinity. Thus a pH of 5 is 10 times more acidic than a pH of 6, and a pH of 4 is 100 times more acidic than a pH of 5 is 10 times more acidic than a pH of 6 (Ibid 1999).

(k) Testing the pH of paper

The level of acidity or alkalinity in something is measured on a pH scale, an arbitrary numerical scale ranging from 0 to 14. Neutrality – a state neither too acid nor too alkaline – is found at 7.0. All numbers above 7.0 represent increasing alkalinity; all numbers below 7.0 indicate increasing acidity. The scale is logarithmic, with each number representing a tenfold change in acidity or alkalinity. Thus a pH of 5 is 10 times more acidic than a pH of 6, and a pH of 4 is 100 times more acidic than a pH of 5 is 10 times more acidic than a pH of 6 (IRMT, 1999).

It can be useful to test the pH of paper records or archives, if there are concerns about high acidity. It is also possible to test the pH of archival storage materials, to ensure they are as stable and neutral or alkaline as they are supposed to be. There are a variety of methods available for testing the pH of paper. Unfortunately, some require the use of expensive equipment, such as a pH meter, while others leave a permanentmark on the object being tested and so should not be used when testing original archival materials. One safe method for testing archival materials is the use of

a pH indicator stick or indicator paper. The paper registers the pH range of the item being tested. The following steps should be taken:

Place asmall piece of polyester under the areas to be tested, to protect the item and contain the moisture.

Place adrop of distilled water on the area to be tested (do not test near ink, as the ink may be fugitive, that is, it may be soluble in water).

Lay one end of the pH indicator in the drop of water and move it around to wet the entire end of the indicator.

Place a second piece of polyeste on top of the pH stick and cover with a light weight tto provide even pressure.

After about five minutes, remove the top layer of polyester and the pH stick and check the colours on the stick against the colour chart provided by the manufacturer of the pH indicator.

Gently blot any remaining water on the paper then place the paper between dry blotters under a light weight to allow it to dry completely without warping (water stains may remain from the test).

To get best results, test the paper in several spots and compare results. If the indicator shows a reading below 7.0, the paper is acidic, if the reading is above 7.0 the paper is alkaline. Any paper below 6.0 is highly acidic and should be isolated from adjacent non-acidic papers by wrapping it in archival quality paper or storing it separately. Testing the acidity of paper should be done only if there is a suspicion that large quantities of material are acidic or if there is a possibility that materials may be deacidified. While testing the pH of paper can be a valuable way to identify acidic

materials, the process can be time consuming and costly. In an institution without established preservation facilities, it is important to decide if the time and effort is warranted; safe storage of materials may be an appropriate solution until professional assistance is available (Ibid 1999).

(l) Mass-Deacidification

One of the problems that archival institutions have to deal with is paper disintegration due to acidity. Restorers have for many years been using methods of de-acidifying single sheets. Recently, technical processes have been developed which can be applied to documents on a large scale. Such processes are referred to as mass de-acidification. According to Kleified, "the aim of mass de-acidification process is a significant improvement of the paper's stability. It is achieved by neutralizing the acids present in the paper and adding an alkaline reserve that will provide long-term protection against a renewed build-up of acid. The de-acidification process does not usually result in an improvement in the physical properties; although most paper benefits from lasting strength when there is simultaneous resizing process. Further deterioration of the paper is brought to a halt provided it is then correctly stored" (Kleifield, 2007).

According to Jones "the shortcomings of mass de-acidification include unsuitability for some kinds of material, an inability to strengthen already brittle and weak paper (even though it is de-acidified) and high costs. Therefore, a mass de-acidification program would be most beneficial for newly created materials on acidic paper, or for older vulnerable paper that still retains some strength". This observation led the preservation team at the National Archives and Records Administration (NARA) in the United States of America to decide to: focus on two important areas-first;

improvement of environmental conditions for storage of records; and second, improvement of the quality of new records by stipulating that they be created on better paper (Jones, 2002).

While decrying the challenges in preservation of records and lack of viability of mass de-acidification, Harvey observes that:

"…the only safe mass preservation technique for archival records is careful packaging and storage of documents within environmentally controlled storage areas" (Harvey, 1993).

It is in the interest of any archival institution then to emphasize preventive preservation while applying prescriptive preservation (conservation) in as limited situations as possible.

Most archival institutions focus on preventive preservation with little emphasis on prescriptive preservation (conservation). The little emphasis on conservation as stated, made it necessary for the study to assess the conservation practices (presciptive preservation) at KNADS given the following facts as stated in the statement of the problem;some of the archival materialsacquired by the KNADS are already old, and in poor condition as ilustrated by conservation registers 2010-2012 and survey reports 2010-2012; most of the archival materials which were acquired in good condition deteriorated when in the archives during access and/or use since number of deteriorated records in paper formats has been increasing over the years according to the Conservation Registers and Annual Reports, 2007 to 2012; and that the figure could even be higher since not all detriorated documents have been conserve due to inadequate funds and skilled manpower.

2.5.5 Effectiveness of Preservation and Conservation Practices

According to Wikipedia, the free encyclopedia (2007), effectiveness is the capability of producing a desired result: when something is deemed effective, it means it has an intended or expected outcome. Oxford dictionary defines effectiveness as the degree to which something is successful in producing a desired result. While business dictionary defines effectiness as the degree to which objectives are achieved and the extent to which targeted problems are solved. The definitions are related and therefore the study related with all of them. As explained in the statement of the problem, some of the archival materialsacquired by the KNADS were already old, and in poor condition as ilustrated by conservation registers 2007-2012 and survey reports 2010-2012; most of the archival materials which were acquired in good condition deteriorated when in the archives during access and/or use, since number ofconserved records in paper formats had been increasing over the years according to the Conservation Registers and Annual Reports 2007 to 2012; and that the figure could even be higher since not all detriorated documents had been conserved, it was important for the study to determine the effectiveness of the preservation and conservation practicves because ineffectiveness of those practices was likely to be the most contributing factor to the situation.

2.6 Methods and Tools of Preservation and Conservation

According to Rhys Lewis (2000), various equipment and tools required for preservation and conservation include: stainless steel conservation sink, domestic refrigerator, drying rack, guillotine, brushes, steel rulers, scissors, small tacking hammer, blades among others. Methods of preservation and conserrvation are as discussed under preservation and conservation practices.

According to Musembi, list of conservation equipment and materials recommended by Albert H. Leisinger were; a fumigator, a humidifying chamber, equipment for the cleaning of records, removing mould, de-acidification tanks, several hand presses, kits for determining the acidity of paper, various chemicals, materials for the encapsulation of documents in mylar or polyster film, paper Cutters –2, Gestetner duplicator, GestetnerVelo-Bind System, a complete line of materials and supplies for both conservation and book binding.

Additional equipment recommended for purchase by Mr J S Rhys-Lewis as quoted by Musembi were; Conservation sinks, Drying racks, Lightboxes for the benches – 3, Blocking press, Microscope (not a priority), Bead-weld polyester encapsulator, Combined hot-plate and mixer, Nipping press – 1, Chemistry beakers, bowls and other related equipment, Brushes. Lewis also recommended that each member of staff in the conservation workshop should have a personal toolkit for which they are exclusively responsible.The kit should contain:- Brushes of various sizes – 5, Hammer, Non-slip metal ruler, A pair of scissors (medium size), Bone folders – 3, A pair of tweezers, Retractable blade 'Stanley' knife, Scalpel blade handles(Musembi, 1999)

The study sought to find out preservation and conservation methodsand tools at KNADS and their appropriateness to preservation and conservation practices.

2.7Challenges in Preservation and Conservation of Archives

According to Dureu& Clements (1986) preservation in the digital world challenges librarians and archivists, but not necessarily due to a lack of understanding of digital technologies, selection criteria, or appropriate preservation options. The technologies are becoming understood well enough. Informed choices about what to preserve in the

digital world and the best ways to accomplish preservation goals both derive from this understanding. The real challenge is creating appropriate organizational contexts for action. In the view of Darling et al (1980), the major obstacle to thedevelopment and administration of preservation programs is the shortage, not of money, as many suppose, but of knowledge. Darling further observes that financialconstraints are serious and will become more so; but until the preservation field reaches the point at which most people know what ought to be done and how it should be done, the lack of money to do it on a scale appropriate to the need is not terribly significant." The basic consciousness-raising task for preservation may have been accomplished for the world of paper and film. It is just beginning for the digital world.

In reference to challenges accruing from need to sustaining the digital content overtime, Howard Besser (2000) outlines five longevity problems specific to preserving digital content:

(I) The viewing problem is the fact that electronic content is stored on physical devices that deteriorate and require proactive planning to migrate and assure longevity.

(II) The translation problem focuses on understanding that "work translated into new delivery devices changes meaning" (Besser 2001). A simple example is a motion pictureresized for the television screen.

(III) The custodial problem concerns determining who will be responsible for the longterm preservation and authentication of digital content. Will it be archivists, computer tecnologists, others, or a collaboration of many?

(IV) The scrambling problem for digital televisionis twofold and relates to the compromise of using compression techniques to satisfy limited storage and bandwidth transmissioncapabilities and encryption schemes to protect content, which make future access potentially a problem. Compression compromises the integrity of original content and encryption adds another layer of complexity to a fragile digital object.

(V) The interrelational problem concerns the complexity of related information to and within a digital object. Because boundaries of information sets or digital objects are not usually defined, this raises not only custodial concerns but also intellectual property concerns.

Another challenge is that of finances. Conway (1996) contends that significant financial barriers slow the design and implementation of effective preservation strategies.

Information managers in African countries especially librarians, records managers and archivists are currently facing the problem of effective preservation and conservation of information materials in their libraries. Mnjama and Wamukoya (2004) (cited in Olatokun (2008) point out that there were real challenges faced by East and Sourthern Africa member countries in the capture and preservation of records. These include: absence of organizational plans for managing records; low awareness of the role of records management in support of organizational efficiency and accountability; lack of stewardship and coordination in handling records; absence of legislation, policies and procedures to guide the management of records; absence of core competencies in records and archives management; absence of budgets dedicated for records

management; poor security and confidentiality controls; lack of records retention and disposal policies and absence of migration strategies for records.

Acase study undertaken by Akotia (2000) in the Ministry of Finance in Uganda on the management of financial records in government, established that throughout the government of Uganda, ICT was considered an indispensable tool for enhancing productivity. Yet little attention was paid to the information management issues and to understanding the forces of change that affect the form and integrity of the record created within an Information Technology environment.

Popoola (2003) (cited in Olatokun (2008) submitted that information professionals in african society today cannot wave aside the obvious fact that the continent stands the imminent risk of losing so much of its valuable documented heritage in consequence of ever increasing deterioration of paper and other media on whichthey have been stored. He observed that the problems of deterioration are caused by three stakeholders in the information sector namely: the government, users and the information professionals working in the available information systems. He recommended that the only antidote to this problem of rapid degradation and decay of information materials is the formulation and implementation of sound preservation and conservation policies and programmes on african information resources.

A survey of of preservation and conservation practices and techniques in Nigerian university libraries by Olatokun (2008) revealed that the prominent inhibitors to effective and efficient preservation of information materials in african libraries, archives and record centres include the following:

(I) Inadequate finance: Almost all African libraries, archives and information centers do not allocate adequate funds in their annual budget for the preservation and

conservation of information materials in their holdings. This has really caused the low priority or lack of desired attention given to the preservation and conservation of information resources by the management of such libraries and archives.

(II) Inadequacy of equipment/materials: lack of suitable or inadequate equipment and materials contributes significantly to the present poor status of preservation and conservation of information materials in African libraries, archives and information centers. Some of the essential materials and equipment required for setting up functional conservation and restoration laboratories in African libraries and archives are not availlable locally.

(III) Unfavourable Government Economic Policies: The economic policies of most African governments do not favour library and archival services, so preservation and conservation activities are not given the prioritity attention they deserve. Such economic policies include those concerning high duties and tariffs charged on imports of preservation and conservation equipments.

(IV) Tropical climate: the effects of tropical climate of excessive temperature, high relative humidity, dust and rodents that feed on paper-based materials cause rapid deterioration and decay of information resources in African libraries and archives. These agents of rapid deterioration and decay of information materials add more to the costs associated with conservation and restoration of information materials in African libraries, archives and records offices. Mwiyeriwa (1998) (cited in Popoola 2003), while stressing the great need for a well established document repair and conservation units in Africa observes that with the exception of air, fungi, insect, and pests are more pronounced in the continent than elsewhere.

(V) Manpower and other infrastructure: For any preservation and conservation programme to succeed in libraries and archives there must be adequate and well-trained manpower (Ngulube, 2001). This is because preservation and conservation of information resources is aspecialised field of knowledge that requires information professionals who understand the physical and chemical nature of materials in their library and archive holdings. Popoola (2003) advocates the need to expose librarians and archivists to conservation and restoration practices during their training. Akussah (1991) (cited in Popoola (2003) suggests that such a training programme should include, operating environmental control, storage and housing, operating environmental systems, designing new buildings or renovation of buildings. Africa has not been able to train students adequately in the area of conservation and restoration of information resources dur to lack of functional laboratories where students could undergo practical works. Addedto this is the problem of inappropriate buildings, poor power supply and water supply that pose great threat to presrvation and conservation of information resources in African countries.

(VI) Lack of preservation and conservation policy: Most African countriesn do not have a national information policy which makes the formulation of preservation and conservation policies in the libraries and information centers out of the question (Wamukoya&Mutula, 2005). Kemoni (1996) (cited in Popoola (2003), reviewed the conservation programmes of archive materials in Kenya and found that the conservation departments did not have adisaster control plan. The absence of such a plan means that in the event of a disaster, they would not be in a position to respond to the disaster with the urgency that is required.

(VII) Quality of paper and ink: The low quality of paper and ink used in the production of information materials especially library book materials and paper-based

records in archives and records offices pose serios danger to preservation and conservation of information materials in African countries (Popoola, 2003).

Smith (1971) explainsthat there is a large portion of the world's area and population, known collectively as the "developing countries," in which both archives and records management either do not exist or are in a primitive stage ofdevelopment. In these countries, moreover, the difficulties of establishing and maintaining a records program and of obtaining the necessary resources and popular support are formidable by any standards. This is because there are many practical reasons for assigning a low priority to archival institutions in developing countries and these are:

The urgent need for economic development has a clear priority over cultural concerns in the allocation of available resources;

The related need to improve standards and conditions of living gives priority not only to economic development and related employment opportunities but also to hospitals, housing, transportation, and welfare;

An emphasis on education and training is required, not only to provide needed leadership and professional and technical expertise but also to release the latent capacities of whole populations where illiteracy is high;

The desire to transform emergent societies from materially primitive and dependent colonies to prosperous, well-informed, and self-reliant countries places a high value on information. But the urgency of problems of the present and plans for the future reduces the interest in the past and the incentive to study it. Indeed, the colonial experience may be considered in some quarters "a record of disgrace."

Unifying diverse racial, religious, and social elements is essential to bringing about cohesiveness and a sense of common identity and united purpose. In attaining this object the printed word and mass media seem to be more effective than unpublished records. Indeed, for the purpose, propaganda may seem more expedient than authentic evidence of the past;

Effects of the typically tropical climate in developing countries make the task of preserving original records difficult, expensive, and seemingly disproportionate to the research value of the records;

Voluntary non-government support from individuals and such groups as local historical societies is lacking;the support of historians, who in North America have been the most effective advocates of the establishment of archival repositories, is divided and uncertain. In the case of developing countries, historians often seem to be more interested in obtaining microfilm copies of records from the archives of former colonial powers than in promoting the establishment of repositories for records that originated locally;

The serious lack of trained archives and records management personnel deprives developing countries of local leadership and adds to the difficulty of diverting scarce funds to an area of low priority;

Where records management and archival systems do not exist, a need for them and an understanding of their value is not felt and is difficult to explain convincingly without being able to demonstrate benefits.

Challenges facing preservation of digital archives such as: Legal/Copyrights Issues. Who owns it? Selection of archival materials for digitization should first be based on

a clear understanding of copyright law and rights of ownership (Stefano, 2000; Tennant, 2000)(cited inAsogwa and Ezema (2012).

Does physical ownership mean rights of reproduction? Physical ownership of records does not mean that an institution owns the rights to reproduce it. One of the most important selection criteria for digitization will be the copyright status of the original materials. Will it be possible to obtain permission to digitize? After digitization, will African institutions be able to protect the digital assets by managing the rights to their use?

Inadequate Funding: - Digital projects are expensive. Digitization of archives requires enormous funding due to frequent hardware and software upgrades, and increasing cost of subscription to electronic databases (Jain, 2002; Mutula, 2003)(cited in Asogwa and Ezema (2012). Apart from inadequate funds to train archivists in Africa, training of archivists in digitization and preservation creates a notherproblem.

Computer Phobia: Due to inadequate skills in information technology in Africa, many traditional librarians and archivists are conservatives and have phobia for computers. Because of generation gaps between the new and old professionals, computers are perceived as a threat to their status as experts. Thus, they find it difficult to cope or measure up with the requirements of the electronic/digital age, and are at the same time 'too reluctant to change from the old practices for new one' (Ayoku,2008). Successful application of information handling technologies in developing countries requires an ability to overcome staff and personal resistance to such innovation.

Technical Expertise:One of the biggest challenges to preservation and conservation of archives and records in developing countries is educating the library community on the best ways to handle library and archival materials. This challenge is exacerbated

by the fact that preservation is not at the center of most library science curricula. There are few places or nowhere, for example in Nigeria where one can receive formal specialized education in preservation and conservation of archives and records. Added to this is the fact that inadequate technical expertise is prevalent in many African countries. There is shortage of personnel/human capital. Few librarians with computer science qualifications (computer engineers) work in archives and libraries, hence the consequent frequent break down of ICT facilities and disruption of services in digitized libraries and archives. In many African countries, human resources with appropriate skills, competences and attitude are not readily available to initiate, implement and sustain digitization project, and most African states are still lagging behind in technological and telecommunications infrastructure. Added to these is the fact that african trainers (archivists) lack expertise and are ill-equipped to train others in electronic preservation and digitization as was obtainable in America and other European countries.

Inadequate Technology Infrastructures:Frequent power outage constitute serious bottleneck to digitization in Africa. This has the effects in damaging digital equipment and where there is a standby electric generator, the cost of running them is prohibitive. Added to this is the harsh environment of Sub-Saharan Africa which is not always friendly with technology equipment. “Most countries in Africa” Zulu (1994) reports, “do not have adequate and reliable supply of electricity which consequently makes it impossible to maintain a conducive and sustainable technological environment suitable for digitization project in the continent”. Again, telecommunications infrastructures in most African countries are either lacking or poorly developed, and few African states have modern digital and packet switching telecommunications facilities needed for data transmission.

These and other reasons explain the low priority which has been given to archives and records management in developing countries. This therefore implies that archives and records in these countries are in poor state and that due to lack of adequate budget for preservation measures, conservation practices are inevitable.This study sought to find out challenges that wereexperienced by KNADS in preservation and conservation of archives which could be causing ineffectiveness of those practices.

2.8 A Strategy for Preservation and Conservation of Archival Materials

According to Scottish Council on Archives discussion on 18th March 2012, the purpose of a preservation and conservation strategy is to ensure the continuing preservation of an archive service's holdings. It identifies preservation issues which may be currently affecting archival material and guides the preservation and conservation practice of the service.

It is a particularly useful document when dealing with issues that may affect the preservation and conservation of holdings, such as moving to a new building, changes in conservation provision, or dealing with the aftermath of an emergency. The strategy can also help to guide the allocation of resources in forward planning. The depth and detail of the strategy will depend upon the size and type of archive service.

From Wikipedia (2007), the free encyclopedia, astrategy is a high level plan to achieve one or more goals under conditions of uncertainty.

Henry Mintzberg(1998) describesa strategy as a plan – a directed course of action to achieve an intended set of goals, similar to the strategic planning concept. In line with Wikipedia, the free encyclopedia and Henry Mintzberg's definition of astrategy as plan, IRMT (1999) explain that once a preservation survey has been conducted, and once the organisation has determined the appropriate course of action, it is critical to

create a written preservation plan.Such a plan outlines the general and specific actions that will be taken. Itincludes information about both policies and procedures. The plan will prioritise the specific tasks that need attention.For example, the plan will identify what steps should be taken in the short term, what can be done in the medium term and in the long term.

The preservation plan also includes the following elements: preservation objectives of the institution; current status; immediate priorities for action; short-term actions; medium-term actions; long-term actions; who is responsible for what activities; how the plan will be implemented; how often the plan will be reviewed and revised.

Strategy typically involves two major processes: formulation and implementation.Formulation involves analyzing the environment or situation, making a diagnosis, and developing guiding policies. It includes such activities as strategic planningand strategic thinking. Implementation refers to the action plans taken to achieve the goals established by the guiding policy.The format of the strategy document and its presentation style depend on the audience and the nature of the topic.

Having an effective and current records management strategy in place, and monitoring it regularly, will help an organisation to more effectively meet the objectives of the strategy.

The study sought to establish whether KNADS had a written presevation strategy with actions undertaken in preservation and conservation of archives. In the absence of the same, the study sought to develop and propose a strategy to promote a systematic approach in preservation and conservation of archival materials for long term usability at KNADS.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that the study adopted. It coversresearch design, population sample and sampling techniques, data collection methods and instruments, techniques for data analysis, presentation and interpretation.This studyadopted qualitative research approach using descriptive research design.

3.2 Research Design

Research design is used to structure the research, to show how all the major parts of the research project work together to address the research questions. This study adopted qualitative research approach using descriptive research design and applied purposive sampling.

3.2.1 Qualitative Research Approach

The study adopted qualitative research approach.According to Creswell (2002) qualitative researchers tend to collect data in the field at the site where participants experience the issue or problem under study. This up-close information gathered by actually talking directly to people and seeing them behave and act within their context is a major characteristic of qualitative research. In the natural setting, the researchers have face-to-face interaction over time.

Qualitative research approach was deemed appropriate for the study because it provided a flexible way of gathering data, analyzing and interpreting data collected and it gave the study a desciptive capacity. The qualitative research approach encouraged greater interaction between the researcher and respondents thus helped collect in depth holistic data from members of staff at KNADS on their opinions,

perceptions, skills, knowledge, suggestions and attitude with regard to preservation and consevation practicesusing interviews and observation methods. Interviews were used to collect data from staff at management level on policy issues and co-ordination of preservation and conservation practices. Interviews were also used to collect data from archivists, assistant archivists, secretaries and clerical officers from all the sections in the department while observation method was used to collect data from custodial and technical sections. The researcher interviewed staff and observed the condition of archival materials, the building environment, storage equipment and conditions, environmental controls, security, emergency preparedness facilities, potential threats to records, condition of preservation and conservation equipment and how they were used. Data was analysed descriptively using descriptions and narrative explanations.

3.3 Study Population

A population is any group of institutions, people or objects that have atleast one characteristic in common (Kothari, 2004). A study population possess some common characteristics and conforms to given specifications. According to Mugenda and Mugenda (2003), population can be classified as target population or acccessible population.

3.3.1 Target Population

Target population is the entire group of people or objects to which the researcher wishes to generalize the study findings, the researcher is interested in describing and making statistical inferences about, while accessible population is a subset of the target population to which a researcher has reasonable access. In this research, the target population comprised of all the 60 members of staff working at KNADSheadquaters, Moi Avenue in Nairobiaccording to KNADS Staff List 2012.

They includedthe top management staff - the director, deputy directors and heads of sections who formulate and co-ordinate policy issues on preservation and conservation practices; technical staff-officers in the technical sections such as Microfilming, Conservation, ICT and Audio-Visual sections involved in preservation and conservation work; custodial staff-officers in the sections involved in storage and retrieval of archival materials and artefacts, such as Repository, NDS, Searchroom and Art gallery; operational staff - officers involved in other operational work in the department whose operations affected preservation and conservation of archives due to their involvement in handling of records. They included staff in the general administration.

3.4 Sample and Sampling Procedure

A sample is a subset of the population which is selected to represent the population during the study, whereas sampling procedure is the process of selecting a sample from a population (Kothari, 2004). For the purpose of this study, purposeful sampling technique was used.

Purposeful sampling is the deliberate choice of an informant due to the qualities the informant possesses (Buhigiro, 2012) (cited in Silas 2018). According to Tangco (2007) a researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowlegde or experience. It aims to afford the researcher, the opportunity to use cases that have the required information based on the objectives of the study.

Purposive sampling was used to select KNADS department headquaters on Moi Avenue in Nairobi because it was the only national archival institution in the country with the responsibility of preservation and conservation of archival materials. The

researcher purposively selected respondents whowere the members of staff at KNADS. These included Archivists, Archives Assistants, Clerical officers, Records Management Officers and Secretariesinvolved in preservation and conservation practices. This is because they had the relevant information with respect to preservation and conservation practices as they were directly involved in those practices through handling of records and archives.

3.5 Sample size

In qualitative studies the aim of sampling is not to get a representative sample of the population but to get valid, meaningful and insightful information from the sample size.According to Hardon, Hodgin and Fresle (2004), qualitative researchers often refer to the redundancy criterion:that is, a researcher should stop collecting data when there is no new information on which is forthcoming.The sample size in this study consisted of 45 respondents which was 75% of the target population.

Table 1: Sample Size Analysis

Section/Category	**Target Group**	**TargetPopulation**	**Sample Size**
Management level	Director	1	1
	Deputy directors	2	1
	Heads of sections/divisions	5	5
Technical staff	Archivist	1	1
Conservation	Archives assistant II	1	1
	Printing assistant II	2	2
	Support staff	2	2
Microfilming	Archivist	2	2
	Archives assistant II	3	2
Audio–Visual	Archivist	2	2
	Archives assistant II	1	1

ICT	Archivist Clerical officer	1 1	1 1
Custodial/technical staff Repository	Archivist Archives assistant II	1 5	1 4
NDS	Librarian	5	3
Art gallery	Clerical officer Archives assistant II	2 1	2 1
Searchroom	Clerical officer Archives assistant II	1 3	1 3
Operational staff General administration	Clerical officer Archives assistant II RecordsManagement Officer Secretaries Drivers Support staff	3 4 1 4 2 2 2	2 3 1 2 0 0 0
Total		**60**	**45**

The sample size consists of 45 respondents who were segmented as follows:

i) Management level staff: this comprised of 7 officers: the director, one deputy director-incharge of professional services and 5 heads of sections. This was because, it was at these level that policy issues on preservation and conservation practices were coordinated. Data was collected using interview method.

ii) Technical staff: this comprised of 15 officers in technical sections involved in preservation and conservation work. This was because they were better placed to provide the required technical data. These included staff at the Microfilming, Conservation, ICT and Audio-Visual sections.

iii) Custodial/technical staff:this comprised of 15 officers in all sections involved in storage and retrieval of archival materials and artefacts. These included staff in the Repository, NDS, Searchroom and Art gallery,

iv) Operational staff: this comprised of 8 officers involved in other operational work in the department. They were included in the study because their operations affected preservation and conservation of archives due to their involvement in handling of records. These included staff in the general administration.

3.6 Data Collection Methods

Qualitative research data collection methods were used to collect data. This included: interview and observation methods to collect data. According to Mills (2003) (cited in Silas 2018) qualitative research uses narrative and descriptive approaches for data collection to understand the way things are and what they mean from the perspective of the research respondents. This was done as follows:

3.6.1 Semi-Structured Interview Method

Saunders, Lewis and Thornhill (2003) opine that interviews allow the researcher to collect valid and reliable data that is important to research questions and objectives. Interviews may be highly formalized and structured, using standardized questions or they may be informal and unstructured conversations. Based on the structure, interviews can take three forms, that is structured, unstructured and semi-structured method.

This study used the face to face semi-structured interview method to collect data from KNADS staff atthe management level to get information on policy issues and the co-ordination of preservation and conservation practices. Semi-structured interviews were also conducted with other KNADS staff. The semi-structured interview method,

according to Kothari (2004) is preferred for descriptive studies, because of providing a safe basis for both comparisons across cases in addition to enabling for generalisability.The face to face interviews provided a good means of probing for more information hence enabled the researcher to gain more detailed information. Interviews provided an opportunity for the interviewer to investigate the responses of the participants which allowed her to pursue in-depth information around the topic (McNamara, 1999).

3.6.2 Observation

Observations were particularly helpful in identifying occurrences that might not be discovered thoughinterviews, including those that a respondent might not freely talk about in an interview or a respondent might take for granted (Patton, 2002). It captures the unexpected, unusual or unsaid (Mayoux, 2012). Observation method was used for data collection in this study. Observation is a fact-finding technique in which the researcher participates in or watches performance of activities with an aim of learning about it**.**Robson (2002)(cited in Silas, 2018) notes that interviews are notorious for discrepancies between what people say they have done and what they actually did, therefore observation provided useful checks for these.

Participant Observation

The researcher observed by participating in preservation and conservation activities in various custodial and technical sections of the KNADS department. It was the most suitable technique for collecting data during survey of repositories and storage areas. Among the itemssurveyed and observed were the buiding environment, storage equipment and conditions, potential threats to records, condition of records (extent and nature of deterioration of records), preservation and conservation methods applied

by staff,the official activities and duties staff undertook, condition of preservation and conservation equipment and how they were used, among other issues.

Information obtained from observation related to what was currently happening. It therefore did not depend on past behaviour or future attitude or intentions. With accurate observation, accurate data was collected.

This method provided the researcher with reliable data and additional information that was notobtained through interviews. It was a valuablecomplementary method to interviewing, on the basis that what people do is likely to be more revealing than what they say. Observation was found to be evaluating real life situation or getting first hand information.

Participant observation and interactive interviews enabled collection of reliable, consistent, primary and first hand information that was useful to the study.

3.7 Data Collection Instruments

3.7.1 Interview Schedules

This refers to a set of questions by the researcher to the respondents. This study used semi-structured interview schedules to obtain data from members of staff at KNADS. The use of this instrument made it possible to sustain the focus of the study by pegging questions to specific objectives. The interview schedule provided room for probing, elicitation of more questions and clarification of issues and therefore the researcher got as detailed information as possible. During the interviews, responses were recorded through note taking. The interview schedules are provided in Appendix I, II and III.

3.7.2 Observation Checklist

The observation checklist was used in the study. The checklist focused onpreservation and conservation activities in custodial and technical sections which included repositories and storage areas. Using the checklist the buiding environment, storage equipment and conditions, potential threats to records, condition of archives, preservation and conservation methods applied by staff,the official activities and duties staffundertook, condition of preservation and conservation equipment and how they were used among other issues were observed and recorded. The Observation checklist is provided in appendix IV.

The researcher participated in activities of custodial and technical sections and this participation enabled respondents become more comfortable with the researcher and gave the researcher understanding of whatwas happening in those sections. The researcher was able to observe the respondents as they worked and gathered additional information on their opinions and attitudes concerning preservation and conservation of archives. This information complimented the information given by respondents in the context of interviews.

3.8 Validityand Reliability of Data Collection Instruments

Noble and Smith (2012) define validity as the integrity and application of the methods undertaken and the precision in which the findings accurately reflect the data while reliability describes consistency within the employed analytical procedures. According to Brink (1993), qualitative researchers avoid the terms validity and reliability and use terms such as credibility, trustworthiness, truth, value, applicability, consistency and confirmability, when referring to criteria for evaluating the scientific merit of qualitatively research. To understand reliability and validity in a qualitative

research, different definitions are given by many researchers from different perspectives.

According to Golafshani (2003) validity is concerned with the accuracy and truthfulness of research findings. McMillan and Schumacher (2006) point out that validity has the ability to address the question whether the researcher captures what the researcher thinks is valid. Validity is used to judge whether the research accurately describes the phenomenon that is intended to describe (Bush, 2007). Reliability on the other hand, is concerned with the consistency and repeatability of the respondent's accounts as well as the researchers' ability to collect and record information accurately (Brink, 1993). Joppe (2000) defines reliability as "the extent to which results are consistent over time and if the results of a study can be reproduced under a similar methodology." Cooper (2003)(cited in Silas 2018) defines validity as the extent to which a test measures what it intents to measure.

To determine both validity and reliabilityof data collection instruments, a pilot study(a pre-test study) was undertaken. The researcher pre-tested the interview schedules by having interviews with one deputy director, two heads of sections and two respondents per category of sections. The observation checklist was pre-tested by observing a few storage areas and one section per each category of sections. The checklist was then modified in relation to the observations made in the pre-test. The results of the pretest interviews with the first respondent were similar with those of the second respondent and thus reflected the expected output.

To enhance validity and reliability of the study, the researcher created rapportwith the respondents so as to establish good relationship and obtain credible information. McMillan and Schumacher (2006) note that positive relationship between the

researcher and respondents is key to obtaining credible and truthful information from the respondents.Another aspect that was used to improve validity and reliability of the study was that the findings of the study epecially on the number of deteriorated archives, repaired and unrepaired deteriorated archives, adequacy and appropriateness of equipment and tools and challlenges experienced, were compared with information captured in the progress reports by all the section heads over a period of time and the findings in the observation checklist. This helped ensure consistency and credibility of the results.

3.9 Data Presentation, Analysis and Interpretation

The data collected was analyzed and interpreted bearing in mind, the objectives and research questions of the study. Qualitative data in this study was analyzed using thematic analysis, a qualitative analytical method described by Braun & Clarke (2006) as a method used to identify, analyze and report patterns or themes within data. Thematic analysis emphasizes pinpointing, examining and recording patterns or "themes" within data (Daly, Kellehear&Gliksman 1997) (cited in Silas, 2018). Themes are patterns across data sets that are important to the description of a phenomenon and are associated to a specific research question (Fereday, Jennifer Elimear 2006) (cited in Silas 2018). In addition, Creswell (2002) defines qualitative data analysis as primarily an inductive process of organizing data into categories and identifying patterns (relationships) among the categories.

To give structure to the data captured by instruments in this study, data analysis involved organizing the raw data collected from KNADS into themes based on trends, patterns and relationships. According to Strauss and Corbin (1990) during coding, data is broken down into discrete parts, closely examined and compared for

similarities and differences and questions asked about the phenomena as reflected in the data. Once patterns had been identified, data was grouped to create themes that were used in the study. The analysis focused on ensuring adequacy, usefulness and consistency of information under each theme, in relation to the research questions and objectives. The key themes in the study were diversity of archival records and their formats, preservation and conservation practices, appropriateness of methods and tools for preservation and conservation, challenges encountered in preservation and conservation. Data presentation and reporting ran concurrently and was guided by the need for giving analytical view, citing significance and implication of the findings in a descriptive manner in form of text.

3.10 Ethical Considerations

Ethics refer to principles or rules of behaviour that act to dictate what is actually acceptable or allowed within a profession (O'leary 2014). William (2005) (cited in Silas 2018) defines ethics in terms of a code of behaviour appropriate to academics and the conduct of research. The researcher conformed to ethical considerations as follows: the researcher took responsibility for the study and its outcome, observing confidentiality and honesty. Purpose and aims of the research were explained to the respondents. The respondents were not forced to answer any questions and any information provided by the respondents was mantained in confidence. Honesty was upheld to ensure that the respondents were well informed of any ways that the information they provided was to be used. Respondents were also given a quarantee that they will not be named in the study. The researcher also ensured that all documentary sources of information or data were acknowledged. Permission was sought for access and use of a few documents from KNADS for basic information such as history and mandate of KNADS and the researcher obtaineda research permit

from the National Council for Science, Technology and Innovation to conduct the research.

3.11 Chapter Summary

This chapter discussed the research methodology applied in conducting this study. The chapter has elaborated on the study population, sample and sampling procedure. It also coveredresearch design, data collection methods and instruments, strategies for data analysis, presentation and ethical consideration.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter is based on data collected through interviews with staff at KNADS at Management level, Microfilming, Audio-Visual, ICT, Repository, NDS, Art Gallery, Searchroom, Conservation and General Administration sections. This was complemented by data collected through observation. Observation method was used to collect data on preservation and conservation activities in custodial and technical sections. Observation was done on the building environment, conditions of storage, condition of records and potential threats to records, condition of preservation and conservation equipment and how they were used among other issues. The analysis in was guided by the study objectives. Data was analysed descriptively using descriptions and narrative explanations.

Based on the objectives, the analysis was done along the parameters under the Delta Plan Model of Preventive Conservation Strategies and The SPOT Model for Risk Assessment. Since the study adopted the qualitative research approach, the meanings derived from the findings were generally qualitative. To make them clearer, descriptions and explanations were used to present the data.

4.2 Response Rate

This study had a hundred percent (100%) response rate. This was made possible by various strategies adopted by the researcher such as; scheduling meetings through appointments set by the respondents and designing clear interview schedules.

The table below gives a summary of the response rate:

Table 2: Response Rate Analysis

Sampled Population Groups	Study Sample	Number of Respondents
Managerial staff	7	7
Technical staff	15	15
Custodial staff	15	15
Operationalstaff	8	8
Total	**45**	**45**

The table above represents 100% response rate of 45 respondents. These consisted of seven officers at management level - The Director, one Deputy Director – Incharge of professional services and 5 heads of sections. The seven provided information on policy issues in relation to preservation and conservation practices. Other respondents included; technical staff consisting of 15 officers in technical sections involved in preservation and conservation work. The officers provided the required technical data. They included staff in the Microfilming, Conservation, ICT and Audio -Visual sections. Custodial staff consisting of 15 officers were drawn from sections involved in storage and retrieval of archival materials and artefacts. They included staff in the Repository, NDS, Searchroom and Art gallery. Operational staff consisted of 8 officers involved in other operational work in the department. Their operations in one way or another affected preservation and conservation of archival materials due to their involvement in handling of records. They included clerical officers and secretaries who worked in the general administration section.

4.3 Diversity of Archival Records and their Formats

Under this objective, the study sought to establish diversity of archival collections and their formats. Information was collected by interviewing respondents from all sections.

4.3.1 Data from Custodial Staff

Custodial staff from the repository section indicated that KNADS had 8 (eight)repositories with a holding that stood at 600 million pages of paper documents namely: colonial government legislative council debates, political record books, original correspondence from former provinces and districts, provincial district annual intelligence reports and files from various government ministries, departments and parastatals. They added that all these records were classified as follows: pre-colonial historical records, colonial historical records and post colonial records.

Custodial staff from the NDS indicated that documents in paper format were also stored at their section and that the section had six distinct sections namely: the Government Publications Section, the Murumbi Africana Collection, the Staff Library, the Legal Deposit Library, the General Publications Section, the Periodicals Section. They added that the NDS had a total of 27,943 documents which included specialised periodicals, journals, magazines, newsletters, research reports, conference proceedings, official publications, dissertations and theses among others.

Respondents who included staff working in the art gallery indicated that, the art gallery consisted of various artefacts like carvings, framed photographs, works of art such as oil paintings, coins, and tools from different countries including Kenya, collected and donated by Joseph Murumbi - the Second Vice President of Kenya. Other collections in the Art gallery as explained by respondents consisted of

photographs of prominent people in Kenya's history and leadership. They added that, the section had one thousand two hundred (1200) items of artefacts and material culture from The Murumbi collection.

4.3.2Data from Technical Staff

Respondents who included technical staff working in the audiovisual section explained that the section had: sound recordings ondiscs, phonographic records, cassette tapes, compact discs and audio CDs that were accessed by listening to sound, records created using magnetic media including audio cassettes, video cassettes and reel-to-reel audiotapes; visual information materials accessed through vision, for example, photographs, pictures, maps and audiovisual materials that could be listened to and viewed simultaneously like moving image films, including film strips and reels. They noted that among these were; a rich collection of 399 still photographs, 150 films on Kenya's heritage, 90 Video Home System cassettes (VHS), 294 magnetic tapes, 1471 umatic tapes, 9351 radio cassette tapes, 20 vinyl tapes, 420 slides with information on natural resources, culture, tourism, history education and constitution making. Others as explained by these respondents were 810 plans and charts on settlement schemes, roads, drainage systems and house plans as well as 2594 maps of former provinces of Kenya.

Technical staff working in the microfilming sectionindicated that most documents microfilmed and stored as microfilms by KNADS included; Daily Nation, Kenya Times and Standard newspapers, annual reports, private archives and title deeds of government property. They explained that there were 14,000 microfilms with 15 documents on each microfilm hence a total of 210,000 microfilmed documents.

Respondents from the ICT section explained that the section had 115 million digital files,fiteen thousand photographs and two thousand audio tapes from audiovisual section which had been digitized. Other digital documents as indicated by respondents included CDS-ISIS database in hard disks and CDs, various softwares, programmes, generated word documents, web pages, e-books on flash disks, DVDs and cloud storage (drop box).

4.3.3 Data from Managerial Staff

Respondents who consisted of the director, deputy director and heads of sections were asked to explain how archival materials were acquired. They explained that, apart from direct donations from various individuals, most of the archival materials were acquired through the records management division with a network of six record centres in Nairobi, Nakuru, Mombasa, Nyeri, Kisumu and Kakamega while others like electronic archives were created by the ICT section.

Discussion

Fromthe findings, KNADS collection comprised of a diversity of archival materials in various formats ranging from paper, audio visual, artfacts, electronic to microfilm. This concurs with the Society of American Archivists (Bellardo and Bellardo, 1992) which defines archives as the 'non-current records' of an organization or institution preserved because of their continuing value; the term 'archival records' or 'archival materials' signifies any physical medium which is employed to transmit information, such as paper, photographs, audio or video tape, computer tapes or disks. IRMT (1999) confirms that the variety of records, archives and information materials found in records offices, records centres and archival institutions has always been astounding.Materials include monographs, serials, newspapers, films, audio

recordings, maps, videotapes, letters, diaries, account books, photographs, documents, slides, posters, leaflets/brochures.Many institutions will have records or archives in several different media; each of these media types requiring particular storage and handling.

Establishing the diversity of archival materials and their formats atKNADS informed the study on the nature and types of archives, material they are made/created from, their format, condition and quantity. This information formed the basis for assessment of the effectiveness ofvarious preservation and conservation practices applied to various media and formats of archival materials at KNADS.

4.4 Preservation and Conservation Practices

Under this objective, the study sought to establish causes of deterioration to archival materials, preservation practices in place to prevent deterioration and conservation practices in place to restore damaged documents.

Information was collected through observation of the building environment, storage conditions of archival materials, packaging used for archival materials, nature and extent of damage to archival materials and the preservation and conservation practices applied. These method was corroborated with interviews with respondents from all the sections.

4.4.1 Causes of Deterioration of Archival Materials

(a) Data from technical and custodial staff

Respondents who included custodial staff from the repository section and technical staff in the conservation section indicated that deterioration of paper records was caused by among others: dust; tight boxing; natural aging process due to inherent properties of information materials such as, poor quality writing inks with high acidic

content and chemical composition of paper which caused paper to become brittle and crumble to dust; human factors including heavy usage of some provenances, frequent photocopying and mishandling which led to wear and tear; unsuitable storage environment which led to a buildup of acidity and oxidation due to uncontrolled light, relative humidity and temperatures which damaged archives.In addition, they explained that biologicalagents like termites and rats fed on paper destroying it, silverfish and fungi caused foxing (brown spots in documents), appearance of holes in paper documents weakening them; atmospheric pollution due to location of KNADS at the city centre which faced high emmission of carbon gases from the heavy traffic around the building leading to oxidation, which affected paper documents. The heads of conservation and repository sections concurred that these were the major threats to paper documents.

Respondents who included staff from the audiovisual section explained that audiovisual archivesdeteriorated due to; acidity which caused photographs to turn yellow; air pollutants and dust which caused abrasion of photographs; oily fingers which left prints on films anddamaged images on films and negatives. Other factors included aging which caused distortion of sound and image; hydrolysis (happens whenwater comes into contact with films) which resulted in destruction of films; denting, breaking or bending of CDS, DVDS and tapes; fading of photographs and slides caused byuncontrolled light, temperatures and humidity and curling of films which caused them to become sticky with brown stains, faded images with unpleasant smell.The head of audio visual section agreed that these were the major threats to audiovisual archives.

Respondents who included technical staff in the ICT section indicated that threats to electronic archives included virus attack on hard drives which led to crushing of the drives and loss of data, aging of hard disks reducing their performance, technological obsolesence which led to loss of information on floppy disks as the file formats on floppy disks could not be accessed and read by new generation computers.They added that there were cases when CDs and DVDs got scratches and even broke on falling down on the floor.

(b) Data collected through observation

As indicated in chapter three, observation was one of the methods employed by the researcher for data collection. The researcher participated in the study by observing preservation and conservation activities in various sections. The researcher observed that some paper archives had brown stains, dust, surface dirt, creases, wears and tears, dark brown discolouration, missing parts eaten off by termites and rats. Other papers had faded writings and holes. These documents were brittle and crumbled to dust at the slightest touch. There were no facilities to regulate relative humidity and temperatures in the offices and repositories except the minimum and maximum thermometers and dehumidifiers which were in the microfilm storage area only.

Observation made on audiovisual archivesrevealed that; some photographs were turning from white to yellow colour while some were fading; there was presence of prints on films, slides and negatives left by oily fingers; some films had become sticky with brown stains and had faded images.

Observation made on computers showed some were not working due to crushed harddisks and some CDs and DVDs had scratches.

Observation made on the building and the environment showed that; the building was located at the city centre which faced high emmission of carbon gases and dust from the heavy vehicular traffic. The human and vehicular traffic around the building made temperatures inside the building rise thus accelerating the rate of deteroriation of the archival collections.

Discussion

The study findings indicated that deterioration of paper records was caused by among other factors: dust; tight boxing; natural aging process due to inherent properties of information materials such as, poor quality writing inks with high acidic content and chemical composition of paper which caused paper to become brittle and crumble to dust; human factors including heavy usage of some provenances, frequent photocopying and mishandlingwhich led to wear and tear; unsuitable storage environment which led to a buildup of acidity and oxidation due to uncontrolled light, unregulated relative humidity and high temperatures. These factors caused damage to archives. In addition, biologicalagents like termites and rats fed on paper destroying it. Atmospheric pollution due to location of KNADS at the city centre which faced high emmission of carbon gases from the heavy traffic around the building led to oxidation, which affected paper documents. This finding is in agreement with Kathpalia (1978) and IRMT (1999) who confirm agents of deterioration as; oxidation/ageing/acidity, high temperatures, relative humidity, light, air pollution, dust, fungi, bacteria, insects, rodents such as rats and mice, abuse and mishandling.

The findings also indicate that electronic or digital archivesat KNADS deteriorated due to virus attacks, obsolescence and physical damage. This is in agreement with Cornell University Library (2005), which explains that, information created and

stored digitally was at risk of loss in three ways: obsolescence, physical damage and file formats that could not be read by hardware and software.

The extent ofdeteroriation of archives materials is further illustrated by the fact that the number ofdeteriorated records in paper formats had been increasing over the years and that not all deteriorated documents had been repaired yet. This is inaccordance with the Conservation Registers and Annual Reports between2007 to 2012 as explained in the statement of the problem in chapter one.These findings made it necessary to establish the preservation and conservation practices that were carried out by KNADS as there seemed to be gaps in those practices hence the many deteroriated and unrepaired archives.

4.4.2. Preservation Practices

(a) Provision of appropriate housing and environment for storage of archival materials.

Information was collected through observation of the building environment and this was corroborated with interviews with respondents from all sections.

(i) Data collected from managerial staff

Information collected from respondents who included staff at managerial level indicated that; KNADS building was not purpose-built but a converted one and was located between the busy Moi Avenue and Tom Mboya Street, next to Ambassedeur hotel in Nairobi City. They explained that the building was full and since more space was required, Nairobi Records Centre had to be relocated to a rented space in Co-operative Bank building along HaileSelasie Avenue.

(ii) Data collected through observation

Observation of the building revealed that the structure comprised of ultra thick walls and doors. Windows in all repositories were fitted with shutters to reduce the amount of light reaching records as well as reinforce security.The surrounding roads and vehicular traffic produced a lot of dust that eventually infiltrated the repositories and into record boxes. The human and vehicular traffic around the building made temperatures inside the building rise thus accelerating the rate of deteroriation of the archival materials.The building was old and many of the installed systems such as air conditioners were no longer functional. At the entrance were security guards who monitored people entering and leaving the building. In addition, the building had closed circuit television (CCTV) surveillance to reinforce security.

(iii) Data from technical and custodial staff

Respondents who included custodial staff in the repository, searchroom, NDS, art gallery sections and technical staff in the conservation, audio visual and microfilming sections explained that the storage environment for archival materials except in the ICT and microfilming sections was not appropriate due to uncontrolled light, unregulated relative humidity and high temperatures which led to deterioration of archival materials. They further noted that the building was old and many of the installed systems such as air conditioning were no longer functional.

Discussion

The findings indicate that the type of housing and environment provided for the storage of archival materials at KNADS was not appropriate. Thebuilding was not purpose-built but a converted one. It was located at the city centre between two busy roads with heavy vehicular and human traffic which led to air polution and generated

alot of heat that made temperatures inside the building rise and hence accelerating the rate of deteroriation of archival materials and destruction of machines. The building was old and many of the installed systems such as air conditioning systems were no longer functional. This status and condition of the building affected the condition of the records leading to deterioration. Despite various preservation and conservation measures put in place lack of environmental regulation rendered most of them ineffective.

The KNADS building did not conform to stipulated archival building standards outlined by Acker and O'Connell (2010), which explains that an Archives and Record Storage Building must have working environments that are safe, secure, healthy, comfortable, durable and aesthetically pleasing.

It also contravenes recommendations made by IRMT (1999) on archival environmental controls which they explain that the best modern archival facilities are purpose-designed and built, providing a safe physical environment for the materials held within them. The environmental conditions within purpose-built archival institutions are always within acceptable limits because of the insulation designed into the building and the construction materials used.The building’s temperature and relative humidity are stable and within acceptable limits.Dust and pollution particles are at a minimum because of good quality filter systems.Lighting is suitable to the particular needs, whether they be storage, reference or office use.In successful buildings of this kind the basics of environmental preservation occur naturally and that the main duty of archives staff in this situation is to monitor the building to see that no defects develop, and that all areas conform to the general standard. Controlling

the environment can dramatically improve the state of archival materials. This was not the case with KNADS building.

(b) Undertake preservation assessment surveys

Assessment surveys help examine all facilities, programmes and materials to determine needs. The steps taken in the surveys include survey of the archives building, storage conditions, materials themselves and maintenance procedures. To find out if KNADS undertook assessment surveys, information was collected through interviews with respondents from all sections.

(i) Data from managerial staff

Regarding assessment surveys, the respondents who included the director, deputy director and heads of sections indicated that they received periodic reports from section supervisors on status of sections, facilities, storage conditions, preservation and conservation duties and activities and therefore they did not undertake assessment surveys directly/physically.

(ii) Data from custodial, technical and operation staff

Other respondents who included staff from custodial, technical and operation staff were asked if assessment surveys were undertaken, and they indicated that they were not aware of any assessment surveys that were undertaken at KNADS neither were they involved in any assessment surveys.

Discussion

The findings indicate thatKNADS did not undertake assessment surveys and therefore it was not able to: examine all preservation and conservation facilities, programmes and materials to determine needs and establish priorities; examine the physical surroundings and the structure of the building and storage locations within it, identify

problems or threats and take corrective action to minimise the problems and protect the facility and its irreplaceable collections as well as identify the physical condition of archival materials.

Therefore KNADS did not benefit from preservation and conservation information such surveys would have provided on preservation and conservation of archival materials, which according to IRMT (1999)preservation surveys are done to examines all facilities, programmes and materials to determine needs and establish priorities. It includes examination of of the archives building, storage conditions and materials, maintenance procedures and the holdings themselves.Delta Plan Model of preventive conservation strategies (1993), explains that assessment surveys are done to determine collection needs; identify the physical condition of specific archival materials, concerns andconservation priorities. Unfortunately, KNADS did not undertake such surveys.

(c) Protective packaging and enclosures for storage of archival materials

Information was collected through observation of the packaging used for storage of archival materials and corroborated with interviews with staff from various sections.

(i) Data from custodial staff in the repository section

Respondents who included custodial staff from the repository section indicated that paper records were filed in file folders and stored in archival boxes laterally. They added that the archival boxes were labeled depending on provenances from the first box to the last one and shelved in one place. The label indicated the box number, shelf and repository number, series of files contained in the box and these details were also recorded in the finding aids. They further noted that worn out boxes were regularly replaced by the repository staff and the boxes were shelved either in open static

shelves or closed mobile shelves. The closed mobile shelves, they explained, were secure in terms of providing protection for records from dust, theft, light and moisture.

Respondents who included custodial staff from the art gallery indicated that paper-based materials like, works of art such as oil paintings and other artistic items were framed and hung on interior walls away from sunlight, some of the unframed items were stored in transparent cases and labelled by captions prepared by the conservation section. They further noted that, other unframed items were stacked upright on interior walls of the art gallery while items like artefacts were displayed resting on wooden stands and tables. They added that the display environment in the art gallery was not regulated.

Discussion

The findings above agree with those of IRMT (1999)opinion that, in order to ensure materials are safely stored on shelves, all shelving units in the repository should be identified and coded.All labels should be tamper-proof and securely attached to the shelves.When placing archives on shelves staff must ensure that the label can be seen on each box or bundle. It is wise to establish a formal process for shelving materials, to ensure materials are retrieved and replaced easily, quickly and securely.

(ii) Data from technical staff

Respondents who included staff from the audiovisual section explained that some of the photographs were placed in acid free envelopes and thereafter put in folders and arranged in metal cabinets according to the principle of provenance while others were put in albums. The respondents added that reel to reel tapes were stored in air tight polythene cases and then refrigerated for two weeks in order to reduce the effects of

moulds. After two weeks they were transferred to lockable cabinets specially built for their storage.They indicated that, films were kept in film cans and shelved vertically in their own room; a suspended tape was placed at the edge of the maps and put on hooks in water proof cabinets in their own room; VHS casettees were put in their own case upright on open shelves while slides were kept in slotted boxes placed in a wooden drawer; radio casettee tapes were kept in their cases and put in drawers vertically.

Respondents who included technical staff in the ICT section indicated that electronic formats were kept and maintained in the ICT section where they were arranged in data safe cabinets. They added that air conditioning wasinstalled at the section to regulate temperature and relative humidity and that antivirus was installed on computers to counter virus attacks.

Technical staff from the microfilming section explained that microfilms were put on plastic spools then put into their own cases and stored chronologically in fire proof cabinets and steel shelves.They explained that the microfilm storage room was environmentally regulated using air conditioners, minimum and maximum thermometers, dehumidifiers and hydro-thermometers. They further noted that the room was dust free, clean, securely locked and kept out of bounds to unauthorized persons.

(iii) Data collected through observation

Observation of the packaging and enclosures used for storage of archival materials revealed thatpaper records were filed in file folders, stored in archival boxes and shelved on either open static shelves or closed mobile shelves while some books were put in bookcases and exhibit cases. Some photographs were placed in acid free

envelopes then put in folders and arranged in metal cabinets while others were put in albums. Films were kept in film cans and shelved, slides were kept in slotted boxes and placed in a wooden drawer; radio casettee tapes were kept in their cases and put in drawers or arranged in archival boxes. Electronic formats like CDs, DVDs, flash disks, external hard disks were arranged in data safe cabinets. Microfilms were put into their own cases and stored in fire proof cabinets and steel shelves.Works of art such as oil paintings and other artistic items were framed while some of the unframed items were stored in transparent cases.

Discussion

The findings indicate that protective shelving and enclosures used at KNADS included file folders, archival boxes, open static shelves,closed mobile shelves, acid free envelopes,metal cabinets, air tight polythene cases and lockable cabinets. Others werefilm cans, water proof cabinets, slotted boxes, wooden drawers, VHS cases, data safe cabinets, microfilm cases, fire proof cabinets, steel shelves, glass and woodenframes, transparent glass tables, wooden stands, tables and locked bookcases. These shelves and enclosures were provided to help protect archival materials from light, dust and airborne pollutants, water, smoke, heat and other destructive agents.

These findings agree with Walsh (2006) who states that “the important point to grasp is that it will always be far cheaper to invest in good storage than spend money trying to rescue the results of poor storage.” there are a number of benefits in the use of protective packaging. Enclosures and the environment around them act as a buffer zone to slow down the rates of change in temperature and relative humidity levels. They provide protection from light, dust and airborne pollutants, water, smoke, heat,

other destructive agents and rehousing items in acid-free containers or inert Mylar sleeves is a strategy that manages risk to print media.

The findings also agree with IRMT (1999) which confirms that, enclosures are the paper folders, boxes or plastic sleeves used to hold archival materials. They are storage containers, specifically archival-quality containers such as acid-free envelopes, folders or boxes, used to hold records or archives and protect them from hazardous elements. Enclosures provide good physical protection, absorb or neutralise harmful gaseous emissions and allow the removal and replacement of materials without any damage.

The Delta Plan Model for preventive conservation strategies (1993), concurs with the findings on this aspect of shelving and enclosures that many collections or holdings maintenance procedures involve simple handling and housing practices ranging from removing harmful materials to containerizing. While overall environmental control is essential to long-range preservation of collections, appropriate housing materials and techniques can buffer and provide interim short- and mid-term protection from minor environmental fluctuations.

(d) Reformatting of archival materials

Information was collected through interviews with technical staff from ICT and microfilming sections on reformatting methods that were applied to preserve archival materials.

(i) Data from technical staff

Respondents who included staff from the ICT section were asked to explain how reformatting of archival materials was done at KNADS and their explanation was that reformatting methods carried out by the section included digitisation which was

undertaken in six monthevery financial year.During that period, heavily consulted archives were converted into digital format. They noted that they had digitised one hundred and fifteen million paper documents, fifteen thousand photographs and two thousand audio tapes and thatdigitization was done by casual workers with supervision by staff from ICT, repositoryand Audio visual sections. The aim of digitization as explained by the respondentswas to improve accessibility to archives by multiple users and enhance preservation of heavily consulted archives by limiting use of original documents, fragile and damaged archives.

When asked if the already digitized archives were being accessed by users and whether they had been uploaded on the KNADS website, the respondents explained that it was not possible due to limited funds in budgetary allocations which hindered acquisition of relevant and suitable software for the exercise, in addition to copyright, administrative and technical issues.

Respondents were also asked to explain how they ensured that the six essential properties of successful digital preservation: availability, identity, persistence, renderability, understandability, and authenticity were achieved in the digitization of archival materials. Their response was that availability of digitized records for long-term use was achieved by ensuring scanned records were saved on computers and on external storage devices and these devices were maintained by the ICT section.

They added that identity of digital records was ensured by capturing descriptive information (metadata) which included; file reference, title/subject, covering dates, provenance so as to make digital archives identifyable. They further noted that persistence was ensured by keeping the physical medium such as magnetic tapes, CDs, DVDs, hard disks in lockable data safes and computers with digital archives

were protected by passwords to avoid unauthorised access. This they said ensured they continued to exist in a processable state, were retrievable and readable from the storage medium and were not corrupted in any way.

On renderability they indicated that renderability was achieved by ensuring electronic records were created and preserved in formats that could be openned by various softwares like JPEG, Text editor, PDF, microsoft word, microsoftpowerpoint, among others. In addition to metadata captured to ensure identity of electronic archives, respondents explained that a summary of information contained in afile or publication was also captured to enable users of the archives understand well the content of electronic/digital records, information on status of a record/file was also captured showing wether it was open or closed in accordance withthe 30 year access rule. They further said that information pertaining to a digital record's authenticity was contained in the metadata captured with the record which included a summmary of the contents of the digital record, creator of the record and the chain of custody prior to acquisition for permanent preservation.

Respondents who included staff in the microfilming section were asked to explain how reformatting of archival materials was done at KNADS and their explanation was that the reformatting method carried out by their section was microfilming and that most documents microfilmed included; Daily Nation, Kenya Times and Standard newspapers, annual reports, private archives and title deeds of government property. They explained that there were 14,000 microfilms with 15 documents on each microfilm hence a total of 210,000 microfilmed documents and that researchers were able to access and read microfilmed information at the searchroom. Microfilming, they explained, enhanced preservation of original paper documents, disposal of

newspapers creating space for preservation of other paper archives and improved accessibility of collections by researchers.

Respondents were also asked to explain how they ensured that the six essential properties of successful digital preservation: availability, identity, persistence, renderability, understandability, and authenticity were achieved in the microfilming of archival materials. Their response was that availability of microfilmed archives for long-term use was done by ensuring microfilmed archives were duplicated on other microfilms and both orginal microfilm and duplicates were stored in a storage room that was well ventillated and storage conditions regulated.

To ensure identity of microfilmed archives, they indicated that stickers were stuck on top of the microfilm cover and descriptive information (metadata) like title of the document, covering dates, reference numbers where applicable and reel number were indicated both on the microfilm case and finding aids.

They further noted that persistence was ensured by keeping the microfilms in a secured storage room protected from unauthorised access. On renderability they indicated that renderability was achieved by ensuring that microfilmed archives were created and preserved in formats that could be read by various microfilm equipment like duplicator and readers. They added that in order to understand the content in themicrofilms, descriptive information (metadata) such as title of the document, covering dates, reference numbers where applicable and reel number were indicated both on the microfilm case and finding aids.

They further stated that information pertaining to a microfilmed record's authenticity was contained in the metadata captured on the microfilm which included title of the

document, covering dates, reference numbers where applicable and reel number were indicated both on the microfilm case and finding aids.

When asked if the microfilmed archives were accessible for use by researchers, the respondents explained that the archives were accessed through the searchroom section which had the microfilm readers.

Discussion

The findings indicate that the reformatting methods carried out by KNADS included digitisation and microfilming. These finding agrees with Delta Plan model of preventive strategies that explains thatone of the holdings maintenance procedures of improving accessibility of collections was duplicating or reformatting fragile or damaged material throughphotocopying or microfilming. However, digitization was not an effective method in preservation of archives at KNADS because, the digitized archives could not be accessesed and used due to software compatibility issues which meant that the original documents whether weak, fragile, damaged had to continue being usedthus damaging them further. This is contrary to the aim of digitization as explained by the respondentsthat it was supposed to improve accessibility to archives by multiple users and enhance preservation of heavily consulted archives by limiting use of originals, fragile and damaged archives.

Though all the six properties of digital preserservation as described by The SPOT model of Risk Assessment were observed and achieved by KNADS to some extent as indicated in the findings, the study established that paper records which had beendigitised had not been uploaded to the KNADS website and were not accessible to users due to reasons explained by respondents in the ICT section as; limited funds in budgetary allocations which hindered acquisition of relevant and suitable software

for the exercise, copyright as well as administrative and technical issues. The findings differ with those of Shep (2006) who opines that, the use of reproductions is a preservation strategy to make objects available when the originals are too fragile and are liable to deterioration or loss, removing items from service and providing surrogates to users (copy prints of photographs, digitzed images, microforms, photocopies and the like) as away of minimizing risk to print media. The findings also differ with Jefcoate (2003) who in acknowledging the benefits of reformatting, noted that "the British Museum library, saw multiple benefits in reformatting: it obtained preservation copies of key collection works; it achieved a conservation benefit by being able to restrict access to many originals; it reduced presssure on its facilities by making its collections availlable as photographic facsimiles at libraries abroad; and it received royalties on the sales of its materials.''

In addition, the findings also differ with IRMT (1999)whichalso confirm that when archival materials are extremely fragile, heavily used, deteriorating or highly valuable, it is common for archival institutions to reproduce the materials and make the copies available for research use.The originals are then kept in safe storage or sent for conservation treatment. This was partly achieved by KNADS in the sense that digital information on microfilms could be accessed by users at the searchroom at KNADS.

(e) Management of disasters

Information was collected through interviews with managerial staff, technical, operation and custodial staff from all the sections.

(i) Data from managerial staff

The respondents who included staff at management level, commented that measures taken to manage disasters like fire, terrorism andwater at KNADS included; a ban on smoking in all records storage areas; installation of fire suppressionsystem to detect fire and work alongside fire extinguishers so as to be able to control any fire outbreak in the building; installation of Closed Circuit Television cameras to detect activities that may endanger the records. They added that the department internally mantained a backup of its database resources and digital archives. However, on the issue of disaster management policy or plan,all the seven members of management staff interviewed concurred that the department did not have a disaster management plan or policy in place in case of fire, earthquake or other hazards that could cause damage to archival materials.

(ii) Data from technical, operation and custodial staff

The respondents who included staff from the operational, custodial and technical sections explained that smoking in record storage areas had been banned; the department had installed fire suppressionsystem and fire extinguishers were put at strategic areas; closed circuit television cameras were also installed to detect activities that may endanger records. They added that the department internally mantained a backup of its database resources and digital archives but the backup was storedwithin the building so incase the building suffered adisaster, the information could not be retrieved from anywhere else. They indicated that there were no water detectors in the storage areas so incase of water leakages from pipes then alot of damage could occur especially in repositories in the basement which were under drainage pipes. They further noted that they had only been trained in actions to take incase of fire and not disaster management as a whole.

Discussion

The purpose of disaster management is to have a preparedness and response plan. It requires that an organization provides guidelines for the identification, storage and protection of vital records. It also provides a guide for the development of adisaster recovery plan to manage these records before and after a disaster and to ensure that the business of the organization can continue through a sound recovery system.

The findings indicate that KNADS did not have a disaster management plan or policy and thatthere was internal back up hence no offsite storage, there were also risks in storage of records in repositories in the basement. This is contrary to Harvey (1993) who confirms that, disaster planning is basically preventive and may include preventing disasters by planning (prevention); reducing hazards (preparedness); establishing procedures to cope with disasters (reaction); coping with a disaster by putting into practice procedures that are understood and have been rehearsed (recovery). Implementing emergency preparedness strategies by equipping storage areas with water-damage protection and training staff in urgent response to catastrophes, manmade and natural, and by taking other similar steps, is arisk management strategy to print and non-digital research collections.

(f) Documented preservation and conservation strategy, policies and guidelines

(i) Data from managerial staff

The managerial staff who included the director, deputy director and heads of sections were askedif they had a documented preservation and conservation strategy, policies and guidelines on preservation and conservation of archival materials; disaster management; reformatting of archives and how such policies were communicated to staff. The respondents indicated that apart from the Public Archives and Documentation Service Act, Chapter 19 of the laws of Kenya 1965 that established

KNADS,they did not have such written strategy, policies and guidelines but had formed a records and archives management committee which was tasked with coming up with the policies.

(ii) Data from custodial, technical and operation staff

Respondents who included other staff were asked if they were aware of any written preservation and conservation strategy, policies and guidelines on preservation and conservation of archival materials, disaster management, reformatting of archives and how such policies were communicated to them. The respondents indicated that they were not aware of the existence of such written strategy, policies and guidelines except the Public Archives and Documentation Service Act, Chapter 19 of the laws of Kenya 1965 that established KNADS.

Discussion

The findings indicate that KNADS did not have a documented preseservation and conservation strategy, policies and guidelines on preservation and conservation of archival materials; disaster management and reformatting of archives. This is contrary to the Delta Plan Model of preventive preservation strategies (1993) which recommends that policies should be documented on: handling procedures for staff and users; appropriate materials and techniques to be used for storage or for exhibition; framing and packing procedures; disaster prevention, preparedness, management, and response.

It is also contrary to IRMT (1999)recommendation on writting preservation plan as such a plan outlines the general and specific actions that will be taken. They recommend that policies should be established for: care and handling of materials; control of pests, insects or rodents; conservation treatments; access and reprography; security and that institutional policies should indicate the commitment to attempt to

maintain stable environmental controls, adequate storage and good handling.They further note that the plan will prioritise the specific tasks that need attention, for example, the plan will identify what steps should be taken in the short term (cleaning storage areas regularly), what can be done in the medium term (acquire storage containers and transfer fragile materials to more secure storage) and in the long term (lobbying the government for an improved environmental monitoring system).

(g) Provide adequate security

To find out whether KNADS provided adequate security to protectarchival materials, staff and valuable archival materials housed in storage areas, data was collected by means of interviews with all the respondents.

(i) Data from managerial staff

Respondents who included the director, deputy director and heads of sections were asked to explainsecurity measures put in place to protect staff working at KNADS, valuable archival materials housed in storage areas or repositories. The respondents explained that, access to storage areas was controlled by lock and key and the keys were kept at the reception in a key box; theyhad discussed security issues with the police and secured two administrative police officers to guard the building at night and two to guard during the day in additionto security guards from a private security company and security classified archives of high intrinsic, legal value like top secret were digitized or microfilmed and kept in the strong room where access was controlled.

They added that exterior doors had adequate locks and secure hinges and the back door had been blocked off; procedure for checking the background of potential

employees involved employees filling forms for vetting; all staff had been trained in fire and safety issues and were required to wear identity tags.

They further noted that users were registered at the searchroom before they gained access to archival materials; as part of registration, users were advised on security concerns and reference rules and werenot allowed to bring into the searchroom their personal belongings, these were securely stored at the reception.

They added that, they had installed security equipment such as closed circuit television cameras to help detect theft or damage and that the Public Archives and Documentation Service Act stipulated as a crime, to damage, mutilate, remove or otherwise harm archives which would lead to prosecution and a fine of Ksh. 5000 or six months imprisonment or both imposed for such violation.

(ii) Data from technical staff

Respondents who included technical staff in the ICT section indicated that the security measuresput in place in their section included use of passwords to log into computers to access digital archives and issuing of right of access to staff as well as internal backup of digital information. They added that procedures for the control of keys which involved putting keys at the reception did not ensure security of ICT section because the keys could be accessed by anyone and there were no security alarmsinstalled in the section.

They further explained that archival materials of high value were digitized or microfilmed;the institution had installed surveillance equipment, such as closed circuit television cameras although they were not sure if the television screens were monitored constantly.

(iii) Data collected from custodial and operation staff

Custodial staff from the searchroom section explained that the security measures taken in their section included: monitoring the use of records in the searchroom; formal registration of researchers who wanted to acess archival materials, as part of registration, researcher were made aware of their responsibilities with regard to use of archival materials which included getting a research permit before they gained access to archival materials; not having access to storage or restricted areas and unprocessed records; security concerns and reference rules; reading and signing a statement of rules and regulations; not being allowed to bring into the searchroom their personal belongings hence leaaving them securely stored at the reception and not being allowed to have more than four records, documents or archival materials at the same time.

The respondents further noted that archival materials were returned to the storage areas promptly after they were used and returned by researchers; archival materials in use by researchers were kept on reference tables in the searchroom after working hours and the room was well arranged so that users could be watched at all times.

They added that access to the searchrom was controlled by lock and key after office hours although the procedures for control of keys did not ensure security of keys; there were surveillance equipment installed, such as closed circuit television cameras although they were not sure about constant monitoring of the television screens.

Respondents who included custodial staff from the repository section, NDS, technical staff from microfilming, conservation, audiovisual sections and operation staff explained that security measures in place were; access to the repositories/storage areas was controlled by lock and key; procedures for control of keys involved putting keys

in an open box at the reception which did not ensure that only authorised persons had access to keys as keys could be accessed by anyone from the key box; accession registers and finding aids provided sufficient information about archival materials in custody of KNADS and that security classified records were kept in the strong room and access restricted to certain senior officers.

They explained that archival materials were returned to storage areas promptly after they had been used; document exhibit cases were not wired to any alarm system but were locked to protect archival materials from theft or damage and that there were no security alarmsinstalled in repositories except the fire suppression system; that there were installed surveillance equipment, such as closed circuit television cameras althouh they were not sure about constant monitoring of the television screens.

They added that there had been security breaches, thefts, losses and vandalism a few years back but the institution had secured administrative police officers and security guards from a private security company to guard the building at night and during the day. Theexterior doors,they indicated, had adequate locks and secure hinges, the back door had been blocked off and as staff, they were vetted by filling forms for vetting and all of them had been trained in fire and safety procedures. They explained further that members of the public were monitored during viewing and touring of the artgallery by art gallery staff after identification and clearing at the reception.

Discussion

These findings indicate that some security measures were in place at KNADS while others were not, hence existence of gaps and needs. These findings differ with IRMT (1999)onthe provision of adequate security measures, to protect people working in the archival institution and valuable archival materials housed in storage areas or

repositories. For example,the findings indicate the procedure for checking the background of potential employees involved employees filling forms for vetting but it was not clear how such information was verifyed. Procedures for control of keys did not ensure security of keys as keys could be accessed by anyone at the reception. Document exhibit cases were not wired to any alarm system or otherwise protected from theft or damage and there were no security alarmsinstalled in repositories.

There were installed surveillance equipment, such as closed circuit television cameras but respondents except those at managerial level were not sure about the constant monitoring of the television screens. The internal backup of digital information could not help access the information elsewhere in the case of occurence of disasters. Lack of these measures as rcommended by Millar and Roper, put the security of the archives building and documentary heritage therein in jeopardy.

(h) Establish Standards

Another measure that can be taken to improve the physical care of archival materials is to establish institutional standards for records creation and care.To establish whether KNADS had established standards for records creation and care, data was collected through interviews with all staff.

(i) Data from managerial staff

Respondents who included the director, deputy director and heads of sections were asked to explain if they had established standards to guide the preservation and conservation practices and if they were aware of existing standards in this area and whether they had adopted some or customized them to fit their needs. Their explanation was that though they were aware of ISO standards in records creation, care, preservation and conservation, they had not established any standards nor

customized any but had developed procedure manuals to guide the preservation and conservation practices basing on what had been passed over to them by their predecessors and what they had read and seen practiced in other archival institutions they had travelled to in the course of their work.

(ii) Data from other staff

Respondents who included custodial staff, technical staff and operation staff from all the sections were asked whether they were aware of any preservation and conservation standards and whether they had adopted them in their work. Their response was that they were not aware of them and did not adopt or customize any. Instead, they said they carried out preservation and conservation practices based on procedure manuals developed by managerial staff and decisions passed to them through minutes of meetings or, were trained by their predecessors.

Discussion

The findings indicate that KNADS had not established standards in records creation, care, preservation and conservation. KNADS therefore may not have carried out preservation and conservation practices in relation to any standards whether internally made, identified, customized or adopted from ISO. This was contrary to IRMT (1999)recommendation that, another action that can be taken to improve the physical care of archival materials is to establish institutional standards for records creation and care and that the archival institution has an important role to play in the establishment of record-keeping standards, in order to protect valuable materials. They further explain that archival institutions can identify International Standards developed by the International Standards Organisation (ISO) so as to improve preservation of archival materials.

KNADS failure to perform or carry out preservation and conservation practices in relation to best practice standards whether internally made or customized in preservation and conservation implies that KNADS was not able to effectively provide care and protection of archival materials.

(i) Annual Stocktaking

In order to keep a check on misplaced or missing records or archives, and to check on the state of items in the repositories, there should be an annual stocktaking of the material held on the repository shelves.To find out if KNADS did annual stocktaking, data was collected by interviewing staff from all the sections.

(i) Data from managerial staff

Respondents who included the director, deputy director and heads of sections were asked whether they undertook annual stocktaking and their response was that they had undertaken the exercise in 2010/2011 financial year in repository two - one of the eight repositories at KNADS and had identified archival materials that were in good condition; damaged ones had received conservation treatment; misplaced documents had been found and retrieved. They added that they had planned and started digitization of the records in repository two. When asked whether the exercise was still on course to spread to other repositories, they explained that they were planning for it.

(ii) Data from other staff

Respondents who included custodial staff, technical staff and operation staff from all the sections were asked to respond on the same issue of annual stocktaking and their response was that, the exercise in repository two ended as soon as it started due to administrative issues and that not much was accomplished in 2010/2011 financial

year. The exercise had not taken place again several years after and that they were not sure whether it will be conducted.

Discussion

From these findings, it is clear that annual stocktaking exercise was not conducted at KNADS and therefore KNADS was not able to: keep a check on misplaced or missing archives and check on the state of items in the repositories; ensure the safe return and storage of archival materials; assess the physical condition of the archival materials looking for signs of insect infestation or mould growth or identify any physical deterioration or damage; identify archives according to different categories and needs, so that resources could be allocated appropriately to their care. The findings differ with those of IRMT (1999) which confirm that, in order to keep a check on misplaced or missing archives, and to check on the state of items in the repositories, there should be annual stocktaking of the materials held on the repository shelves.Annual stocktaking is critical in ensuring the safe return and storage of archival materials. The staff are able to assess the physical condition of the material, looking for signs of insect infestation or mould growth or identify any physical deterioration or damage.It is particularly important in identifying archives according to different categories, so that resources may be allocated appropriately to their care. The categories include; in good condition unlikely to need attention from conservators in the foreseeable future; weak but serviceable hence would be better for attention but not in urgent need; unfit for production thus must receive conservation treatment before consultation; misplaced documents that need to be found and retrieved.

4.4.3 Conservation Practices

In reference to the findings on the causes of deteroriation as mentioned above in this chapter, the extent ofdeteroriation illustrated by the Conservation Registers and Annual Reports between2007 to 2012 and the fact that the figure could even be higher since not all detriorated documents had been conserved as explained in the statement of the problemin chapter one, it was necessary to establish the conservation practices that were applied to the deteroriated archives to treat, repair and restore them so as to be able to determine the various challenges and the gaps therein. Interviews were held with respondents who included technical staff at the conservation, audio visual and microfilm sections.

(a) Data from technical staff

The respondents were asked to describe the conservation practices they applied in conservation of archives and whether there were damaged archives and documents they could not restore. The respondents described the conservation practices as follows.

(i)Surface cleaning of paper in which dirt on the surface of paper was removed using a soft flat brush or a document cleaning pad according to the type of paper and its condition.

(ii) Removal of adhesives whereby pressure sensitive adhesive tapes were removed from paper by carefully applying small quantities of a solvent (water or acetone) and pulling the tape off as the adhesive softened.

(iii) Removal of paper fasteners; since metal fasteners rust, rubber bands become brittle and discolor paper, strings or cloth ties cut into brittle paper and can be highly

acidic. These and other fastening devices were carefully removed by hand, in some cases using tools such as pin remover.

(iv) Mending tears in paper; tears in paper were repaired by patching them with strong acid-free paper such as long fibred handmade japanese papers which were torn easily to fit the shape of the tear. Two patches a little larger than the shape of the tear to be mended were cut, adhesive was applied on both sides of the paper being repaired, the patches were stuck on the tears, and the repaired tear dried under weights in the compressing machine.

(v) Testing the solubility of ink; ink solubility was tested by putting a drop of water on a word on the document and allowing it to settle for about 5 minutes. Then a blotting paper was pressed on the drop of water. If it was dyed by black marks, then the ink was soluble, and needed to be fixed before carrying out any aqueous restoration techniques. Fixing of soluble ink they said, was not possible due to; lack of skills and requisite chemicals and machines such as ultra violet lamp. Instead the documents with soluble ink were among documents held at the section until at a time when fixing ink will be possible.

Other conservation practices described by respondents were:

(vi) Testing the pH of the document; the pH of the paper to be repaired was determined by physical eye examination of colour changes on the document and brittleness of paper while placed on the light table.If the colour of paper was found to have turned to brown or yellow then the paper was acidic;the level of acidity was determined by the extent of brown or yellow colour and brittleness of paper. Acidic documents were deacidified before any other treatment could commence.

(vii) Preparation of Calcium Hydroxide solution; a suitable amount of calcium hydroxide was put in a jar to which a measured amount of water with light stirring was gradually added. This resulted in formation of a milky creamy solution. After 10-15 minutes, more water was added with constant stirring till a required volume of water was obtained. After excess calcium had settled at the bottom, the clear liquid was drained off and sieved to get rid of suspended impurities in the lime.

Pure lime remained in the jar. More water was again added and the solution well stirred. The lime in excess was allowed to settle and the liquid which was a milky suspension was drained, sieved and used for de-acidification.

(viii) Preparation of Calcium Bicarbonate solution; half a kilogram of calcium carbonate was put in a 25-30 litre enameled containerto which a measured amount ofwater was added, this dissolved in water to form calciumbicarbonate solution. The addition of water was repeated until 25 litresolution was obtained.

(ix) De-acidification; when a document was found to be acidic, deacidification was done using water and calcium hydroxide solution,the processneutralized the paper's acidity and deposited an alkaline buffer using calcium bicarbonate to prevent the effects of acidity in future. It was done by putting sheets of dismantled document in the sink and tap water used to wash off dirt and dust from the document. The paper was supported using valeen paper. The water was drained severally until satisfactory colour of water was obtained. Each paper to be deacidified was placed on valeen paper larger than the document and both immersed in calcium hydroxide solution.After fifteen minutes, the sheets were removed and excess of calcium hydroxide drained.

Fresh tap water was used to remove remains of calcium hydroxide on the paper document. The paper was supported using valeen paper. The document was then immersed in calcium bicarbonate solution for fifteen minutes.This acted as a buffer solution to prevent further attack of acidity. The document was removed from the sink and spread on the drying rack to dry after which any of the following restoration method could be applied.

(x) Minor repairs; edges and corners of papers/records may be folded, torn, damaged, crumpled or creased. Portions with creases, folds, and crumbles were made damp with a wet piece of cotton wool and pressed between two pieces of blotting paper to flatten them. Minor tears were repaired by pasting strips of hand-made paper at the back of the torn portion. Pasting was done using starch paste. If the portion where the tear existed was written on both sides, strips of thin japanese tissue paper were pasted on both sides of the tear.

The respondents further described more conservation practices as:

(xi) Full-pasting: this method was applied on documents that were affected by acidity and written on one side only like maps, wall charts among others.

Materials and tools used included starch paste for sticking the supporting materials on to the document, supporting material such as handmade paper, water for smoothening and relaxing the affected documents, smooth brush, pair of scissors, glass topped table and rollers, spraying pump.

The procedure involved preparation of starch paste as follows; a measured quantity of water was heated to 80-90°C. The heating was discontinued and 100grams starch (wheat flour) was added in small quantities with gradual stirring till it was fine. After the solution cooled down, glycerine was added to make it sticky followed by boric

acid-an insecticide to kill insects that might feed on the document. The solution was allowed to stand for 3-4 hours to obtain a homogeneous dispersal of the paste.A piece of handmade paper was cut to size that was slightly larger than the document, rolled and relaxed by immersing it in water. The document to be repaired was relaxed by spraying it with water uniformly. The affected document was placed with the written side facing down on glass top table and starch paste was applied on backside with a smooth brush. Rolled hand-made paper was put on the edge of the document and unrolled on the document. The unrolled paper was simultaneously pressed with a dry piece of cloth or cotton swab or rollers to remove water bubbles. The pasted document was removed from the glass top table and spread on a drying rack to dry. The oversize hand-made paper was trimmed using a pair of hand scissors to the size of the document, leaving a margin of 2-3 mm around the document to safeguard the edges of the document when in use.

(xii) Tissue repair: this method was applied on fragile documents that were affected by acidity and written on both sides.

Materials and tools used included Carboxyl methylcellulose paste for sticking, supporting material such as Japanese tissue paper, water for smoothening and relaxing the affected documents, smooth brush, pair of scissors, glass topped table, rollers and spraying pump.

The procedure involved preparation of Carboxyl Methyl Cellulose paste as follows; a measured quantity of water was heated to 80-90°C. The heating was discontinued and 100grams Carboxyl Methyl Cellulose paste was added in small quantities with gradual stirring till a concentration of 100grams was obtained in the solution. The solution was allowed to stand for 3-4 hours to obtain a homogeneous dispersal of the

paste.Two pieces of Japanese tissue paper were cut to the size that was slightly larger than the document. One piece of Japanese tissue paper was placed on a glass topped table. Water was sprayed on it to make it straight, relaxed, transparent and firm, the Carboxyl Methyl Cellulose paste was applied on the side facing up using a smooth brush. The document to be repaired was relaxed by spraying it with water uniformly. The paste was applied on the side facing up using a smooth brush. The other piece of the tissue paper was gently put on top of the document; water was sprayed on it, paste applied and the procedure repeated for other pages of the document. Rollers were used to remove any air bubbles and the freshly repaired document spread on a drying rack to dry. When dry the document was trimmed to remove the excess tissue paper and then rebound back into the original one volume as it came to the section.

(xiii) Chiffon repair: this method was applied on fragile documents affected by acidity and written on both sides. Materials and tools used included Carboxyl methylcellulose paste for sticking, supporting material- chiffon material, water for smoothening and relaxing the affected documents, smooth brush, pair of scissors, glass topped table and rollers, spraying pump

The procedure involved preparation of Carboxyl Methyl Cellulose paste as described under tissue repair method above. Then, two pieces of chiffon material were cut to a size that was slightly larger than the document. One piece of chiffon material was placed on a glass topped table. Water was sprayed on each page of document to make it straight, relaxed, transparent and firm. The Carboxyl Methyl Cellulose paste was applied on the side facing up using a smooth brush. The document to be repaired was relaxed by spraying it with water uniformly.The paste was applied on the side facing up using a smooth brush. The other piece of the chiffon materialwas gently put on top of the document; water was sprayed on it, paste applied and the procedure repeated

for other pages of the document. Rollers were used to remove any air bubbles and the freshly repaired document spread on a drying rack to dry. When dry the document was trimmed to remove the excess chiffon material rebound back into the original one volume as it came to the section.

(xiv) Solvent lamination: this method provided strength to fragile documents written on both sides. Materials and tools used included cellulose acetate which acted as an adhesive, acetone solution to dissolve acetate in preparation of adhesive, japanese tissue paper to act as reinforcing material, cotton swabs, glass topped table.

The procedure involved the following: a relaxed de-acidified document was put on a glass topped table. It was covered with a piece of cellulose acetate film which was larger than the document. Japanese tissue paper was put on top of the cellulose acetate film. A cotton swab was dipped in acetone and used to touch the corners of the assembled papers and the document above to make them firm. The assembled repair papers including the document were turned over and the above procedure was repeated on the other side. The cotton swab was put at the centre and spread sideways. The adhesive dissolves the acetate film in a semi-plastic condition to stick the tissue paper onto the document.

(xv) Binding: This method was undertaken to protect and restore covers and pages fallen off from the spine. The following were some of the types of binding that were applied:

Spiral binding: This method involved use of the spiral binding machine to make perforations which were used to stick the papers together using spirals. Perforated papers were put between two perforated covers. A spiral of appropriated size was put through the spikes on the spiral binder machine and opened up by the same machine

to allow inserting of the papers. Papers were inserted and the spiral closed up and removed from the machine. The excess spiral was trimmed off to the right size at the edges of the document.

Soft cover binding: This method involved punching of the papers to be bound using a nail and a hammer twice along the spine. The papers were then sewn together by passing of thread through the sheets in the document and two pieces of manila paper put on sides as cover. The sewn spine was then clothed with the binding cloth using binding glue.

Case binding: This method involved sticking the papers to be bound together using binding glue on the spine. Cartridge paper was folded once and stuck on both sides of the document. A strip of brown paper was cut and put round the spine of the document. Strawboard was trimmed into appropriate sizes and covered with the binding cloth using binding glue to make the cover of the document. This cover was then stuck to the document using binding glue.

Flush binding: This method involved folding two cartridge papers once separately and sticking each piece on each side of the document. The two pieces of cartridge were then reinforced with a strip of brown paper on the spine. Light strawboard was cut into two pieces and stuck at both sides and reinforced by the binding cloth. The original cover of the document was stuck on the appropriate sides using glue if the cover came with the document, if not available, manila paper was used as the cover.

The respondents further explained that in addition to the above practices, the following conservation practices were also applied as follows:

(xvi) Salvage of water damaged documents: Documents that had been exposed to flood or rain or rendered wet by leakages of pipes and tap water were likely to suffer damage due to rotting, attack of mildew or fungus. To restore them, the atmosphere of the room where these documents were located was treated with 10% thymol solution in methylated spirit to eliminate spores in the air. Completely soaked documents were separated from slightly wet documents. Wet papers were carefully separated from each other and kept individually between white blotting papers and spread on valeen papers in a well ventilated room. The blotting paper was changed as often as possible until the document dried.

(xvii) Deep freezing: This involved putting documents which were affected by insects to temperatures below the freezing point of water (below 0°) to kill insects, fungi and remove moulds. Documents were put in clear polythene paper, tied with a piece of rope and placed in a deep freezer for 72 hours.

(xviii) Machine lamination: This involved putting the document in inside the laminating pouch according to the size of the document. The laminating machine was switched on. The document was inserted into and passed through the laminator below the rollers, heat and pressure from the laminator melted the laminating pouch at the edges sealing them together and the document then came out through the other end of the machine.

(xix) Tape lamination: This method involved applying binding glue at the back of the document (side without writing). Gently the backside was stuck to the mounting board. Creases were removed using a piece of cotton wool. The laminating tape was stuck gently on top of the document with writings. The document was then trimmed into the right size using the guillotine machine.

When asked whether there were damaged archives and documents they could not restore, conserve or repair, the respondents added that, there were 60,000 documents at the conservation section which had not been repaired due to administrative, technical and financial reasons.They explained that the the methods of repair that they used were traditional thus could not be applied to repair all the documents. They also added that some of the important modern conservation methods like leafcasting were not done due to lack of the required equipment hence the many unrepaired documents at the section.

When asked how they conserved audiovisualarchives, respondents from the audiovisual section commented that the audiovisual section was planning for conversion of information from analogue format to digital format as a method of preservation and conservation of audiovisual information. They explained that they did curation by putting AV materials in a freezer for two weeks then the freezer was switched off with tapes and films inside (aclamatization) to moderate temperature and relative humidity. This was done to manage vinegar syndrome (decay of tapes and films due to growth of moulds) further magnetic tapes were retained in cases and put on the shelf vertically to prevent damage and the projection of torn or tearing films was stopped to reduce wear and tear in addition to scanning of photographs to create backup.

On conservation methods for microfilms, the respondents who included staff working at the microfilming section indicated that there were no conservation methods for damaged microfilms. Once damaged, information was lost, thus it was important for them to ensure that sufficient preservation measures were in place to prevent damage.

Staff from the ICT section were asked to comment onconservation methods for electronic formats and their comments were; there were no conservation methods that could be applied to physical media like broken CDs, DVDs, hard drives, flashdisks and computers to repair them at KNADS. The only methods applied to unbroken ones were as explained by respondents, cleaning and scanning of computers using antivirus, migration of information to other storage devices throughdigitisation, formatting of hard disks, flash disks and replacing of old computer cables with new ones. They further noted that conservation of non-paper archives as a whole relyed more on preventive preservationtechniques and practices.

Discussion

From the findings, most of the conservation practices except one - testing the PH of paper, agree with Kathpalia (1978), Jayakumar (2006), IRMT(1999). Testing the PH of paper at KNADS as indicated in the findings was done by physical eye examination of colour changes on the document and brittleness of paper while placed on the light table.If the colour of paper was found to have turned to brown or yellow then the paper was acidic,the level of acidity was determined by eye examination of the extent of brown or yellow colour and brittleness of paper. This differs with the three authors mentioned above who explain that, one safe method for testing PH of archival materials is the use of a pH indicator stick or indicator paper. The paper registers the pH range of the item being tested, the procedure should be as follows:

Asmall piece of polyester is put under the areas to be tested, to protect the item and contain the moisture. Adrop of distilled water is put on the area to be tested which should not be near ink,as the ink may be soluble in water. One end of the pH indicator laid in the drop of water and moved around to wet the entire end of the indicator. A

second piece of polyester is placed on top of the pH stick and covered with a light weight to provide even pressure. After five minutes, the top layer of polyester and the pH stick are removed and the colours on the stick checked against the colour chart provided by the manufacturer of the pH indicator. Gently any remaining water on the paper is blotted, the paper is then placed between dry blotters under a light weight to allow it to dry completely without warping (water stains may remain from the test).

To get best results, the paper is tested in several spots and results compared. If the indicator shows a reading below 7.0, the paper is acidic, if the reading is above 7.0 the paper is alkaline. Any paper below 6.0 is highly acidic and should be isolated from adjacent non-acidic papers by wrapping it in archival quality paper or storing it separately.

The practice at KNADS as indicated in the findings on the previous page compared to Kathpalia (1978), Jayakumar (2006), IRMT (1999)above cannot guaranteeacurateand reliable results in determining PH value. The findings also indicate that the conservation practices were could not be applied to repair all the damaged archives.

4.4.4 Effectiveness of Preservation and Conservation Practices

After collecting information on causes of deterioration to archival materials, preservation and conservation practices applied on archival materials, it emerged from the findings that the extent of deteroriation of archives was extensive and that while many deteroriated archives had been repaired many others had not as previously indicated in the statement of the problem. One of the objectives of the study was to establish the effectiveness of thepreservation and conservation practicves applied because ineffectiveness of these practices was likely to be the most contributing factor

to the situation as mentioned. Data was collected through interviews with all the respondents.

a) Data from managerial staff

Respondents who included the director, deputy director and heads of sections explained that inspite of the numerous challenges in preservation and conservation, the institution had done its best to keep the collections in a good state.

b) Data from other staff

Respondents who included custodial staff in the repository, NDS and searchroom sections, technical staff in the conservation, microfilming, audiovisual and ICT staff were asked to give their views and opinions on the effectiveness of preservation and conservation practices and they explained that preservation and conservation practices were not effective due to many factors and challenges experienced.

From the findings, while top management pointed out that they had tried their level best to make preservation and conservation practices effective, this was contradicted by what other respondents said that, the preservation and conservation practices were not effective as there were 60,000 (sixty thousand) unrepaired damaged paper archives at the conservation section, in addition to deroriated audiovisual materials and electronic storage media that could not be repaired.

Ineffectiveness in preservation and conservation practices is further illustrated in the statement of the problem that most of the archival materials which were acquired by KNADS in good condition had deteriorated while in the archives during access and use and not all of them had been repaired.

4.5 Appropriateness of Methods and Tools for Preservation and Conservation

This objective sought to determine the appropriateness of methods and tools used for preservation and conservation of information materials at KNADS. Information was collected through interviews with staff in the technical and custodial sections and observation of various preservation and conservation equipment and tools used.

(a) Data from custodial staff

Respondents from the repository section explained that storage equipment which included archival boxes and closed mobile shelves were appropriate for preservation of paper records in the repositories where they had been installed while the open static shelves were inappropriate. They further noted that the repository lacked environmental control equipment such as air conditioners, thermometers, dehumidifiers and water detectors.

(b) Data from technical staff

Respondents from the conservation section explained that the various equipment and tools for conservation of paper documents were appropriate. These included; stainless steel conservation sink used for deacidification, deep freezing used for eliminating insects and moulds, drying rack for drying wet records, guillotine for trimming bound documents, light table used for tissue repair, chiffon repair, full pasting and patch repair, brushes, steel rulers, scissors, small tacking hammer, blades, document drilling machine and spiral binder used for binding documents. However, they also noted that although all the equipment and tools were appropriate most of them were inadequate while others were completely lacking.

Respondents from the ICT section explained that equipment used to provide appropriate storage included computers (harddisk), server storage space, data safes,

flash disks,CDs and DVDs. They noted that though appropriate for preservation of electronic records, these equipment and facilities were not adequate.

On the appropriateness of equipment and tools for microfilming the respondents who included staff working in the microfilming section indicated that equipment and tools included; duplicator, slicer, reader, cleaner, printer, digital and manual cameras, hygrometer, dehumidifier, densidometer, hydro-thermometers and air conditioner used to regulate storage environment and fire proof cabinet used for storage of microfilms.They noted that these equipment were appropriate to meet the requirements of microfilming. However, they added that the steel shelves used also for storage of microfilms were not appropriate as they were not built for the size of microfilms and were not fireproof.

Respondents who included staff from the audiovisual section explained that the various storage equipment and tools used for preservation included; film cans, air tight polythene cases, acid free envelopes, lockablemetal cabinets, water proof cabinets and suspended tapes put at the edge of maps. They further noted that the equipment and tools for preservation were appropriate to methods of preservation as they protected AV materials from dust, light, water and other environmental hazards. However, these were inadequate.

(c) Data from operation staff

Respondents who included secretaries and clerical officers explained that the various equipment used for preservation of electronic records such as computers, flash disks and CDs were appropriate. They added that, use of file folders and closed mobile shelves for storage of paper records was appropriate for the protection of the records.

(d) Data from managerial level staff

On disaster management tools and equipment, the respondents who included staff at management level, commented that the tools/equipment that included fire suppression system with smoke detectors in the repositories and offices and fire extinguishers located in strategic areas for extinguishing fire were appropriate for the control of fire.

(e) Data collected by observation

The observation method was used alongside interviews. It was observed that in most cases or sections there was lack of essential environmental regulation equipment, use of inappropriate storage equipment like open static shelves in some repositories, use of steel cabinets that were not waterproof for the storage of microfilms, inadequate operation space in technical sections leading to crowding of equipment, tools and staff working area and also hindered purchase of more essential equipment. It was noted that the various appropriate equipment and tools availlable were inadequate.

Discussion

From the above findings, respondents not only indicated that they had appropriate equipment and tools, they further noted that those tools and equipment were inadequate and some had broken down. In other instances, the equipment and tools that were available were not appropriate while in other cases essential equipment and tools were not available or installed at all. This showed that the preservation and conservation infrastructure at KNADS was plaqued by many problems among them; lack of adequate, essential and appropriate equipment and lack of enough operating space. These findings concur with asurvey of literature on preservation and conservation of library materials in Africa by Olatokun (2008) which revealed that the prominent inhibitors to effective and efficient preservation of information materials in

African libraries, archives and record centres included, among others, inadequacy of equipment/materials. Another challenge is that some of the essential materials and equipment required for setting up functional conservation and restoration laboratories in African libraries and archives are not availlable locally. Musembi (1999) confirms that the development of a conservation workshop and other related facilities in a 'Third World' country is certainly full of pitfalls.In many cases, the equipment and materials needed for the workshop are not easily available.Most of them have to be imported.However, experience has shown that this is easily said than done.And then there is the question of inadequate fundingAs noted by IRMT(1999), the selection of good quality equipment in offices or repositories (boxes, trolleys, ladders or steps) will result in a good service, which not only assists the users but also minimises the damage done to the records or archives. KNADS needs to provide essential and more appropriate equipment, tools and resources to enhance effectiveness in preservation and conservation practices.

4.6 Challenges Encountered in Preservation and Conservation of Archival Materials

This objective sought to identify challenges encountered in the preservation and conservation of documentary heritage at KNADS. Information was collected through interviews with staff in all the sections.

(a) Data from managerial staff

When asked to comment on challenges facing KNADS in preservation and conservation of archival materials, respondents who included the director, deputy director and heads of sections commented that the challenges were; lack of preservation and conservation policy, in particular, lack of a preservation and

conservation strategy to guide preservation and conservation, an inappropriate building for preservation and conservation of archives due toits location,and lack of space in the archives to store more archival materials.

Respondents indicated that funds allocated to preservation and conservation of archival materials in the annual budget were not enough making it difficult to purchasenew equipment and enough materials. Other challenges mentioned by respondents included inadequate competent manpower with practical skills, knowledge and core competenciesin preservation and conservation and lack of knowledge in disaster management by officers in the public service. The consequence accoding to respondents was deterioration and destruction of records which ended up in the conservation section for repairs.

(b) Data from technicalstaff

Respondents from the audiovisual section indicated that there were various challenges experienced in their section as follows; air conditioners were not up to the required standard and were not working, storage conditions were not regulated thus accelerating deterioration, inadequate shelves for VHS cassettes, films and magnetic tapes, inadequate staff with competent technical skills and lack of a comprehensive audiovisual policy. Further they noted that access and retrieval of digitised photographs was inefficient as the database was rigid and contained scanned photos that werenot linked.

Respondents who included staff from the microfilming section indicated that; digital cameras were not functioning due to lack of local service providers who could repair and service them,offsite storage for duplicate microfilms was lacking, inadequate funding had led to inadequate equipment and lack of enough competent staff.

Staff from the ICT section explaned that challenges experienced in digitisation were; inability to migrate data from floppy disks to hard disks was not possible due to obsolete technology which made it hard to read the data and lack of floppy drives in the market.They further noted that, digitisation was arelatively new technology hence developing standards for usewas a challenge, there was inadequate storage space on the server to store digital records, there was lack of offsite storage for backup of digital records, inadequate technical staff and equipment.

Respondents from this section explained that there was inadequate infrastructure in terms of operating space, essential equipment and tools, inadequate funds which led to lack of training in practical skills,a shortage of competent manpower, delay in supply of materials, chemicals and equipment and, in some cases, complete failure to supply certain materials. They further indicated that harsh environmental conditions due lack of regulation, poor quality of paper and inks and ineffectiveness of preservation practices had accelerated deteroriation of archives and records in the storage areas. The quantity of deteroriated archives overwelmed the conservation section which had few trained staff and lacked essential equipment.

In addition, the respondents noted that lack of adequate competent manpower with practical skills, knowledge and core competencies in preservation and conservation and in disaster management had led to deterioration and destruction of records which ended up in the conservation section for repairs. They noted that repairs were expensive and time consuming.Sometimes, the records brought in for repair were damaged beyond repair.

(c) Data from custodial staff

Staff from the repository section and NDS indicated that; the repositories and NDS lacked environmental control systems namely; air conditioners, thermometers, dehumidifiers and water detection systems. They observed that the harsh environmental conditions which were as aresult of lack of regulation combined with poor quality of paper and inks accelerated the rate of deterioration. Additional challenges as mentioned by respondents included; inadequate funding, lack of enough competent manpower, lack of preservation and disaster managementplan, lack of storage space for storage of records, lack of closed mobile shelves in some repositories and exposure of records to dust and excess light. Respondents from the NDS also pointed out that the NDS storage areas were full hence lacked storage space for new acquisitions.

Staff from the searchroom section indicated that; there was no regulation of environmental conditions in the searchroom. This caused discomfort for researchers and the documents held there. Other problems were inadequate reading space during the peak season, delays in file retrieval from the repository, cases of misplaced files and missing files in the boxes.

Discussion

From the findings, KNADS experienced various challenges in preservation and conservation of archival materials which ranged from; managerial challenges such as lack of preservation, conservation and disaster managementpolicies,inappropriate housing environment for preservation and conservation of records and archives, beuraucracy in tendering and supply of materials, chemicals and equipment which led to delay in supply of most of the required resources.

The repositories for paper records and audiovisual archives lacked appropriate environmental control system which had resulted in harsh environment conditions that accelerated deteroriation of records.

Other challenges experienced were technological in nature including hardware and software obsolescence, lack of offsite storage for digitised archival materials, and deterioration, crushing and ageing of storage media; digitisation being a relatively new technology the ICT section had not been able to develop best practice standards and copyright policies to regulate the management and use of digital records.

Financial challengesarose from inadequate funding. Funds allocated to preservation and conservation of achival materials in the annual budget were not enough. This was evident given the inadequateequipment, tools and materials; failure to repair broken equipment; and lack of adequately skilled manpower.

Other challengesinvolved the human resource in the form of inadequate manpower with practical skills, lack of knowledge and core competencies in preservation, conservation and disaster management; all these factors combined leading to deterioration and destruction of records. All these records ended up at the conservation section for repairs.

All the above challenges hindered effective preservation and conservation of archival materials which in turn resulted in more deterioration and destruction of archival materials and subsequent loss of documentary heritage. These findings agree with first, Conway (1996) who notes that significant financial barriers slow the design and implementation of effective preservation strategies. Second, Mnjama and Wamukoya (2004) who point out that there were real challenges faced by East and Sourthern Africa member countries in the capture and preservation of records. These included:

absence of organizational plans for managing records; absence of legislation, policies and procedures to guide the management of records; absence of core competencies in archival materials management; absence of budgets dedicated to records management; poor security and confidentiality controls and absence of migration strategies for records.

Third, a survey of literature on peservation and conservation of library materials in Africa by Olatokun (2008) revealed that the prominent inhibitors to effective and efficient preservation of information materials in African libraries, archives and record centresincluded inadequate finance; inadequacy of equipment and materials; unfavourable government economic policies; the effects of tropical climate of excessive temperature, high relative humidity and dust. Musembi (1999) notes that the development of a conservation workshop and other related facilities in a 'Third World' country is certainly full of pitfalls.In many cases, the equipment and materials needed for the workshop are not easily available.Most of them have to be imported.However, experience has shown that this is easily said than done.And then there is the question of inadequate funding. All these factors caused rapid deterioration and decay of information resources.

4.7 A Strategy for Preservation and Conservation of Archival Materials

One of the objectives of the study was to Propose a strategy for preservation and conservation of archival materials. Based on the findings of the study coupled with various suggestions by the respondents, the researcher developed a preservation and conservation strategy which addresses gaps, needs and challenges identified in the study. The strategy has four components namely: Current preservation and

conservation practices; interventions required; best practices in preservation and conservation and expected outcome. The strategy is presented in figure 1 below.

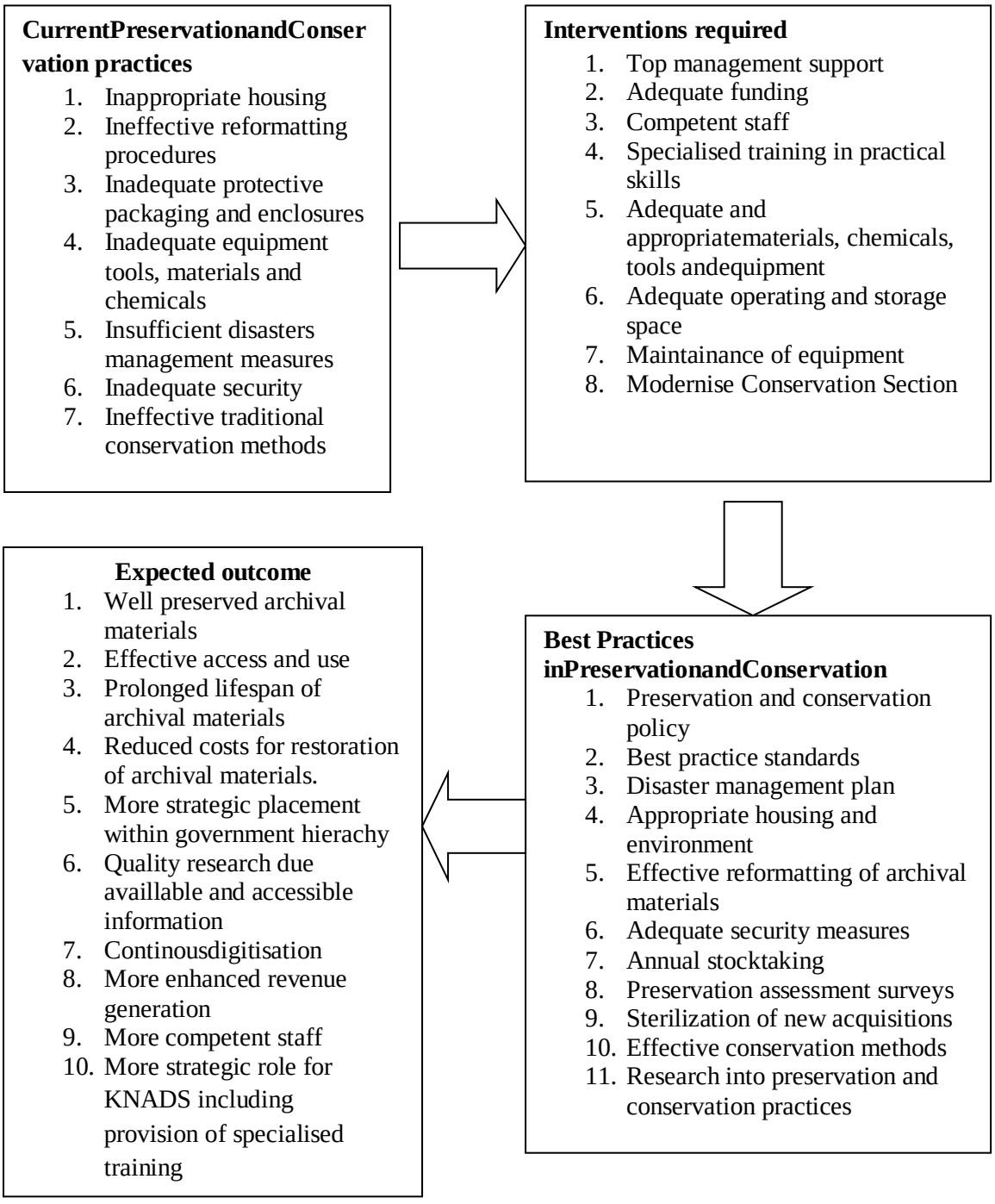

Figure 1: A preservation and Conservation Strategy for Kenya National Archives and Documentation Service

The components of the strategy are described as follows:

4.7.1Current Preservation and Conservation Practices

The current preservation and conservation practices established by the study at KNADS were provision of inappropriate housing environment for storage of archival materials; provision of inadequate protective packaging and enclosures for storage archival materials; provision of inadequate disaster management measures; provision of inadequate security measures; ineffective reformatting of archival materials; ineffective conservation methods such as ineffective method for testing the pH of the documents and fixing soluble ink.

The following gaps existed in the current preservation and conservation practices mentioned above:inappropriate location of archives building; use of inadequate and inappropriate equipment, tools and materials for preservation and conservation; carrying out preservation and conservation without guidance from documented preservation policies, guidelines, standards and disaster management plan; failure to conduct annual stocktaking,preservation assessment surveys and leaf-casting; inability to fix soluble ink.

The gaps were caused by the various challenges experienced by KNADS such as beuraucracy in tendering and supply of materials, chemicals and equipmentleading to delays in supply of these resources and sometimes complete failure of supply, thus lack of resources for efficient preservation and conservation of archival materials; technological obsolescence which led to loss of digital information on obsolete hardware; inadequate storage space on the server to store digital records and lack of offsite storage for digital records;inadequate funding since funds allocated to preservation and conservation of achival materials in the annual budgets were not

enough to provide enough essential and appropriate equipment, tools, materials, repair broken equipment and employ enough skilled manpower hence lack of enough competent manpower;low quality of paper and ink used in the production of paper-based records led to deteroriation of paper; unregulated temperature and high relative humidity in the storage areas caused deterioration information materials making the task of preserving original records difficult, and expensive.

4.7.2 Interventions Required

The current preservation practices applied at KNADS were not effective since they did not eliminate deteroriation of archival materials or reduce it to the minimum.This led to deteroriation of archival materials to a large extent as indicated by the numberof both repaired and unrepaired damaged paper archives at the conservation section, in addition to deteroriated audiovisual materials and electronic storage media.

Likewise, conservation practices applied were not effective because they did not achieve the desired outcome of restoring and repairing all damaged archival materials brought to the conservation section, as there were many unrepaired damaged paper archives held at the conservation section. In addition there were deteroriated audiovisual materials and electronic storage media that could not be restored.

Therefore, interventions in this strategy comprise of the measures that should be put in place to ensure preservation practices are effective so as to prevent deterioration and destruction of archival materials. Prevention can be achieved when the measures are able to control and if possible eliminate agents of deterioration of archival materials or reduce deterioration and destruction to a minimum level.

The interventions also comprise of the measures that should be put in place to ensure conservation practices are effective so as to conserve, repair, treat and restore all damaged, and deteriorated archival materials. Theinterventions are as follows:

Relocate to a site outside the city centre where the atmosphere is less polluted andconstruct a purpose-designed and built archives, that complys with appropriate accommodation standards required, it should also provide enough operation space for every section; install functional environmental control and regulation systems to ensure temperature, relative humidity are within the specified range and there is good air circulation;

provide an ideal studio for storage of AV materials; provide more fire proof cabinets for storage of microfilms; duplicate information on microfilms onto atleast one other microfilmand provide offsite storage for digital and microfilmed archiveslike in records centers so that in case of disaster, information can be retrieved from there; provide adequate,tested, acid-free packaging and good quality storage enclosures and equipment for all archival materials; replace open static steel shelves in storage areas with closed mobile shelves;

ensure descriptive information/metadata is captured during digitization of recordsincluding file reference, title/subject, covering dates, provenance and all the important information required; upload paper records which have beendigitised to the searchroom computers and KNADS website for use by researchers; install up-to-date virus detection and protection software on the server and all computers in the department; digitise all the paper records and audiovisual archives that are still in analoque format; authorize and document any changes to hardware and security features; formulate media refreshment, hardware migrationand data security policy to

guide and ensure digital preservation techniques like refreshing, technology preservation, migration, and emulation are done to guard against technological obsolescence and ensure the continued meaningful existence of electronic records;

train staff in emergency response to disasters; improve security and be more vigilant to potential threats of fire, civil unrest and terrorism; develop a disaster management plant provide guidelines in disaster prevention, preparedness, reaction and recovery; ensure good housekeeping and cleanliness procedures are effectively carried out daily to contol dust and dirt that may attract rodents and insects; treat new acquisitions first before incorporating into the rest of the archives; regularly inspect repositories so as to check out for any affected spots; eliminate dump conditions in storage areas since these conditions attract insects; spray repositories and other storage areas regularly with effective,insecticide/pesticide to eliminate insects or vermin;

purchase essential, suitable, adequate and more appropriate equipment, tools and materials as per requirements of every section for presevation and conservation of archival materials; install modern equipment for restoration of records such asthe leafcaster, autosuction machine, water purification system; bio-master ultra pel among others; remove the redundant machines which are not productive from conservation section; provide service contract for repair and maintanance of all preservation and conservation equipmentto ensure they are mantained in good working condition;seek for practical training opportunities in preservation and conservation through partnerships and collaborations with other archival institutions and facilitate KNADSstaffto attend the training,so as to maintain or enhance their expertise continuously; advice officers in the public service on best practices in preservation,

conservation and disaster management to reduce deterioration and destruction of records which eventually end up at conservation section for repair;

employ more competent staff with practical technical skills in preservation and conservation practices; create and establish a chemical preparation and research laboratory and undertake research into chemicals and materials used for preservation and conservation; create suitable storage for conservation chemicals; purchase and install specialised shelves for storage of chemicalsand move all conservation chemicals from departmental store to the specialised shelves; create document sterilization section and undertake sterilization of nnewly acquired archival materials first before incorporating them into the rest of the archives; provide adequate funds so as to be able to provide adequate and appropriate materials, tools, equipment, chemicals and other preservation and conservation facilities.

The funds can be provided through but not limited to the following ways: seek for grants and donations from KNADS partners and other donors through writing and submitting proposals on undertaking various preservation and conservation projects; generate own funds through providing preservation and conservation services such as training, restoration and binding of documents, digitization of documents to bothpublic offices and private sector; defend and justify KNADS budget before top management and parliamentry budget committee so as to get their support for adequate funding.

4.7.3Best Practices in Preservation and Conservation

Thebest practices in preservation and conservationthat should be applied at KNADS to prevent deterioration and destruction of archival materials are as follows:

Provide appropriate housing and environment for storage of archival materials; provide protective packaging and enclosures for storage of archival materials; reformat archival materialseffectively and appropriately; put in place sufficient disaster management plan; effective pest control; formulate, documentand implement preservation policy and guidelines;

Establish institutional standards for records creation, preservation and conservation; provide effective and adequate security measures; undertakeeffectiveannual stocktaking; undertake assessment surveys;

effective conservation methods such as, effective surface cleaning of paper,removal of adhesives and paper fasteners from damaged archival materials before repairing them; effective mending of tears in paper, testing pH and solubility of ink before repairing damaged archival materials; effective de-acidification, full-pasting, tissue repair, chiffon repair, solvent lamination, binding, leaf-casting, salvage of water damaged documents; sterilization of newly acquired archival materials before incorporation in the rest of the collection; conversion of audiovisual information from analogue format to digital format using appropriate equipment; curation of AV materials by deep freezing; scanning of photographs to create backup copy; blowing and cleaning of computer hardware; scanning of computers using antivirus, formatting of computer storage hard disks and flash disks;

Research into preservation and conservation practices, trends, materials, chemicals and equipment.

4.7.4 Expected Outcome

It is expected that with successful interventions, KNADS will implement best practices inpreservation and conservation and ultimately achieve effectiveness in

preservation and conservation of archival materials thereby minimizing factors that cause deterioration and destruction of archival materials.

Effective preservation of archival materials will lead to well preserved archival materials hence reduce costs in conservation of damaged archival materials in terms of money, time and labour because conservation is costly, labour intensive and time consuming. This will inturn lead to effective access, use and enhanced revenue collection. Enhanced revenue collection may result to increase infunding, more strategic placement within government hierachy, quality research due availlable and accessible information.

If there shall still be some damaged documents then it is expected that best practices in conservation will effectively restore and repair all damaged archival materials brought to the conservation section and no damaged, unrepaired records will be held at the section. This will prevent loss of information byprolonging lifespan of archival materials. Besides this, conservation section will become an effective training unit in practical and technical conservation skills thus generate funds for KNADS from training students and officers from national and international institutions.

The ultimate outcome of all these initiatives is improved access to information resources by the users and increased use of archival resources.

4.8 Chapter Summary

This chapter provided information on data collection through interviews with staff (respondents). This was complemented by data collected from observation made on preservation and conservation activities in custodial and technical sections, building environment, preservation and conservation equipment, conditions of storage and

storage equipment, potential threats to records and condition of records. Data analysis was guided by the study objectives. Data presentation was done using qualitative approach by means of descriptions and explanations.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter provides a summary of findings, conclusion and recommendations. It is based on the findings of the study and the analysis in chapter four. The summary was guided by the objectives of the study and the conclusion and recommendations were derived from the findings of the study.

5.2 Summary of Findings

The aim of the study was to assess preservation and conservation practices at KNADS with a view to developing a strategy to promote a systematic approach to preservation and conservation of archival materials for longterm usability. To achieve this, the study was guided by the following specific objectives namely to:-

i. Establish the diversity of archival materials and their formats at KNADS
ii. Establish the effectiveness of preservation and conservation pratices at KNADS
iii. Determine appropriateness of methods and tools of preservation and conservation at KNADS
iv. Identify challenges encountered in preservation and conservation of archival materials at KNADS
v. Propose a strategy that promotes a systematic approach to preservation and conservation at KNADS.

To achieve the above objectives, data was collected from 45 respondents who included Archivists, Archives Assistants, Clerical Officers, Records Management Officers, Secretariesand Support Staff involved in preservation and conservation of

archival materials. These consisted of 7 officers at management level; technical staff consisting of 15 officers drawn from Microfilming, Conservation, ICT and Audiovisual sections; custodial staff consisting of 15 officers drawn from Repository, NDS, Searchroom and Art gallery and operational staff consisting of 8 officers drawn from the General Administration section. All the respondents were selected using purposive sampling technique. The study response rate was 100%.

5.2.1 Diversity of Archival Materials and their Formats

The findings of the study revealed that KNADS collection comprised of a diversity of archival materials in various formats ranging from paper, audiovisual, electronic, microfilm toartefacts.The archival materials were acquired by direct donations from various individuals and through the records management division with a network of six regional archives/recordscentres in Nairobi, Nakuru, Mombasa, Nyeri, Kisumu and Kakamega while electronic archives were created or received by the ICT section.

5.2.2 Effectiveness of Preservation and Conservation Practices

i. Agents of deterioration

The findings indicated that deterioration of archival materials was caused by chemical agents such as natural aging process due to inherent properties of information materials like, poor quality writing inks with high acidic content and chemical composition of paper which caused paper to become brittle and crumble to dust; acidity also caused photographs to turn yellow, dust caused abrasion of photographs, aging led to distortion of sound and image, hydrolysis resulted in destruction of films; biological agents such as human factors including heavy usage of some provenances, frequent photocopying and mishandling which led to wear and tear; termites and rats fed on paper destroying it, activities of silverfish and fungi led to decomposition,

foxing (brown spots), appearance of holes in paper and weakening of papers, oils on fingers left prints on films anddamaged images on films and negatives.

Other findings indicated that physical agents such as atmospheric pollution due to high emmission of carbon gases from the heavy traffic around the building, uncontrolled light, unregulated relative humidity and temperatures caused fading of photographs and slides, curling of films andmelting of sound recordings, tight boxingdamaged archival materials while dust caused abrasion of photographs.

From the findings, threats to electronic archives were; virus attack on hard drives which led to crushing of the drives and loss of data, aging of hard disks reducing their performance in addition to technological obsolesence which led to loss of information. Meanwhile, there were cases whereby CDs and DVDs got scratched and even broke on falling down on the floor.

The good news was that therewas no deterioration of microfilms since their storage environment was well regulated and similarly, there was no deterioration of artefacts in the Artgallery.

ii. Preservation and conservation practices

The findings of the study showed that there were various preservation and conservation practices in place at KNADS but these practices were insufficient and inadequate. For example, the housing and storage environment for archival materials was inappropriate and inadequate; reformatting procedures were ineffective; packaging enclosures were inadequate; disaster management measures were inadequate;security measures were inadequate and conservation practices were ineffective.

In addition, the study established that most of the preservation and conservation best practices were not carried out at KNADS. For example, there was no documented preservation and conservation policy; disaster management plan was not in place; preservation assessment surveys were not conducted; annual stock taking was not conducted; best practice standards had not been established; leaf casting of fragile records was not done leading to loss of information.

Furthermore the findings of the study revealed that preservation practices applied had not achieved the desired goal of preventing deterioration of archival materials or reducing it to the minimum but instead the numberof deteroriated archival materialshad continued to increase throughout the years. Conservation practices on the other hand did not achieve the desired outcome of restoring and repairing all damaged archival materials brought to conservation section as there were 60,000 unrepaired damaged paper archival materials at the conservation section and deteroriated audiovisual materials and electronic records storage media that could not be restored.

5.2.3 Appropriateness of Methods and Tools for Preservation and Conservation

The findings revealed that in some sections, though they posed appropriate equipment and tools, these were inadequate and some had broken down. In other sections the equipment and tools that were provided were not appropriate while in others essential equipment and tools were not availlable or installed at all. This indicated that the preservation and conservation infrastructure at KNADS was plaqued by lack of essential equipment, tools and materials.

5.2.4 Challenges encountered in Preservation and Conservation of Archival Materials

The findings of the study revealed a number of challenges encountered in preservation and conservation of archival materialsatKNADS. These challenges were categorized into managerial, environmental, technological, financial andhuman resource.

Managerial challenges

These included lack of preservation, conservation and disaster managementpolicies, plan or strategy; inappropriate housing and storage environment for preservation and conservation of archival materials; beuraucracy in tendering and supply of materials, chemicals and equipment which led to delay in supply of most of these resources; poor quality of writting and printing paper which deteriorated easily through wear and tear; acidic ink which accelerated deterioration; lack of offsite storage for electronic and microfilmed records and lack of enough storage and operating space.

Environmental challenges

These included lack of environmental control system in the storage areas for paper and audiovisual archives which led to harsh environmental conditions that accelerated deteroriation.

Technological challenges

These included migration of data from floppy disks to hard disks, an activity which could not be accomplished due to obsolete technology; attack of computers hard drives by virusesfrom time to time due to obsolete antivirus; deterioration of audiovisual and electronic storage media; copyright issues affecting digitized records.

Financial challenges

This was primarily aboutinadequate funds to purchase equipment and materials; inability torepair broken equipment; lack of funds to employ adequate skilled manpower; lack of funds to enhance infrastructure such as acquisition of enough storage and operating space, equipment and other tools.

Human resource challenges

These included inadequate competent manpower, lack of practical skills and knowledge among KNADS officers and those in the public service on what preservation and conservation entails.

5.3 Conclusion

KNADS has a legal mandate to acquire and preserve public records and archives of permanent value and make them accessible to users. The public records and archives form a valuable part of Kenya's documentary heritage. Preservation of archives is the means by which the survival of the acquired archives is ensured for enduring access. IRMT (1999) defines preservation as the totality of processes and operations involved in the protection of records and archives against damage or deterioration. IRMT further explains that preservation involves four related activities which are maintenance, examination, conservation and restoration. The aim of archival preservation is to prolong the usable life of useful research information in two ways. First, preventive preservation seeks to reduce risks of damage and to slow down the rate of deterioration. This aim is usually accomplished by selecting good quality materials and by providing suitable storage environments and safe handling procedures. Secondly, prescriptive preservation is a means of identifying and treating or copying damaged materials to restore useful access to the information.

However, the findings of the study show that, the number of deteriorated archival materials at KNADS continued to increase over the years and that deterioration was caused by chemical, physical, biological and technological factors. The deteriorated archives eventually ended up at KNADS conservation section for conservation. Hadgraft (1991) defines conservation as the active intervention in the repair of items, which are in a deteriorated or degraded condition. As such, conservationpractices are meant to treat, repair and restorearchival materials which are in a deteriorated or damaged condition. However, the findings indicate that conservation practices did not achieve the desired outcome of treating, restoring and repairing all damaged paper archival materials brought to the conservation section as there were many unrepaired archives at the section. In addition deteroriated audiovisual materials and electronic storage media were not repaired. This state of preservation and conservation practices at KNADS clearly indicates that these practices were insufficient and inadequate. This is attributed to the following factors and challenges:

Inadequate funding which contributed significantly to lack of important and crucial resources required for preservation and conservation.Conway (1996) notes that significant financial barriers slow the design and implementation of effective preservation strategies.At KNADS, funds allocated to preservation and conservation of achival materials were not enoughto purchase equipment and materials; repair broken equipment; employ adequate skilled manpower and enhance infrastructure such as acquisition of enough storage and operating space, equipment and other tools, hence KNADS preservation and conservation infrastructure was plaqued by lack of adequate, essential and appropriate equipment, tools, materials and space due to inadequate funding;

Inappropriate and inadequate housing and storage environment provided for archival materials. The type of housing and environment provided for the storage of archival materials at KNADS was not appropriate. The status and condition of the building affected archival materials leading to deterioration. Despite various preservation and conservation measures put in place, lack of environmental regulation rendered most of them ineffective;

Lack of documented preservation and conservation strategy, policy and guidelines.KNADS did not have documented policies and guidelines on preservation and conservation of archival materials, disaster management and reformatting of archives to guide members of staff. Lack of documented preservation and conservation policy and guidelines hindered theability to preserve archival materials and implementation of sound preservationand conservation procedures and guidelines that could have ensured cost-effective preventive measures to reduce the need for more costly conservation and restoration;

Failure to establish best practice standards in preservation and conservation of archival materials. Another measure that can be taken to improve the physical care of archival materials is to establish institutional best practice standards for records creation and care. IRMT (1999) points out that an archival institution has an important role to play in the establishment of record-keeping standards, in order to protect valuable materials. The findings indicate that KNADS had not established standards in records creation, care, preservation and conservation. KNADS therefore did not carry out preservation and conservation practices in adherence to best practice standards hence was not able to effectively provide care and protection of archival materials;

Failure to undertake modern methods of conservation such as leafcasting which is an effective method of repairing fragile and delicate records. Heft (2010)explains that leaf-casting is a conservation process developed by conservators in Eastern Europe to reintegrate paper pulp into the lost areas of documents through gravity and/or suction. According to IN SITU Museum and Archive Services (2016)new leaf casting machine has been developed after years of experience. Futernick (2011) explains that damage to paper takes many forms. The availability of a growing number of repair technologies enables the conservator to meet the needs presented by particular problems.The leaf casting technique offers a quick and viable alternative to traditional repair techniques. Mowery(2018) adds that book and document leafcaster conserves and restores many items including books, printed documents, newspapers, manuscripts and works of art on paper. It saves labor costs over manual repairs and provides excellent results. KNADS did not applyleafcasting which is an important modern conservation practice hence many damaged documents that could be repaired using this method remained unrepaired. These documents continued to deteriorate leading loss of information;

The study therefore concluded that preservation and conservation practices at KNADS were not effective in protecting archival materials for enduring access. So as to achieve its responsibility of acquiring and preserving archives and making them accessible to users, KNADS needs to implement intervention measures such as those that are described in the proposed strategy in chapter four above, these measures will help improve preservation and conservation practices and ensure that theyare effectively done in order to protect Kenya’s documentary heritage for long-term userbility.

5.4 Recommendations

The recommendations contained in this section are based on the findings of the study. The recommendations highlight key findings and are intended to mitigate some of the issues that undermine preservation and conservation in the public service and chat the way forward on preservation and conservation in the country.

One of the objectives of the study was to establish the effectiveness of Preservation and conservation practices at KNADS.The findings of the study showed that there were various preservation and conservation practices in place at KNADS but these practices were insufficient, inadequate and ineffective leading to loss of archival information.Another objective of the study was to determine appropriateness of methods and tools of preservation and conservation at KNADS. The findings of the study revealed that the preservation and conservation infrastructure at KNADS was plaqued by lack of adequate, essential and appropriate equipment, tools and materials. Furthermore there was lack of enough storage and operating space. This resulted into poor and ineffective preservation and conservation. The ineffectiveness in preservationand conservation practices and the inappropriateness in methods and tools were attributed to various challenges and factors identifyedunder the other objective of the study and these were;inadequate funding; inappropriate and inadequate housing and storage environment for archival materials;lack of documented preservation and conservation strategy, policy and guidelines;failure to undertake preservation assessment surveys and annual stocktaking;failure to establish best practice standards in preservation and conservation of archival materials;ineffective reformatting of archival materials and failure to undertake modern methods of conservation.In view of these findings under the study objectives the study recommends:

i. Provision of adeguate funding for preservation and conservation practices

The director KNADS should look for ways in which KNADS should beadequatelyfunded so as to provide essential, suitable, adequate and appropriate equipment, tools and materials for preservation and conservation to improve preservation and conservation of archival materials.Adequate funding will also enable repair and maintanance ofequipment.

The various ways the director can use in seeking for adequate funds include; seek forums for defending and justifying department's annualmbudget before parliamentary budget committee; seek for grants and donations from KNADS partners and other donors through writing and submitting proposals on preservation and conservation requirements;generate own funds through providing preservation and conservation services such as training, restoration and binding of documents to the public at afee among others.

ii. Provision of adequate and appropriate housing and storage environment for archival materials

The type of housing and storage environment provided for archival materials at KNADS was not appropriate. It was impacting negatively on their condition leading to deterioration. Therefore the KNADSmanagement should undertake to relocate KNADS department to a site outside the city centre where the atmosphere is less polluted and construct a purpose-designed and built archives, thatcomplys with safety regulations as required. The management should ensure functional environmental control and regulation systems such as air conditioners, thermometers, hygrometers, dehumidifiers, fire and water detection systems are installed in the buildingto ensure temperature, relative humidity are within the specified range and there is good air circulation. In addition, appropriate accommodation standards should be

followed,tested materials and equipment should be used to store archival materials, offsite storage for digitized paper archives, audiovisual archives and duplicated microfilm archives should be provided.

iii. Ensurereformatting of archival materialsis done effectively to enhance access and preservation of original records.

The director KNADS should provide enough funds to facilitate digitization and uploading ofpaper archives to the KNADS website and onthe computers at the searchroom. He/she should address thecopyright, administrative and technical issues that are affecting digitisation.

In order to avoid loss of information due to technological obsolescence, the head of Information Communication Technology section should formulate media refreshment, hardware migrationand data security guidelines and ensure digital preservation techniques like migration are done to guard against technological obsolescence.

iv. Develop preservation and conservation policy

KNADS is the only institution with the responsibility of preservation of national documentary heritage, it is important that the it should develop or spearhead development of preservation and conservation policy to guide members of staff and public officers. The policy will act as areference point and give direction and the likely procedures. It will provide a platform for standardizationand uniformity of purpose making it possible to hold staff to account for any oversight.

v. Establish best practice standards

KNADS as an archival institution has an important role to play in the establishment of record-keeping standards, in order to protect valuable materials and improve preservation of archives. It should liaise with Kenya Bureau of Standards and

collaborate with International Organization for Standardization to establish and domesticate standards that should include standards for the type of paper to use for creation of original records; the type of storage containers and shelving; the type of file folders to use for filing; the type of staples or fasteners for filing; the quality of writting and printing inks to use for creation of records; preservation practices and conservation practices to implement, among other relevant areas to records and archives management.

vi. Undertake annual stocktaking and preservation assessment surveys

In order to: keep a check on misplaced or missing archives; ensure the safe return and storage of archival materials; assess the condition of archival materials; identify any physical deterioration or damage; examine archives building, storage conditions and maintenance procedures; formulate procedures for handling and maintenance, annual stocktaking and preservation assessment surveys should be undertaken effectively and effeciently.

vii. Modernise the conservation section

The facilities at the conservation section were not able to treat, repair and restore all the damaged archival materials hence the director and head of conservation section should modernise theconservation section as follows:

a)Remove redundant machines which are not productive to create space for the section then purchase and installmodern equipment for restoration of fragile records for example,the leafcaster, autosuction machines andwater purification system.

b)Establish a chemical preparation and research laboratory for appropriate preparation of chemicals for restoration of records. The equipment, tools, materials and chemicals which are required for preparation of restoration chemicals and

research should be acquired and installed to enhance effective preparation of chemicals and research. The director should then ensure that there are enough trained staff members to undertake research into chemicals and materials of preservation and conservation to ensure they are of the required standard, research will also address preservation and conservation problems encountered or anticipated.

c) Create suitable storage for conservation chemicals bypurchasing and installing the specialised shelves for storage of chemicals and moving all the conservation chemicals from the departmental store to the specialised shelves to protect the chemicals getting spoiled before use due topoor storage.

d) Createa document sterilization section

Newly acquired archival materials may be affected with water as indicated in the statement of the problem, infested with insects, bacteria, fungi and molds. There is need to treat them before incorporating into the rest of the archives to avoid infecting them with the wetness, insects, bacteria, fungi and molds. The KNADS management should create a document sterilization section; purchase and install sterilization equipment such as biomaster ultra pel, autoclave machine, vacuum cleaners, microscope among others; ensure that there are enough trained staff members to undertake sterilization of records.

viii. Train and improve knowledge of existing staff in practical skills in preservation and conservation and recruit enough competent staff with requisite skills, knowledge and core competencies.KNADSshould improve the technical knowledge of staff in best practices of preservation and conservation and employ more competent staff with practical, technical skills in preservation and conservation. Training opportunities that should be provided should include; attendance at national and international conferences, seminars, study visits, internships and working

exchanges through partnerships and collaborations with other institutions and professionals;in-house training in disaster management,preservation and conservation practices for non technical archives staff.

The heads of sections through the records management division should give advice to officers in the public service on best practices in preservation, conservation and disaster management to reduce deterioration and destruction of records in those offices which eventually end up at KNADS conservation section for repair.

5.5 Proposed Strategy for Preservation and Conservation of Archival Materials

One of the objectives of this study was to propose a strategy for preservation and conservation of archival materials. This objective was strengthened by various findings of study which touched on various issues concerning the manner in which preservation and conservation was done. Based on the findings the study has come up with a proposed strategy on preservation and conservation of archives. The proposed strategy if accepted and adopted by KNADS and other key stakeholders will go a long way in enhancing preservation and conservation of archival materials at KNADS and in the country. The proposed strategy is found in section 4.7 in chapter four of the study.

5.6 Suggestions for Further Research

Since the study assessed preservation and conservation practices at Kenya National Archives and Documentation Service, the study highlighted a few issues touching on digitisation as apreservation practice. The study therefore recommends that a detailed study should be done to assess digitisation as a preservation and conservation strategy at KNADS.

5.7 Chapter Summary

This chapter provided the summary offindings of the study, conclusion and recommendations that can be adopted by KNADS to ensure effectiveness in preservation and conservation of archival materials.

REFERENCES

Abend, G. (2013) "The Meaning of Theory." Sociological Theory 26 (June 2008): 173-199; Swanson, Richard A. Theory Building in Applied Disciplines. San Francisco, CA: Berret-Koehler Publishers 2013.

Acker, E. and O'Connell P. (2010).Archives and Record Storage Building, National Institute of Building Sciences.Washington, DC.USA.Accessed on 14th August 2012 at http://www.wbdg.org/.

Akotia, P. (2000). Financial Records Management Project: Phase Three. Submitted to the Government of Uganda, 17-28 January. Kampala: DFID: 1-24

Asogwa, B. and Ezema, I. (2012).The Challenges of Preservation of Archives and Records in the Electronic Age.Unpublished.

Ayoku, A.O. (2008). Transition to automated library information systems and the challenges for libraries in Africa. In Aina, L.O., et al. (Eds.) Knowledge and information management in the digital age: Concepts, technologies and African perspectives. Ibadan: Third World Information Service.

Banks, P. N. (1999) Overview of Alternative Space Options for Libraries and Archives, U.S. National Archives and Records Administration, USA

Bellardo, L. and Bellardo, L.(1992). A glossary for Archivists, Manuscript Curators, and Records Managers.Chigago.Society of American Archivists.Availlable at: http://www.worldcat.org(accessed on 12/02/2013).

Besser, Howard (2000).Digital Longevity, in Maxine Sitts (ed.) Handbook for Digital Projects: A Management Tool for Preservation and Access, Andover, MA: Northeast Document Conservation Center, pages 155-166.

Besser, Howard (2001).Digital Preservation of Moving Image Material.Retrieved on 5/2/2014 from http://www.gseis.ucla.edu/~howard/ , http://sunsite.berkeley.edu/Longevity/

Boote, D. N., Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. Educational Researcher, 34(6), 3-15.

Braun, V. and Clarke, V. (2006).Using thematic analysis in psychology.Qualitative Research in Psychology 3 (2). pp. 77-101. Retrieved on 5/2/2014 from: http://eprints.uwe.ac.uk/11735/2/thematic_analysis_revised.

Brian, L. et al (2012). D-Lib Magazine Volume 18 of September/October 2012 Identifying Threats to Successful Digital Preservation: the SPOT Model for Risk Assessment availlable at: http://www.dlib.org/dlib/september12/vermaaten/09vermaaten.html(Accessed on 1/4/2013)

Brink, H.I.L. (1993).Validity and Reliability in Qualitative Research. Retrieved on 23/07/2014 from www.curationis.org.za/index.php/curationis/article/download/.../1350

British Standard Institute, London (1973). Recommendations for repair and Allied Processes for the conservation of documents: Part 1. Treatment of sheets, membranes and seals. British Standards Institute, London.

Brown, H. (2003). Preservation microfilming: learning guide. Canberra. National Library of Australia.

Bush, T. (2007). Authenticity in research – reliability, validity and triangulation.In Research Methods in Educational Leardership and Management. Retrieved on 5/2/2014 from http://pebblepad.wlv.ac.uk/viewasset.aspx?oid=103268&type=webfolio...

Business Dictionary (2007). Retrieved on 4/07/ 2016 fromhttp://www.businessdictionary.com/definition/effectiveness.html

Chandler, A. (1962).Strategy and Structure: Chapters in the history of industrial enterprise, Doubleday, New York, 1962.

Chapman, P. (1990). Guidelines on preservation and conservation policies in the archives and libraries heritage. Paris: UNESCO, 6.

Clements, D.W.G. (1987).Preservation and conservation of library and archival documents: UNESCO/IFLA/ICA enquiry into the current state of the world's patrimony. Availlable at: http://www.unesco.org/webworld/ramp/htm(Accessed on 10/04/2013)

Clements, D. and Dureau, J. (1986).Principals for the preservation and conservation of library materials, IFLA Professional Reports No. 8 (IFLA and The Library Association, The Hague).

Conway, P. (1996). *Preservation in the Digital World*. Washington, DC: Commission on Preservation and Access.

Cornell University Library (2005). Digital preservation management: Implementing short-term strategies for long-term problems. Retrieved on 30/5/2010 from http://www.library.cornell.edu/iris/tutorial/dpm/eng_index.html

Creswell, J.W. (2002). Research design: Qualitative, quantitative and mixed methods approach (2nd ed.). Thousand Oaks, CA: Sage.

Darling, P. and Ogden, S.(1981). "From Problems Perceived to Programs in Practice: The Preservation of Library Resources in the USA, 1956-1980." Library Resources and Technical Services 25: 9-29.

Davis, S. (2004). Looking back to the future: 30 years of keeping electronic records in the National Archivesbof Australia. Canberra: National Archives of Australia.

Dianne, V. (1993). Delta Plan Model of preventive conservation strategies in North Americahttps://www.si.edu/mci/english/professional_development/past_courses_programs/programs/relact_pcsna.html(Accessed on 11/11/12).

Drogin, M. (1983).Medieval scribes and the history of book curses. New Jersey: Allanheld, Osmun& Co.

Elatoroti, D. F. (1990).Developing a school library media center. Ibadan: Onibonoje Press and Book Industries: 76.

ESARBICA, (2002).Minutes of ESARBICA executive board meeting held at the Mountain Inn, Mbabane, Swaziland, 11-13 March 2002 http://libres.Curtin.edu.au/ vol 18 issue 2 September 2008.

Feather, J. (1996).The Preservation and the Management of Library Collection. The Library Association, London.

Freedman, L. (2013).Strategy.Oxford University Press.Available at: http://www.gloucestershire.gov.uk/media/ /policy.pdf. (Accessed on 11/04/2013)

Futernick, R (2011).Leaf Casting on the Suction Table The American Institute for Conservation Retrieved on 03/8/2012 from http://cool.conservation-us.org/coolaic/sg/bpg/annual/v01/bp01-14.html

Ghemawat, Pankaj (Spring 2002). "Competition and Business Strategy in Historical Perspective".Business History Review (Harvard Business Review).

Giles, L. (2007).The Art of War by Sun Tzu - Special Edition.Special Edition Books.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. The Qualitative Report, 8(4), 597-606. Retrieved 5/4/14, from http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf

Government Of Kenya, Ministry of State for National Heritage and Culture Draft Strategic Plan 2008-2012.

Government Of Kenya: Public Archives and Documentation Service Act, Cap 19 of the Laws of Kenya 1965 revised edition 2003.

Hadgraft, N (1991). Conservation in Kenny G. (ed) (1991), A reading guide to the preservation of Library Collections, Library Association Publishing Ltd, London.

Hardon, A., Hodgin, C. &Fresle, D. (2004). How to investigate the use of medicines by consumers: World Health Organization and University of Amsterdam. Retrieved on 16/6/2015 from: http://apps.who.int/medicinedocs/en/d/Js6169e/

Harvey, R. (1993). Keeping archives: Preservation. Port Melbourne, Victoria: Thorpe. The Australian Society of archivists.

Heft, T. (2010). Leaf-casting. Eclipse Paper Conservation. Retrieved on 15/11/15from www.eclipsepaper.com

Henderson, B. (1981). "The Concept of Strategy."Boston Consulting Group.

Heslop, H., Davis, S. & Wilson, A. (2002).An approach to the preservation of digital records. Canberra: National Archives of Australia.

IN SITU · Museum & Archive Services (2016) Leaf-casting Materials & Equipment for the Conservation, Restoration & Preservation of Antiquities & Works of Art, Greece.www. insituconservation.com accessed on 15/11/18

International Records Management Trust (IRMT) (1999). Preserving records: A training Programme.Retrieved on 20/1/2012 from: http://www.irmt.org.

International Standards Organization (2009).ISO TC 46/SC 11 N912: 2009. Information and Documentation - Records Management Systems-Fundamentals and vocabulary, ISO, Geneva.

International Standards Organization (2001). ISO 15489-1:2001. Information and Documentation: Records Management Standard. ISO, Geneva.

Jayakumar, K. (2006). Repair and Preservation of Records.national Archives of India, government of India Press,Faridabad.

Jefcoate, G. (2003). Preservation or access: Developing strategies for microfilming and digitisation. Munich, Germany: Liber Quarterly13:103-112.

Jenkinson, H. (1980). *A manual of archives administration*. London: Percy Lund, Humphries & Co. Ltd.

Jones,A. (2002). Preservation at the National Archives. Retrieved on 7/2/2013 fromhttp://www.archives.gov/preservation

Joppe, M. (2000).The Research Process.Retrieved 7/2/2013 from http://www.ryerson.ca/mjoppe/rp.htm.

Kathpalia,Y.(1973). Conservation and restoration of archives materials, Documentation, Libraries and Archives Studies and Research Vol. 1 Unesco, Paris.

Kathpalia, Y. (1978). Conservation and restoration of archives: a survey of facilities National Archives of India, Government of India Press,Faridabad.PGI-78/WS/14.

Kemoni, H. (1996). Preservation and conservation of archival materials: The Case of Kenya. African Journal of Library, Archives and Information Science Vol. 6, No. 1,46-51.

Kemoni, H. &Wamukoya, J. (2000).Preparing for the management of electronic records at Moi University, Kenya. African Journal of Library, Archives and Information Science 10(2) 125-138.

Kenya Bureau of Standards KNA/1/43

Kenya National Archives and Documentation Service Briefs to the Principal Secretary KNA/1/71.

Kenya National Archives and Documentation Service Charter 2009.

Kenya National Archives and Documentation Service Conservation Section Annual Reports (2007/2012).

Kenya National Archives and Documentation Service Conservation Section Procedures Manual 2011.

Kenya National Archives and Documentation Service Draft Strategic Plan (2008-2012)

Kenya National Archives and Documentation Service Conservation Section Registers (2007-2012).

Kenya National Archives and Documentation Service Conservation Section Survey Reports2011-2012 KNA/ 7/11.

Kenya National Archives and Documentation Service Progress Reports KNA/1/32

Kothari, C. R. (2004). Research methodology: Methods and techniques. New Delhi: New Age International (p) Limited Publishers.

Matwale, G. M. (1993). A review of problems related to the establishment of effective conservation programmes for libraries and archives materials in Kenya. Pan AfricanConference on Preservation and Conservation of Library and Archival materials. Nairobi, Kenya: IFLA

Mazikana, P. C. (1993). An evaluation of preservation and conservation programmes and facilities in Africa. International Federation of library Association (IFLA). Pan African Conference on Preservation and Conservation of Library and Archival materials. Nairobi, Kenya: IFLA

Mayoux, L. (2012). Quantitative, Qualitative or Participatory. Retrieved on 10/6/2015 from www.cbs.dk/.../ qualitative-methods-in-development

McMillan, J. H., & Schumacher, S. (2006). Research in education: Evidence-based inquiry. (6th ed.). Boston: Pearson education.

McNamara, C. (1999). General Guidelines for conducting interviews. Available online at: http://managementhelp.org/businessresearch/interviews.htm

Mintzberg, H. (1998). 5Ps of Strategy.Retrieved on 15/11/15 from: http://www.mindtools.com.

Mintzberg, H. Ahlstrand, B. and Lampel, J. (1998).Strategy Safari : A Guided Tour Through the Wilds of Strategic Management, The Free Press, New York.

Mintzberg, H. and, Quinn, J. (1996).The Strategy Process:Concepts, Contexts, Cases.Prentice Hall.

Mirjam, M. (2001).Building blocks for a preservation policy.Availlable at:www.bl.uk/blpac/pdf/blocks.pdf (Accessed on 10/4/2013).

Mnjama, N. &Wamukoya, J. (2004).E-government and e-records management. Paper Presented at the SADC workshop on E-government, Gaborone, Botswana 14-16 April 2004

Mowery, F. (2018).Leaf casting machines.Museum Services Corporation Minnesota USA. Retrieved on 2/1/2019 from www.museumservicescorporation.com

Mugenda, O.M. and Mugenda, A.G. (2003). Research methods: Quantitative and Qualitative Approaches. ACT, Nairobi.

Muhammed, M. and Rowshon, A. (2008).Preservation of Archives.Availlable at: ir.inflibnet.ac.in.(Accessed on 10/4/2013)

Musembi, M. (1984), Archives Management: The Kenyan Experience: Africa Book Services (E.A) LTD. QuaranHse. Mfangano Street.

Musembi, M. (1999). Managing public sector records: Development of conservation facilities in the Kenya National Archives and Documentation Service: A case study. London: International Records Management Trust.

National Archives of Australia, (2007).The Preservation Policy.Retrieved on 11/4/2013 from:www.nationalarchives.gov.uk/documents/preservation_pol.pdf.

National Archives of Nigeria (1985). National Archives of Nigeria: Its purpose, development and functions.

Ngulube, P. (2001). Guidelines and standards for records management education and training: A model for Anglophone Africa.

Noble, H. and Smith, J. (2012). Issues of validity and reliability in qualitative research: Queens's University Belfast, UK. Rerieved 16/10/2014 from: http://ebn.bmj.com/content/18/2/34.full.

Nottinghamshire Archives (2007): Preservation and Conservation Policy. Retrieved on 10/4/2013 from: www.nottinghamshire.go.uk/EasysiteWeb?getresource.

Ndung'u, H. (2004). Preservation and Conservation of information materials: Unpublished.

Ogden, S. (1999). Preservation of library and archival materials: Amanual and over, MA: Northeast Document Conservation Center. Availlable at: http://www.nedcc.org(accessed on 18/01/2013).

Olatokun, M. (2008).A survey of Preservation and Conservation Practices and Techniques in Nigerian Universities, Libraries.Availlable at: http://libres.curtin.edu.au. (accessed on 25/02/13).

Olatokun, M. (1985).Enguiry into the current state of worlds patrimony. Availlable at: unesdoc.unesco.org. (accessed on 25/02/13).

O'Leary, Z. (2014). The Essential Guide To Doing Your Research Project (2nd ed.). London UK: Sage.

O'Toole, James M. (1989). "On the Idea of Permanance. "The American Archivist 52.

Oxford dictionary (2007).Retrieved on 4/7/2016 fromhttp://www.oxforddictionaries.com/definition/english/effectiveness.

Patkus, B. (2003). Assessing preservation needs: A self surveyguide.Available at: http;//www.nedcc.org/resources/downloads/.(Accessed on 17/3/2013).

Patton, M. (2002). Qualitative research and evaluation methods, thousands Oaks California: sage publications.

Pederson, A. (1993). Keeping archives: User education and public relations. Port Melbourne, Victoria: Thorpe. The Australian Society of Archivists.

Perti R. K. (1991). Guide to restoration of documents. National Archives of India, Government of India Press,Faridabad.

Popoola, S. (2003).Preservation and Conservation of Information Resources. University of Ibadan, Nigeria: Distance Learning Centre.

Porter, M.E. (1980). Competitive Strategy.Free Press.

Rhys-Lewis, J. (2000). Conservation and Preservation Activities in Archives and Libraries in Developing Countries.An Advisory Guideline on Policy and Planning.Available at http://www.conservationresources.com (accessed on 20/4/2012).

Ritzenthaler, M.L. (1993). Preserving archives and manuscripts. Chicago: Society of American Achivists.

Roberts, D. (1993). Keeping archives: Managing records in special formats. Port Melbourne, Victoria: Thorpe. The Australian Society of Archivists.

Rumelt, R.P. (2011). Good Strategy/Bad Strategy. Crown Business.

Saunders M., Lewis P. and Thornhill A. (2003). Research methods for business students: Prentice Hall, Harlow.

Schellenberg, T.R. (1965). Modern archives: Principles and techniques. Melbourne: F.W. Cheshire.

Schellenberg, T.R. (1985). The management of archives. Washington DC: National Archives and Records Management.

Schwirtlich, A. (1993). Keeping archives: Getting organised. Port Melbourne, Victoria: Thorpe. The Australian Society of Archivists.

Scottish Council on Archives discussion on 18th March 2012. Available at https://www.scottisharchives.org.uk/wp-content/uploads/2018/10/Issue-20_Nov-2012.pdf(accessed on 10/6/2013).

Shep, S. (2006).Preservation management for libraries, archives and museums. New York: Neil-Schuman Publishing.

Silas, B. (2018).Access to and use of information in Mukuru and Kangundo digital villages, Kenya.Moi University.

Smith W. (1971). Archives in developing countries; A contribution to national development. Society of American archivists. San Francisco.

Smith, A. (2004). Archives policy for Northern Ireland, Consultation Document and Marketing Strategy for the Public Records office of Northern Ireland.

Strauss, A., & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage Publications, Inc.

Swan, A. (1981). Conservation of photographic print collections. Library Trends 30 (2).

Tangco, D.C. (2007. Purposive sampling as a tool for informant selection: Ethnobotany Research and applications. Retrieved on 20/11/12) from http://journals.sfu.ca/era/index.php/era/article/viewFile/126/111.

UNESCO (2000).Safeguarding our documentary heritage.Availlable at: webworld.unesco.org(Accessed on 20/11/12).

US Library of Congress (2003).US Congress Approves Library of Congress Plan for Preservation of Digital materials. Retrieved on 10/6/2008 from http://www.loc.gov/today/pr/2003/03-024.html

Vermaaten S., Lavoie B. and Caplan P. (2012).Identifying Threats to Successful Digital Preservation: The SPOT Model for Risk Assessment. D-Lib Magazine Volume 18, Number 9/10.Retrieved on 6/11/2013 from doi:10.1045/september2012-vermaaten http://www.dlib.org/dlib/september12/vermaaten/09vermaaten.html.

Walsh, D. (2006). The preservation of film and video: Paper presented at the Baltic Audiovisual Archival Seminar, Riga, Latvia.

Wamukoya, J &Mutula, S. M. (2005).E-records management and Governance in East and Southern Africa. Malaysian Journal of library and Information science 10(2) 67-83

Wikipedia, the free encyclopedia (2007).Retrieved on 15/7/2013 fromhttps://en.wikipedia.org/wiki/Effectiveness.

Wikipedia, the free encyclopedia (2007).Retrieved on 15/7/2013 fromhttps://en.wikipedia.org/wiki/Strategy.

Wilson, A.(2012). Masters of War:History's Greatest Strategic Thinkers.The Teaching Company.

Wordnet (2009).A lexical database for the English language.Availlable at: Wordnet. Princeton.edu/perl/web. (Accessed on 22/4/2012).

Zulu, S.F.C. (1994). Africa's survival plan for meeting the challenges of information technology in the 1990s and beyond.Libri44(1), 63-76.

APPENDICES

Appendix I: Interview Schedule for KNADS Senior Management Staff (Director, Deputy Director and Heads of Divisions)

Section I: General Information

1. Title/designation……..

2. Division …… .....

Section II: Content

3.How does KNADS acquire archival materials?

. . . . . .

. . . . . .

4. How does KNADS preserve and conserve archival materials?

. . . . . .

. . . . . .

5. Does KNADS building provide appropriate housing and environment for storage of archival materials?

…….

……

6. Does KNADS conduct preservation assessment surveys?

. . . . . .

. . . . . .

7. What are the measures taken in management of disasters?

. . . . . .

. . . . . .

8. Does KNADS have a written preservation strategy or policy on preservation and conservation of archival materials?

. . . . . .

. . . . . .

9. If Yes, has the strategy or policy enhanced preservation and conservation of archival materials?

. . . . . .
. . . . . .

10. (a). What are the security measures in place to protect staff, archival materials at KNADS? . . . . . .
. . . . . .

(b). Has there been any breaches of security, thefts, losses, vandalism and so on?

. . . . . .
. . . . . .

(c).Does KNADS haveinsurance against theft or damage and loss of archival materials?

. . . . . .
. . . . . .

11.Has KNADS established institutional standards in preservation and conservation practices?

……
……

12. Does KNADS undertake annual stock taking of thearchival materials?

. . . . . .
. . . . . .

13. Are preservation and conservation practices applied at KNADS effective?

. . . . . .
. . . . . .

14. Are methods, equipment and tools of preservation and conservation appropriate?

……
……

15. What are the challenges encountered in preservation and conservation of archival materials?

……

……

Appendix II: Interview Schedule for Staff in Technical, Custodial and Operational Sections (Conservation Section Excluded)

Section I: General Information

1. Title/designation……

2. Division …… . .....

Section II: Content

3.What are the various formats of archival materials in your section?

. . . . . .
. . . . . .

4.What are the causes of deterioration to these formats of archival materials in your section?

. . . . . .
. . . . . .

5.What are the preservation and conservation practices applied by your section?

. . . . . .
. . . . . .

6. Does KNADS provide appropriate environment for storage of archival materials?

. . . . . .
. . . . . .

7. Does KNADS conduct preservation assessment surveys?

. . . . . .
. . . . . .

8. What packaging and enclosures do you use for storage of archival materials?

. . . . . .
. . . . . .

9 (a).Explain how reformatting of archival materials is done in your section? (for ICT and microfilming sections only).

. . . . . .
. . . . . .

(b).How are the following properties of digital preservation ensured in reformatting of archival materials: Availability, Identity, Persistence, Renderability, Understandability, Authenticity?

. . . . . .
. . . . . .

10. What are the measures taken in management of disasters?

. . . . . .
. . . . . .

11.DoesKNADS have a written preservation strategy or policy on preservation and conservation of archival materials?

. . . . . .
. . . . . .

12.Doesthe strategy or policy enhance preservation and conservation of archival materials?

. . . . . .
. . . . . .

13.What are the security measures in place to protect staff, archival materials at KNADS?

. . . . . .
. . . . . .

14. Has there been any breaches of security: thefts, losses, vandalism and so on? . . . .
. . . . . .
. . . . . .

15. Does KNADS haveinsurance against theft or damage and loss of archival materials?

. . . . . .
. . . . . .

16. Has KNADS established institutional standards in preservation and conservation practices?

. . . . . .
. . . . . .

17.Are you aware of standards in this area and has KNADS adopted or customized them to fit the preservation and conservation needs?

. . . . . .
. . . . . .

18. Does KNADS undertake annual stock taking of its archival materials?

. . . . . .
. . . . . .

19. Are preservation and conservation practices effective?Can you explain?

. . . . . .
. . . . . .

20. What are the tools and equipment used in preservation and conservation in your section?

. . . . . .
. . . . . .

21.Are methods, equipment and tools of preservation and conservation appropriate? Explain?. . . . . .
. . . . . .

22. What are the challenges facing preservation of archival materials in yoursection ?

. . . . . .
. . . . . .

Appendix III: Interview Schedule for Technical Staff at Conservation Section

Section I: General Information

1. Title/designation……

2. Division …….

Section II: Content

3.What are the formats of archival materials conserved in your section?

. . . . . .

. . . . . .

4. What are the causes of deterioration to formats of archival materials that you conserve?

. . . . . .

. . . . . .

5. What methods or practices of conservation do you apply to deteriorated records?

. . . . . .

. . . . . .

6. Are there damaged archival materials that you have not been able to conserve? how many?

. . . . . .

. . . . . .

7. Are the conservation practices or methods you apply effective?Can you explain?

. . . . . .

. . . . . .

8. Does KNADS provide appropriate environment for storage of archival materials?

. . . . . .

. . . . . .

9. Does KNADS conduct preservation assessment surveys?

. . . . . .

. . . . . .

10. What are the measures taken in management of disasters?

. . . . . .

. . . . . .

11.DoesKNADS have a written preservation strategy or policy on preservation and conservation of archival materials?

. . . . . .

. . . . . .

12. Doesthe strategy or policy enhance preservation and conservation of archival materials?

. . . . . .

. . . . . .

13. What are the security measures in place to protect staff, valuable archival materials at KNADS?

. . . . . .

. . . . . .

14. Has there been any breaches of security, thefts, losses, vandalism and so on?

. . . . . .

. . . . . .

15.Does KNADS haveinsurance against theft or damage and loss of archival materials?

. . . . . .

. . . . . .

16. Has KNADS established institutional standards in preservation and conservation practices?

. . . . . .

. . . . . .

17. Are you aware of standards in this area and has KNADS adopted or customized them to fit the preservation and conservation needs?

. . . . . .

. . . . . .

18. Does KNADS undertake annual stock taking of the archival materials?

. . . . . .

. . . . . .

19. What are the tools and equipment used in conservation in this section?

. . . . . .

. . . . . .

20. Are methods, equipment and tools of conservation appropriate? Explain?. . . . . .

. . . . . .

. . . . . .

21. What are the challenges you face in conservation of archival materials?

. . . . . .

. . . . . .

Appendix IV: Observation Checklist – Technical and Custodial Sections

The checklist focused onpreservation and conservation activities in custodial and technical sections which included repositories and storage areas. Using the checklist the buiding environment, storage equipment and condition, potential threats to records, condition of records (extent and nature of deterioration of records), condition of preservation and conservation equipment and how they were used, whether they were working among other issues were observed and recorded as follows;

1. Observe the building environment (internal and external)
2. Observe the storage conditions for various formats
3. Observe packaging and enclosures used for storage of archival materials
4. Check and identify potential threats to records
5. Observe condition of records in terms of nature and extent of deterioration
6. Check preservation and conservation equipment and tools in relation to methods of preservation and conservation practices.
7. Check disaster management equipment in place at KNADS

Appendix V:Research Permit

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THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Rosemary Achando Oluchina
of (Address) Moi University
P.O Box 63056-00200, Nairobi,
has been permitted to conduct research in

Location
Nairobi District
County

on the topic: Assessment of preservation and conservation practices at Kenya National Archives and Documentation Service (KNADS).

for a period ending: 30th September, 2015.

PAGE 3

Research Permit No. *NCST/RCD/13/013/93*
Date of issue *5th August, 2013*
Fee received *KSH. 1000*

Applicant's Signature

For Secretary
National Council for
Science &Technology

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed with-out prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

GPK6055(3mt10/2011

HARAMBEE

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS—see back page)